

Exploring Mobile Market Research

The Impact of SMS and E-Mail Invitations on Outcome Rates of Stationary and Mobile Web Surveys

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List of Abbreviations

AAPOR	American Association for Public Opinion Research
abbr.	Abbreviation
ADM	Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V.
AICR	attention, intention, completion, return
AIDA	attention, interest, desire, action
am	ante meridiem
AMSR	Australian Market and Social Research Society
app	application
approx.	approximately
ARD	Consortium of Public Broadcasters in Germany (Ger. “Arbeitsgemeinschaft der öffentlich-rechtlichen Rundfunkanstalten der Bundesrepublik Deutschland“)
B	logit coefficient of SPSS
B2C	business to consumer
BAKOM	(Swiss) Federal Office of Communications (Ger. “Bundesamt für Kommunikation“)
bc	level of agreement to statements on the benefits and costs of internet usage
BLUE	best linear unbiased estimate
BVDW	German Federal Association of the Digital Economy (Ger. “Bundesverband Digitale Wirtschaft“)
c	constant, e.g. for monetary units
CAGR	compound annual growth rate
CAPI	Computer Assisted Personal Interview
CASRO	Council of American Survey Research Organizations
CATI	Computer Assisted Telephone Interview
CATV	cable television
CD	Cognitive Dissonance Theory
CIA	Central Intelligence Agency

C-OAR-SE	construct definition, object classification, attribute classification, rater identification, scale formation, and enumeration and reporting
CPU	central processing unit
CR	completion rate
CUMRR	cumulative response rate
d	standardized mean difference d (e.g. Cohen's d)
df	degrees of freedom
DGOF	German Society for Online Research (Ger. "Deutsche Gesellschaft für Online-Forschung")
DPW	days per week
DSL	Digital Subscriber Line
DV	dependent variable
DVA	Dummy Variable Adjustment
ea	level of agreement to statements on the ease of accessing web surveys
ed. / eds.	editor / editors
EFS	Enterprise Feedback Suite
e.g.	exempli gratia, for example
EM	Expectation Maximization
e-mail	electronic mail
EMS	Enhanced Messaging Service
EPT	Ease of Processing Theories
ESOMAR	European Society for Opinion and Market Research
et al.	et alii (Lat. and others)
etc.	et cetera (Lat. and so on)
eu	frequency of e-mail usage
expgr	experimental group
fake	bogus headphone brand name
FIV	focal independent variable
FTTx	fiber to the x
GDP	gross domestic product

gen	gender
Ger.	German
GPS	Global Positioning System
gr	running index
HSDPA	High-Speed Downlink Packet Access
HSUPA	High-Speed Uplink Packet Access
HTML	HyperText Markup Language
HWFM	Hierarchically Well-Formulated Model
I	complete interviews
iac	Informational Ad Content
IBM	International Business Machines Corporation
id.	ibidem (Lat. in the same place)
IDC	International Data Corporation
iframes	inlineframes
ii	level of agreement to statements on product class involvement in the incentive used (here: tablet PC)
Inc.	incorporated
IO	item omission
ip	level of agreement to statements on the immediate perception
it	level of agreement to statements on product class involvement in the topic of the main study (here: audio headphones)
ITE	iterations
iu	frequency of internet usage
IV	independent variable
k	number of independent variables
K–S test	Kolmogorov–Smirnov test
Lat.	Latin
link	hyperlink
LOA	length of answers
LTE	Long Term Evolution

m	million
MfG	kind regards (Ger. “Mit freundlichen Grüßen”)
MIS	Management Information Systems
ML	Maximum Likelihood
MLE	Maximum Likelihood Estimation
MMR	Mobile Market Research
MMS	Multimedia Messaging Service
MPD	minutes per day
mpfs	Medienpädagogischer Forschungsverbund Südwest
MRMW	Market Research in the Mobile World
MRS	Market Research Society
n	sample size
N	frequency
n/a	not available
NC	non-contacts
NFC	Near Field Communication
O	others
oesp	open ended suspicion probe
OLS	ordinary least square
oq	open questions
OR	odds ratio
OS	operating system
p	p-value
p.	page
P	probability of an event
PAR	participation
PARR	participation rate
PBC	perceived behavioral control
PC	personal computer

PEST	political, economic, social, technological
PI	partial interviews
pm	post meridiem
POS	point of sale
pota	Public Opinion Towards Advertising
pp	level of agreement to statements on the probability to participate in web survey
pp.	pages
prelim.	preliminary
PROR	profile rate
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
q.v.	quod vide (Lat. which see)
QR	quick response
R	refusal and break-offs
RAM	random-access memory
real	real headphone brand name
reco	recommendation
RECR	recruitment rate
resp.	respectively
ROM	read-only memory
RR	response rate
RR5 / RR6	Response Rate 5 / Response Rate 6 (<i>AAPOR 2011</i>)
RT	response time
RTR	(Austrian) Rundfunk und Telekom Regulierungs-GmbH
RWTH	Rhenish-Westphalian University of Technology (Ger. "Rheinisch-Westfälische Technische Hochschule")
SE	standard error

SMS	Short Messaging Service
SPSS	Statistical Package for the Social Sciences
sr	running index
SRB	Survey Response Behavior
S-W test	Shapiro-Wilk (S-W test)
SX	Social Exchange Theory
syn.	synonymous
tac	Transformational Ad Content
TAM	Technology Acceptance Model
TOL	tolerance
TPB	Theory of Planned Behavior
TÜV	Association for Technical Inspection (Ger. “Technischer Überwachungsverein”)
UAE	United Arab Emirates
UMTS	Universal Mobile Telecommunications System
un	frequency of usage of different notification functions
URE	uninformed response error
URL	Uniform Resource Locator
US	United States (of America)
USA	United States of America
var.	variable
VIF	variance-inflation-factor
VoIP	Voice over IP, Voice-over-Internet Protocol
Wald	Wald Statistic
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network
WML	Wireless Markup Language
wpas	willingness to participate in another study
XHTML	Extensible HyperText Markup Language
XHTML-MP	Extensible HyperText Markup Language Mobile Profile

XML	Extensible Markup Language
ZDF	Second German Television (Ger. „Zweites Deutsches Fernsehen“)
-2LL	deviance, -2 LogLikelihood test statistic
∞	infinity
LR- χ^2	likelihood ratio test statistic, model chi-square test statistic
α	rate of type I error
β	rate of type II error
μ	mean
$\tilde{x}$	median
©	copyright
®	registered trademark
σ	standard deviation
ω	Cohen's ω -algebra

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1 Introduction into the Present Study

1.1 Background

Since 1998 (*ADM 2013*) most web surveys have been conducted on devices such as personal computers (PCs) and laptops connected to the stationary internet, e.g. by DSL. Lately there has been a dramatic rise of internet-enabled mobile device sales and, hence, also mobile internet usage worldwide. Mobile devices such as smartphones and tablet computers became a wide-spread daily companion – not only among the German population – frequently used by people to access the internet on the go (*Van Eimeren 2013; Van Eimeren and Frees 2013; Müller 2013*). As a consequence, already now a remarkable share of respondents invited to web surveys started participating on smartphones and tablets via the mobile internet (e.g. *Mavletova 2013, p. 728*). Forecasts indicate that mobile internet penetration will further grow in the near future and eventually overtake the stationary internet by the year 2017 (*PricewaterhouseCoopers 2013*). Consequently, the phenomenon of web surveys conducted on mobile devices will likely become more and more important for both researchers and industry practitioners in the near future.

Unfortunately, not much is known about this relatively new mobile web survey mode until now (*Macer 2012, p. 569*). Moreover, methodological results previously obtained from other survey modes, e.g. stationary web surveys, cannot simply be transferred to this new mobile mode because it is different: Despite their similarity at first sight, looked at it more closely surveys conducted on mobile devices show distinct advantages and disadvantages over those conducted on the stationary internet (*Romano 2009, pp. 249-51*).

In addition, important variables have not yet been examined for mobile web surveys in an appropriate rigorous manner. Here, most importantly the outcome rates of stationary and mobile web surveys – and with it individual level participation and non-participation – have not been compared under well-controlled conditions (*Buskirk and Andrus 2012b, p. 1*). Outcome rates are particularly important for researchers, because high levels of nonresponse may substantially raise the costs of a study and foreclose the application of sophisticated methods of analysis. Furthermore, low outcome rates cause diminishing representativity and high nonresponse error in surveys (*Hoonakker and Carayon 2009, pp. 351-2*).

In this regard, the differentiating impact of the invitation mode on outcome rates – the question whether SMS or e-mail invitations draw more participants in different modes – has been largely overseen in literature. So far, SMS have rather intuitively been associated with mobile devices, such as mobile phones or smartphones, and e-mails with stationary devices, such as PCs or laptops. Hence, SMS invitations have been sent in order to invite panelists to mobile web surveys, and e-mails as invitations to stationary web surveys (*Mavletova 2013, pp. 728-33*). At this, it has been simply assumed that these are the easiest ways to access the respective surveys because subjects do not have to switch with difficulty from one device, which they received the invitation on, to another device, which they take the survey on (*De Bruijne and Wijnant 2013, p. 487*). However, while SMS invitations to web surveys may only be received on mobile devices, it is possible to read invitational e-mails on stationary as well as mobile devices in recent times. Consequently, e-mail invitations may also provide an easy way to access a mobile web survey. Although it has already been shown that invitations sent by e-mail cause higher outcome rates than SMS invitations in stationary web surveys (*Bosnjak et al. 2008, p. 220*), it is still necessary to proof that just the opposite – or, yet possibly the same – holds true for mobile web surveys.

1.2 Objectives of the Present Study

The comprehensive experimental study conducted within the limits of this doctoral dissertation aims at closing this important research gap. It intends to do so by deepening knowledge on survey outcome rates and individual level survey participation. In particular it is researched by means of multivariate hypothesis testing, whether distinct combinations – and, hence, interactions¹ – of invitation and survey modes yield different levels of survey participation. Here, SMS and e-mails serve as invitation modes, whereas, stationary and mobile web surveys make up the survey modes of interest. It is tested whether the anticipated ease of accessing such web surveys moderates the impact of different combinations of invitation and survey modes on participation. At this, hypotheses are based on the Social Exchange Theory (SX) – a popular theory frequently utilized in survey research (*Albaum, Evangelista and Medina 1998, p. 116; Evangelista, Albaum and Poon 1998, pp. 227-44*).

¹ In regard to survey and invitation modes the term “combination” is used synonymously to “interaction” in this thesis.

This study may be regarded as pioneer work in the field of Mobile Market Research (MMR) and considered as best practice in the procedure of comparing stationary with mobile web survey outcome. In addition, aiming to further analyze the field of MMR this study briefly explores other mode differences in stationary and mobile web surveys – e.g. regarding data quality, response time and speed – by means of univariate testing². In this way the present dissertation not only contributes to the continuously growing body of research work on Survey Response Behavior (SRB) and, especially, outcome rates and participation in web surveys, but also to the brand new field of Mobile Market Research (MMR).

1.3 Structure of Presentation

After this brief introduction, an overview of the topic of MMR is given in Chapter 2 of this study. At this, recent trends in stationary and mobile internet usage and the ownership of different web-enabled devices in Germany are depicted³. It is carved out that the rise in mobile device ownership and mobile internet usage might have similar impact on the global market research industry as the introduction of the stationary internet at the end of the last millennium⁴. Moreover, a first systematization of the extensive field of MMR is given⁵. Thereafter, the advantages and disadvantages of different web survey modes will be discussed⁶. At first, focus is put on web surveys to which the largest potential in the market research mass market has been attributed. Here, the advantages and disadvantages of stationary web surveys are highlighted in comparison to other, already established survey modes⁷. Thereafter, the various advantages and disadvantages of mobile web surveys are similarly discussed and compared to stationary web surveys⁸. At this, it is pointed out that mobile web surveys differ from their stationary counterparts. Hence, research results regarding the latter cannot be transferred to the prior and vice versa. Moreover, possible areas of application of MMR are introduced to the reader⁹. Finally, the new field of MMR is identified as an extensive research gap in the large body on survey research literature¹⁰. This gap will then be narrowed down to outcome

² However, due to the limited scope of this study no theoretical reflection and hypotheses testing is conducted regarding the latter variables.

³ Q.v. Section 2.1.

⁴ Q.v. Section 2.2.

⁵ Q.v. Section 2.3.

⁶ Q.v. Section 2.4.

⁷ Q.v. Section 2.4.1.

⁸ Q.v. Sections 2.4.2.1 and 2.4.2.3.

⁹ Q.v. Section 2.4.2.2.

¹⁰ Q.v. Section 2.5.

rates of surveys and individual participation¹¹ as primary research targets in this study. At the end of the chapter a literature review on outcome rates in MMR will be conducted¹². At this, special focus is put on the shortcomings of past studies which this study – as a future best practice – aims to overcome.

Outcome rates are the result of aggregated individual survey participation. Therefore, it is important to present the current “state of affairs” on the topic of Survey Response Behavior (SRB) in the course of Chapter 3. At first, Social Exchange Theory (SX), one of the most popular theories of SRB (*Albaum, Evangelista and Medina 1998, p. 116; Evangelista, Albaum and Poon 1998, pp. 227-44*), which is also applicable to MMR, will be presented to the reader¹³. Most importantly, SX adds to the conceptualization of the research topic as it forms a foundation for the AICR model (*Helgeson, Voss and Terpening 2002*) of SRB¹⁴. Next, the four stages of the AICR model – attention, intention, completion and return¹⁵ – are introduced as a process of survey response. At this, the SX explains how subjects move through the four stages of the process (*Helgeson, Voss and Terpening 2002, p. 312*). Finally, several important factors influencing SRB and, hence, the entire response process, are depicted in three distinct categories: survey design, respondent, as well as situational factors (*Groves, Cialdini and Couper 1992, pp. 477-9*)¹⁶. Later, in the course of data analysis – or evaluation¹⁷ – of the experiment conducted in Chapter 6, several of these variables will enter the estimated Multiple Binary Logistic Regression model as covariates. In this way the second and third chapter of this work will form the scientific foundation for the survey research experiment conducted.

Based on these foundations it is then described in Chapter 4 how a mode experiment has been prepared and conducted in this study. At this, the procedure of the study is divided into two distinct phases: In the first phase, 37,351 panelists have been recruited for the study by means of various recruitment activities¹⁸. In addition a preliminary study – which aimed to draw up anonymous profiles of respondents – has been conducted with all panelists “hired” within the

¹¹ Q.v. Section 2.6.1.

¹² Q.v. Section 2.6.2.

¹³ Q.v. Section 3.1.

¹⁴ Q.v. Section 3.2.

¹⁵ Q.v. Sections 3.2.1 to 3.2.3.

¹⁶ Q.v. Sections 3.3.1 to 3.3.3.

¹⁷ In this thesis “evaluation” is used as a synonym for “data analysis”.

¹⁸ Q.v. Section 4.2.

limits of recruitment¹⁹. Variables measured in the preliminary study will serve as independent variables in the course of evaluation.

After the preliminary study finished procedures of data cleaning were applied for the first time in this study²⁰. In this way a high quality of data used has been ensured. With a small pretest sample of 600 panelists²¹ drawn from the cleaned preliminary sample frame of 10,311, a pretest²² has been conducted to gain first insights on expected effect sizes.

Subsequently, in the second phase of the study – the main study – the remaining 9,711 recruited panelists were pre-notified and then invited to participate in web surveys as part of a mode experiment²³. Here, both the mode in which invitations were sent to panelists²⁴ as well as the mode the survey was conducted in²⁵ both have been manipulated at two levels. Participation measured in the course of the main study served as dependent variable during the evaluation phase. Here, outcome rates – in particular participation rates – were operationalized as the most important dependent variable used in this study²⁶. Other dependent variables – e.g. data quality and response speed – were made measurable as well, but did not constitute the primary objective of this study²⁷. Moreover, several independent variables measured in the preliminary study – among others the anticipated ease of accessing web surveys in different modes, which later served as a moderator of participation – were operationalized²⁸ here as well.

After pre-notifications have been sent out the dataset was cleaned for a second time by removing all delivery failures²⁹. Missing values in the remaining datasets were then replaced by means of the Expectation Maximization (EM) algorithm³⁰. In addition, data cleaning procedures³¹ were applied for a third time. In particular all datasets which failed an open end suspicion probe or showed suspicious, unwanted user agent strings were removed after the main study survey ended. Finally, running a Multiple Binary Logistic Regression Analysis multi-

¹⁹ Q.v. Section 4.3.

²⁰ Q.v. Section 4.3.2.

²¹ 600 panelists were drawn from the preliminary sample frame (before pre-notification) of which only 536 were left after further procedures of data cleaning and outlier removal had been applied.

²² Q.v. Section 4.4.

²³ Q.v. Section 4.5.

²⁴ SMS or e-mail invitations.

²⁵ Stationary or mobile web surveys.

²⁶ Q.v. Section 4.5.3.1.1.

²⁷ Q.v. Section 4.5.3.1.2.

²⁸ Q.v. Section 4.5.3.2.

²⁹ Q.v. Section 4.5.4.1.

³⁰ Q.v. Section 4.5.4.2.

³¹ Q.v. Section 4.5.4.3.

variate outliers were also deleted³² by means of studentized residuals, Cook's Distance (Cook's D) and DfBeta computation. Thereafter, the remaining total final sample frame of 9,004 panelists was described in detail. In this sample frame 8,468 panelists were designated for the evaluation and holdout sample³³ out of which an optimum sample size of 5,124 panelists was then randomly drawn for the purpose of evaluation³⁴. Hence, 3,344 remained for holdout validation. The optimum size of the evaluation sample has been previously calculated based on the results of the aforesaid pretest³⁵. At this, the effect sizes presumed for this study were determined and, subsequently, used in order to calculate the optimum sample size³⁶ for the evaluation of hypotheses by means of Multiple Binary Logistic Regression Analysis. It is important to carefully plan the necessary sample size appointed in an experiment beforehand, in order to solely unveil meaningful effects and determine whether they are interpretable (*Rasch et al. 2009, pp. 77-86*).

Then, in the course of Chapter 5 different hypotheses which will be guiding subsequent research will be derived from a combination of SX (*Blau 1964; Dillman 1978; Homans 1961; Thibaut and Kelley 1959*) and practical deliberations on panelists' data³⁷ – in particular in regard to their anticipated ease of accessing a survey. First, two separate hypotheses about the impact of survey and invitation mode on survey participation were derived³⁸. Thereafter, further six hypotheses deal with the impact of different experimental groups, which constitute a combination – and, hence, an interaction³⁹ – of different survey and invitation modes, on participation^{40 41}.

Subsequently, all data previously collected will be analyzed in Chapter 6. At first – among other types of potentially relevant dependence analyses – the choice of a Multiple Binary Logistic Regression Analysis will be justified as appropriate evaluation method⁴². Thereafter, the

³² Q.v. Section 4.5.4.4.

³³ Q.v. Section 4.6; Final sample frame + final pretest sample = 8,468 + 536 = 9,004.

³⁴ Q.v. Section 4.7.

³⁵ Q.v. Section 4.4.

³⁶ Q.v. Section 4.7.

³⁷ Because the hypotheses derived here are partly based on panelists' data illustrated in the sample description it is important to mention at this point that this chapter is intentionally not placed subsequent to the theoretical Chapters 2 and 3.

³⁸ Q.v. Section 5.1.

³⁹ In regard to the four experimental groups the term “combination” is used synonymously to “interaction” in this thesis.

⁴⁰ Q.v. Section 5.2.

⁴¹ Additionally, hypotheses regarding the impact of an interaction between experimental groups as well as the anticipated ease of accessing variables on participation were tested in Annex CXIII.

⁴² Q.v. Section 6.1.1, e.g. Contingency and Discriminant Analyses.

method itself will be introduced and described⁴³. Here, special focus will be put on the sophisticated interpretation effects⁴⁴. Moreover, the requirements for conducting a Multiple Binary Logistic Regression Analysis without methodological distortions will be presented, tested, and – in case violated – healed⁴⁵.

Furthermore, in the end of this chapter, the evaluation results will be presented⁴⁶. At first, focus is solely put on outcome rates and, hence, participation as the primary dependent variable in this study. Here, the analysis conducted may be divided into two sections: univariate analyses⁴⁷ and multivariate Multiple Binary Logistic Regression Analyses^{48 49}. Additionally, several variables of secondary interest⁵⁰ were analyzed by means of univariate testing⁵¹ with the sample of 1,487 (of 5,124) panelists who completed the main study survey.

Finally, Chapter 7 comprises a summary of all study results obtained⁵² as well as their limitations⁵³. The following Figure 1-1 gives an overview of the fundamental proceeding in the course of this doctoral thesis handed in at the Chair of Marketing at RWTH Aachen University in the autumn of 2014.

⁴³ Q.v. Section 6.1.2.1.

⁴⁴ Q.v. Section 6.1.2.2.

⁴⁵ Q.v. Section 6.1.3.

⁴⁶ Q.v. Section 6.2 and 6.3.

⁴⁷ Q.v. Section 6.2.3.1.

⁴⁸ Q.v. Sections 6.2.3.2.1 and 6.2.3.2.2.

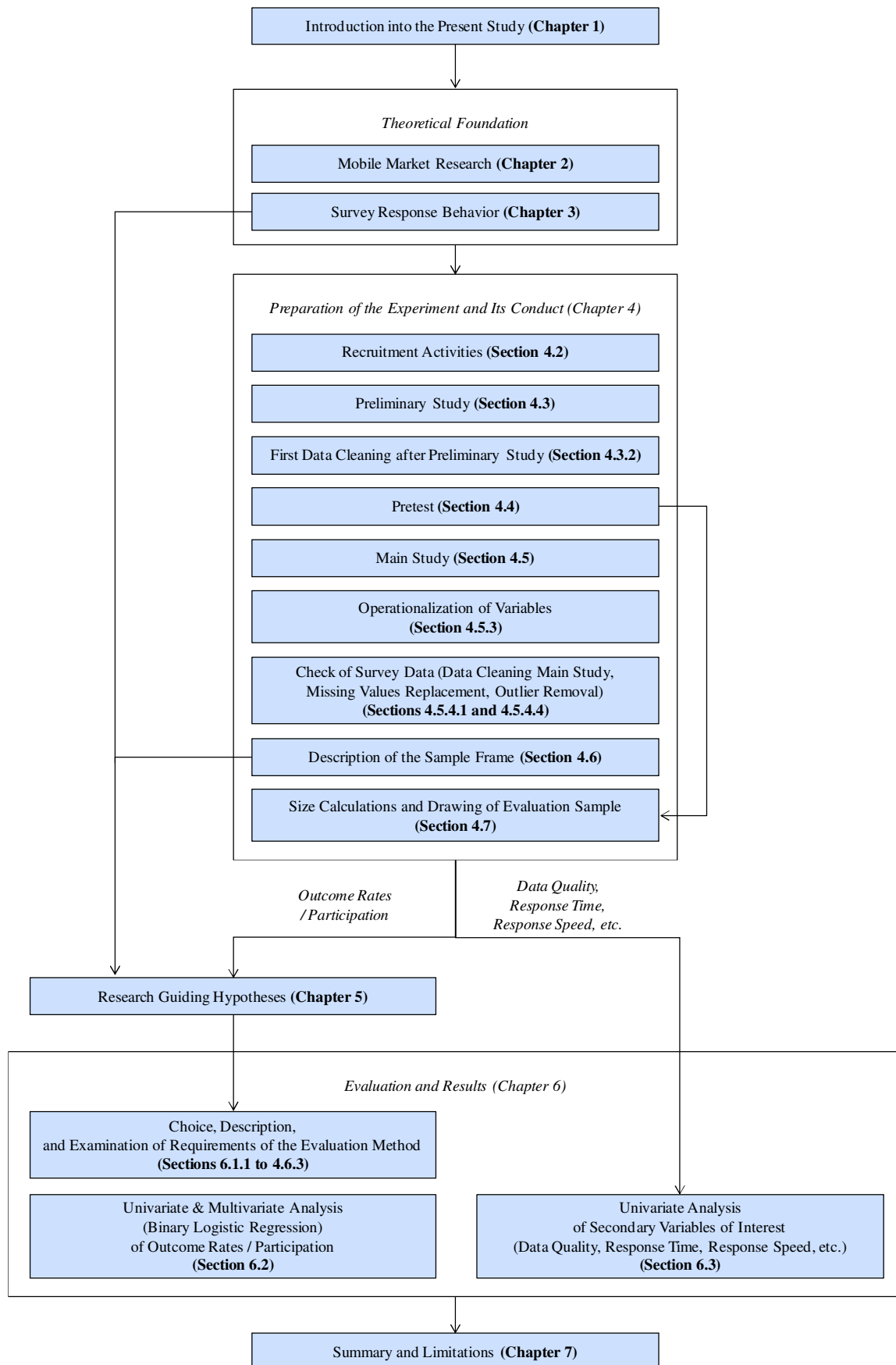
⁴⁹ Furthermore, results of a Multiple Binary Logistic Regression Analyses with interaction terms were reported in Annex CXIII.

⁵⁰ Data quality, response time, response speed, etc..

⁵¹ Q.v. Section 6.3.

⁵² Q.v. Section 7.1.

⁵³ Q.v. Section 7.2.

Figure 1-1: Scaffold of Study Procedure

2 Mobile Market Research

2.1 Recent Trends in Mobile Internet Usage and Device Ownership

The internet becomes increasingly ubiquitous. According to Van Eimeren and Frees (2013, p. 358) the World Wide Web has developed from a medium solely used by elite minorities in the mid-nineties to the fastest spreading medium since decades. It reaches major parts of the global population now. This development holds true for Germany, the largest European economy in terms of GDP (CIA 2014), just as well: A recent annual Online Study jointly conducted by ARD and ZDF – the two largest German public TV broadcasters – (Van Eimeren 2013; Van Eimeren and Frees 2013; Müller 2013) indicates that the number of Germans above the age of 14 which access the web at least occasionally has substantially increased from 4.1 m to 54.2 m from 1997 to 2013. This equals a compound annual growth rate (CAGR) of 17.51%. At the same time the share of internet users among the German population rose from 6.5% to 77.2% (Van Eimeren and Frees 2013, p. 359). This rapid increase was mainly due to an excellent supply of consumers with attractive, easy to use devices, affordable internet access (e.g. so called flat rates), and interesting web content (*Id.*, p. 358).

However, despite high growth rates in the past, the share of internet users within the German population is stagnating recently: Their number increased by only .8 m in 2013 (CAGR=1.5%) (*Id.*, p. 359). In this context the authors of the aforementioned study claim that the largest growth potential of younger age groups, which are highly interested in the internet, is largely exhausted by now (*Id.*, p. 359). For instance, approximately 95.5% to 100%⁵⁴ of people between the age of 14 and 39 and 82.7% to 88.9%⁵⁵ between 40 and 59 years of age are already online. Consequently, nowadays further growth can only be obtained with less web-affine, elder age groups above the age of 60 of which currently only 42.9% are online (*Id.*, p. 360). Nevertheless, recent forecasts predict that approximately 82 to 85% of Germans will be “online” in 2018 (*Id.*, p. 360).

While the number of internet users is stagnating the amount of time they spent online has vastly increased during the last year. The time span which German internet users were online was stagnating at an average of 135.5 minutes per day (MPD) not too long ago between 2009

⁵⁴ This is 100% of people between the age of 14 to 19, 97.5% between 20 and 29, and 95.5% between 30 and 39 (Van Eimeren and Frees 2013, p. 360).

⁵⁵ This is 88.9% of people between the age of 40 and 49, and 82.7% of people between 50 and 59 (Van Eimeren and Frees 2013, p. 360).

and 2012 (CAGR=-.74%). However, most recently online retention times vastly increased from 133 MPD in 2012 to 169 MPD in 2013 (CAGR=27.07%). More than this, growth was even a multiple thereof greater within the segment of the 14 to 29 year olds. Here, internet usage boomed from 168 MPD to 237 MPD within the same time span (CAGR=41.07%) (*Id.*, p. 361). Already now this particular age group spends more time on the internet than in front of the television or other media (*Id.*, p. 370). Moreover, the average intensity of usage is likely to further increase in the future as approximately 43% of these internet users still only use the internet occasionally (*Id.*). As a reason for this recent development of online retention times Van Eimeren and Frees (2013, p. 362) claim that web usage on mobile devices – such as smartphones and tablets – as well as internet usage “on-the-go” are currently booming.

Table 2-1: Device Ownership among German Onlines in 2012 and 2013

<i>internet enabled mobile devices</i>	<i>2012</i>	<i>2013</i>	<i>CAGR</i>
smartphones (Apple iPhone and others) ⁵⁶	n/a ⁵⁷	56%	n/a
Apple iPhone	12%	22%	+83.33%
other smartphone brand	21%	42%	+100.00%
tablet PC (Apple iPad and others)	8%	19%	+137.50%
Apple iPad	4%	11%	+175.00%
other tablet PC brand	4%	9%	+125.00%

German onliners above the age of 14 (2013: n=1,389, 2012: n=1,366) (*Van Eimeren 2013, p. 387*). Own CAGR calculations. Onliners may own several internet enabled mobile devices.

Many internet users recently bought mobile devices. As Table 2-1 shows, in total 56% of German onliners owned at least one smartphone in 2013. Here, the share of owners of an Apple iPhone has increased from 12% in 2012 to 22% in 2013 (CAGR=83.33%) and the share of those owning other smartphone brands among all onliners increased from 21% to 42% during the same time span (CAGR=100.00%) (*Van Eimeren 2013, pp. 386-7*). At this, the consumers' decision to purchase a modern mobile phone was mostly driven by the availability of attractive new devices (as e.g. the launch of the Apple iPhone in 2007 and several of its variations in the following years), interesting web content (e.g. Social Media) and mobile applications in online app stores (e.g. WhatsApp), as well as the fast expansion of mobile broadband

⁵⁶ Onliners may own multiple devices.

⁵⁷ Unfortunately, aggregated smartphone ownership shares were not published for 2012.

networks with cheaper tariffs (e.g. so called flat rates) (*Busse and Fuchs 2009, p. 217; Cape, P. 2013, p. 50; Van Eimeren 2013, p. 388; Tjostheim 2009, p. 186; Thunig 2009, p. 24*).

In the long run, industry experts expect mobile internet penetration rates to equal the rates of regular phone usage (*deBruijne and Wijnant 2013, p. 483*). All the same, Freese and Ludwig (*2013, p. 34*) noted a steady increase in the distribution of mobile devices among the population and, therefore, also their growing relevance for the discipline of Marketing. For instance, internet vanguard Google Inc. increased its mobile internet ad revenue share from 38.11% in 2011 to 53.36% in 2013 (CAGR=18.12%). Similar increases have been noted for Facebook Inc. (*Beiersmann 2013*). Moreover, with the massive rise of device sales also smartphone usage boomed in recent years. While only 8% of onliners accessed the internet on such devices in 2008 their number has vastly increased to a share of 45% in 2013 (CAGR=41.26%) (*Van Eimeren 2013, pp. 386-7*). At the same time the share of tablet PC owners among German onliners increased from 8% in 2012 to 19% in 2013 (CAGR=100.00%). Currently 16% of onliners use a tablet to access the internet (*Id. 2013, p. 387*).

An average German household owned 5.3 web-enabled devices in 2013 of which 2.5 were used on a regular basis (*Id., p. 386*). In particular, 76% of internet users above the age of 14 owned a PC and 74% a laptop. However, internet usage on PCs is slowly declining. While 85% of onliners accessed the internet on such devices in 2008 only 70% did so in 2013 (CAGR=-3.81%). Most recently Gartner (*2014*) reported that combined global PC and laptop sales remarkably dropped by 6.9% compared to the previous year due to increasing smartphone and tablet sales in the fourth quarter of 2013. In contrast, the share of onliners who accessed the internet on a laptop increased from 40% to 67% during the same time period (CAGR=10.87%) (*Van Eimeren 2013, p. 387*).

It is highlighted by Van Eimeren (*2013, p. 386*) that the usage of web-enabled devices is no more a question of “either this or that device”. Onliners rather use multiple devices and specialize in using them selectively on certain occasions and locations. Due to their larger screen sizes and immobility PCs, for instance, are only used at home mostly for work related purposes (*Müller 2013, pp. 411-3*). Meanwhile smartphones are most frequently used on-the-go for the purpose of messaging, reading news, playing music or games, for minor search engine request, and as a navigation device (*Müller 2013, p. 413; Van Eimeren 2013, p. 390*). The latter devices are particularly relevant for those internet users which now may use the internet

at places – e.g. on public transportation or in the office – they either were not able or allowed to use it for private purposes before then (*Müller 2013, p. 411*)⁵⁸.

In this way, the share of German internet users above the age of 14 which use the mobile internet on-the-go vastly increased from 23% in 2012 to 41% in 2013 (CAGR=78.26%) (*Müller 2013, pp. 413-4*). Moreover, the frequency and length of internet usage of onliners who accessed the internet on mobile devices surpasses the figures for onliners which did not do so. In particular onliners accessed the web using mobile devices on 6.3 DPW and 208 MPD. In comparison those that did not, used it on 5.1 DPW and 122 MPD only (*Id., p. 387*). Consequently, for many German onliners the smartphone most recently became a personal “mate” accompanying them all day long (*Müller 2013, pp. 410-1; Tjostheim 2009, p. 185*) and a part of their personality. Therefore, mobile communication quickly rose to establish itself as an unavoidable factor deeply integrated into our daily life (*Maxl 2009, p. 11*).

The aforementioned development of internet usage on stationary devices had a severe impact on the development of the German market research industry since 1998. Therefore, those past developments will be displayed in a nutshell in the course of the following section. Drawing parallels from the impact of past technological developments the recent increase in ownership of and internet usage on mobile devices may likely have similar consequences for the German market research industry in the near future. Finally, it has to be stressed that the development of mobile communication and mobile internet usage is not limited to Germany only but increasingly a worldwide phenomenon (*Okazaki 2007, pp. 651-2*). In particular it is not limited to highly developed, but also to middle- and low-income countries (*Van Heerden et al. 2013, p. 6*). Therefore, further research in this field is not only important but much-needed and might even become unavoidable soon.

2.2 Impact of Recent Trends on German Market Research Industry

The previously depicted furious growth of the internet caused wide-ranging, fundamental changes in the market research industry. German market research institutes – which until then mostly conducted quantitative studies by means of personal interviews as well as surveys with paper and pencil – suddenly started substituting both by self-administered web surveys. This

⁵⁸ However, mobile devices are not only frequently used on-the-go but also at home as they do not constrain the users’ freedom of movement while being online (*Van Eimeren 2013, p. 389*). For instance, it has been reported that mobile devices are frequently used parallel to watching television as a so called “second screen” (*Müller 2013, pp. 413-4*).

sudden change primarily occurred because the majority of tests and research previously conducted offline could be transferred to the more cost efficient and faster online mode now (*Forster 2009, p. 22; Tjostheim 2009, pp. 184-6; Zerr 2003, pp. 12-4*)⁵⁹. Furthermore, as it is explained in the previous section, the internet has been adopted by large parts of the population by then. At the same time this new mode profited from decreasing response rates due to a lack of respondents' motivation to participate in traditional survey methods and their overload with offline advertizing contacts (*Maxl 2009, p. 11*), e.g. by landline telephones.

Consequently, the share of studies conducted by means of personal interviews with interviewers using paper and pencil among all studies conducted continuously declined from 34% in 1998 to 6% in 2012 (CAGR=-11.65%). All the same, the share of self-administered paper and pencil surveys almost diminished from 28% in 2001 to 6% in 2007 (CAGR=-22.64%). On the contrary, the share of web surveys conducted grew from 1% in 1998 to 35% in 2012 (CAGR=28.91%). In some countries web surveys have even substituted telephone surveys (*Tjostheim 2009, p. 184; Townsend 2005, p. 40*), however, this has not happened in Germany yet (*ADM 2013*). This strong growth flattened within the last five years, increasing from a share of 27% in 2007 to 35% in 2013 (CAGR=5.33%) only (*ADM 2013*).

With an introduction of a new mode of data collection diverse scientific examinations will have to be conducted in order to compare it to already established methods (*Romano 2009, p. 248*). Such research has already been conducted for stationary web surveys to a large extent⁶⁰. In this way web surveys quickly became a standard method to collect data highly valued by market researchers (*Tjostheim 2009, p. 186*).

Approximately 20 years after web surveys saw the light of the world, due to the fast growth of mobile device sales and mobile internet usage we are currently standing at verge of a new revolution in marketing research: due to advances in mobile technology surveys can now easily be conducted on different types of mobile devices (*ESOMAR 2012, p. 4; Peytchev and Hill 2010, p. 319*). With as many as 45% of German online users using a smartphone to access the internet as well as 16% accessing it by tablet by now, it is not astonishing that some of these users will occasionally access web surveys destined for the stationary web on their web-enabled mobile devices (*Van Eimeren 2013, pp. 386-8*). Most times this relatively new phenomenon is unintended and sometimes even unwanted by practitioners, because they lack well-founded knowledge about it. Nevertheless, it has already been reported by several re-

⁵⁹ A detailed overview of the strengths and weaknesses of web surveys is given in Section 2.4 of this chapter.

⁶⁰ Q.v. Chapter 3.

searchers (e.g. *Cape 2013, p. 51; Cazes et al. 2010, pp. 3-4; Guidry 2012, p. 8; Mavletova 2013, p. 728; McClain, Crawford, Dugan 2012, p. 3; Saunders et al. 2012, p. 2; Wells, Bailey and Link 2013b, p. 2*).

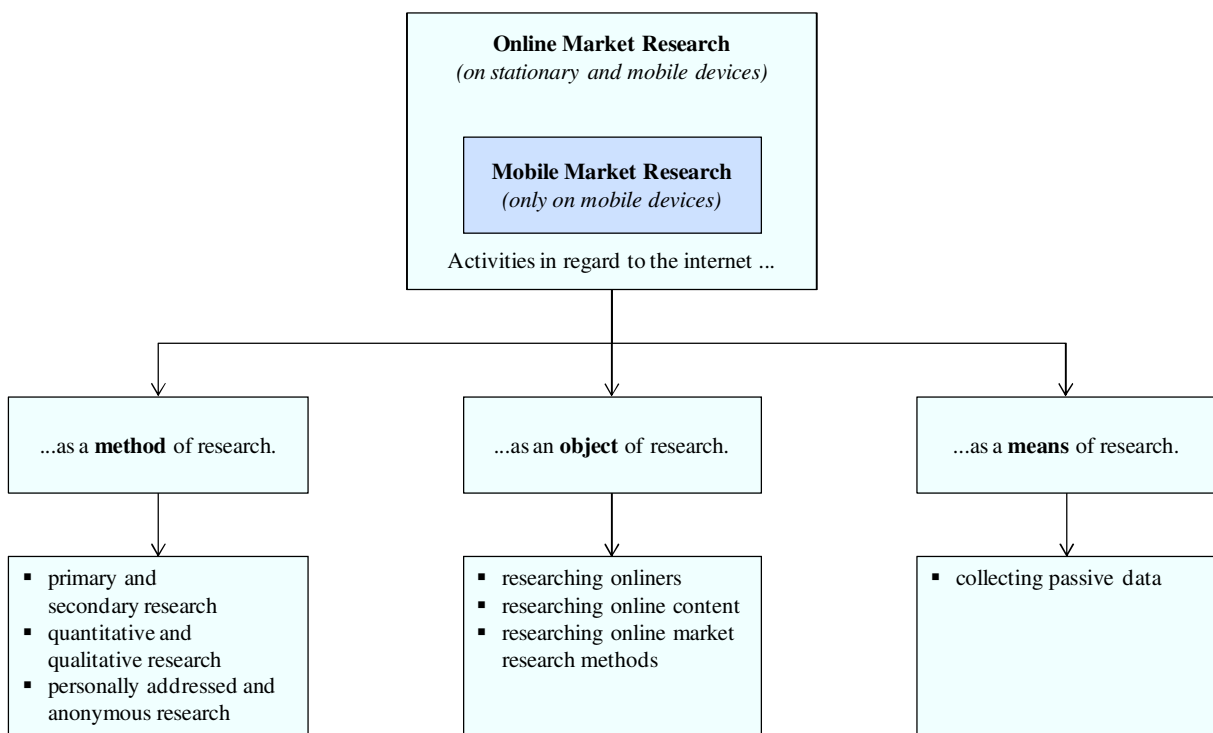
Stapleton (2012, p. 9) showed that the rate of mobile participations in web-surveys steadily increased from 2% in 2008 to 13% in 2012. She noted that it varies between different age groups, genders, as well as countries. For the latter it largely depends on their mobile penetration rate. All the same, McClain and Crawford (2013, p. 3) reported an increase in the share of mobile and tablet users among web survey respondents from about .50% in 2009 to up to 10% in 2013. Recent publications claim that depending on survey topic and given sample up to 30% of participants will access web-surveys on their mobile devices (*Callegaro 2013, p. 317; Peterson 2012, p. 32*). Furthermore, a recent small size meta analysis of seven studies which utilized web surveys reported an average unintended mobile participation rate of 5.8% (*Bosnjak et al. 2013, p. 7*). In this context Callegaro (2013, p. 318) suggested that subjects chose to answer in the mode that was handy to them at the moment. This means they will choose to conduct a mobile web survey in case they read a survey notification or invitation on their mobile, or a stationary web survey in case they will notice it on their PC or laptop. In his opinion web surveys that are feasible on a variety of web-enabled devices – so called multi device web surveys – are a solution to this problem (*Callegaro 2013, p. 318*). On the way to this, however, it is important to scientifically underpin that the results of stationary and mobile web surveys are complementary (*Mavletova 2013, p. 726*).

As survey participation on mobile devices becomes more and more mundane, consequently, most recently a new field of research called Mobile Market Research (MMR) evolved around it. The future importance of this emerging field is further stressed by the publication of first mobile research guidelines by leading market research associations (*AMSRS, CASRO and MRS 2011; ESOMAR 2012*). Furthermore, different special interest international conferences on this important topic which are supported by several market research industry leaders and their blue chip company clients (*MRMW 2014*), and conference tracks at renowned market research and Online Market Research (OMR) conferences (*AAPOR 2014; ESOMAR 2014; DGOF 2014*) have evolved. The following section gives an overview of the different facets of MMR so far discussed in literature.

2.3 Defining and Structuring Mobile Market Research

Zerr (2003, p. 8) defines Online Market Research (OMR) as a term which comprises diverse activities regarding the internet as a method, an object, or a means of research. Such research may be conducted on a variety of web-enabled stationary or mobile devices. At this, as it is displayed in Figure 2-1, activities utilizing the internet as a method of research include all types of primary and secondary, qualitative and quantitative, personally addressed or anonymous research that aims to collect consumer or market data (*Id.*, pp. 8-14). By contrast, activities which utilize the internet as an object of research include research on the topic of onliners (e.g. their demographics), online content (e.g. layout of websites), and methods of OMR (e.g. mode effects) (*Id.*, pp. 14-22). Finally, activities for which the internet serves as a means of research, e.g. collecting and analyzing metadata of consumers surfing the web (*Id.*, pp. 22-4), are also included in above definition. As all of these activities may be conducted on both stationary as well as mobile web-enabled devices, Mobile Market Research (MMR) may therefore be regarded as a subfield of OMR in which the internet on mobile devices serves as a method, an object, or a means of research.

Figure 2-1: Defining and Structuring Online Market Research



Based on Zerr (2003, pp. 8-24).

In the following emphasize will be put on Mobile Market Research (MMR) as method of research. AMSRS, CASRO and MRS (2013, pp. 9-10) define MMR as “any research done on a [...] mobile device”⁶¹. Here, the term “mobile device” is specified as any type of „small, hand-held computing device, typically having a display screen with touch input and/or a miniature keyboard and weighing less than 2 pounds / .9 kg“ (AMSRS, CASRO and MRS, p. 10) – that is less than a customary pack of milk (1 kg). Consequently, in line with Zerr’s (2003, pp. 8-24) attempt of systematization of OMR, this brief but broad definition of MMR includes all research – conducted by academics or professional researchers – on web-enabled feature phones, smartphones, and tablets. At the same time, it implicitly excludes all research conducted on larger devices such as laptops and, of course, stationary PCs. Research on the two latter types of devices, nevertheless, is still regarded as OMR. Moreover, basic mobile phones without capability to connect to the internet are excluded from MMR, as this characteristic is not in line with the upper definition of OMR, for which internet connectivity is a requirement. Due to the same reason as well as obvious methodological parallels of mobile phone surveys to traditional landline telephone surveys, voice telephony – comprising VoIP⁶² – is not included in MMR just as well (Maxl 2009, p. 12).

In this section focus will be put on MMR as a method of primary data collection. Secondary data collection – so called desk research – will be completely ignored here, as no relevant share of turnover (0%) due to this type of research has been obtained by member institutes of ADM – which is a large association of private-sector market and social research agencies in Germany – from 2012 onwards (ADM 2013). Moreover, personally addressed and anonymized research is not discussed in this section, as – in the opinion of the researcher – it constitutes no additional benefit for structuring MMR.

Most market research handbooks make a distinction between two key approaches to primary data collection: quantitative and qualitative (approaches)⁶³ (Creswell 2009). A similar differentiation applies to studies utilizing MMR as a method of research (ESOMAR 2012, p. 11). First studies making use of these approaches have already been conducted on mobile devices (e.g. Mavletova 2013; Lai et al. 2010). For instance, the qualitative approach has been applied in mobile diaries (Dennig and Keim 2013, p. 54; Keim and Dennig 2013), blogs (Maxl 2009, pp. 31-3), as well as digital ethnography studies (Lai et al. 2010). In turn the quantitative ap-

⁶¹ This term, however, may not be confused with Mobile Research, which comprises all studies conducted “on the topic of mobile technology” (Maxl 2009, p. 12).

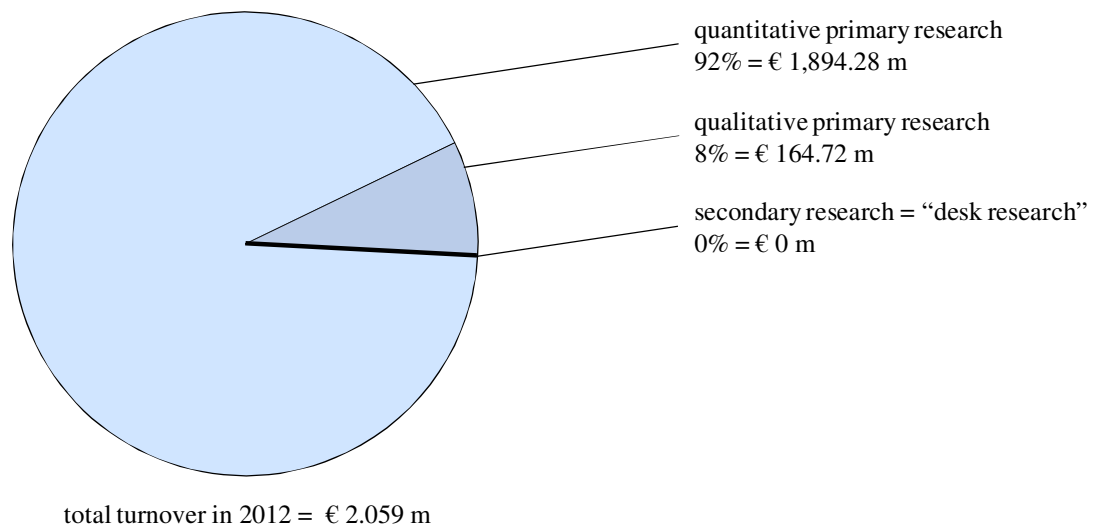
⁶² Voice over IP, Voice-over-Internet Protocol.

⁶³ In addition there are mixtures of the quantitative and qualitative approaches (Creswell 2009) which for the purpose of simplification of the underlying systematization are neglected here.

proach has been used in several mobile web surveys by different authors (*e.g. Dayton, Pels and Driscoll 2011; Mavletova 2013*).

ADM (2013) estimated that currently only about 8% (approx. € 165 m) of their members' turnover in 2012 (approx. € 2,059 m) has been achieved with qualitative studies. In contrast, quantitative studies amount to 92% (approx. € 1,894 m). Therefore, it is expedient to put the primary focus of this study on the quantitative aspect of MMR in order to cover the majority of today's market for market research in Germany. All of this is displayed in Figure 2-2.

Figure 2-2: ADM Member Institute's Turnover by Type of Research

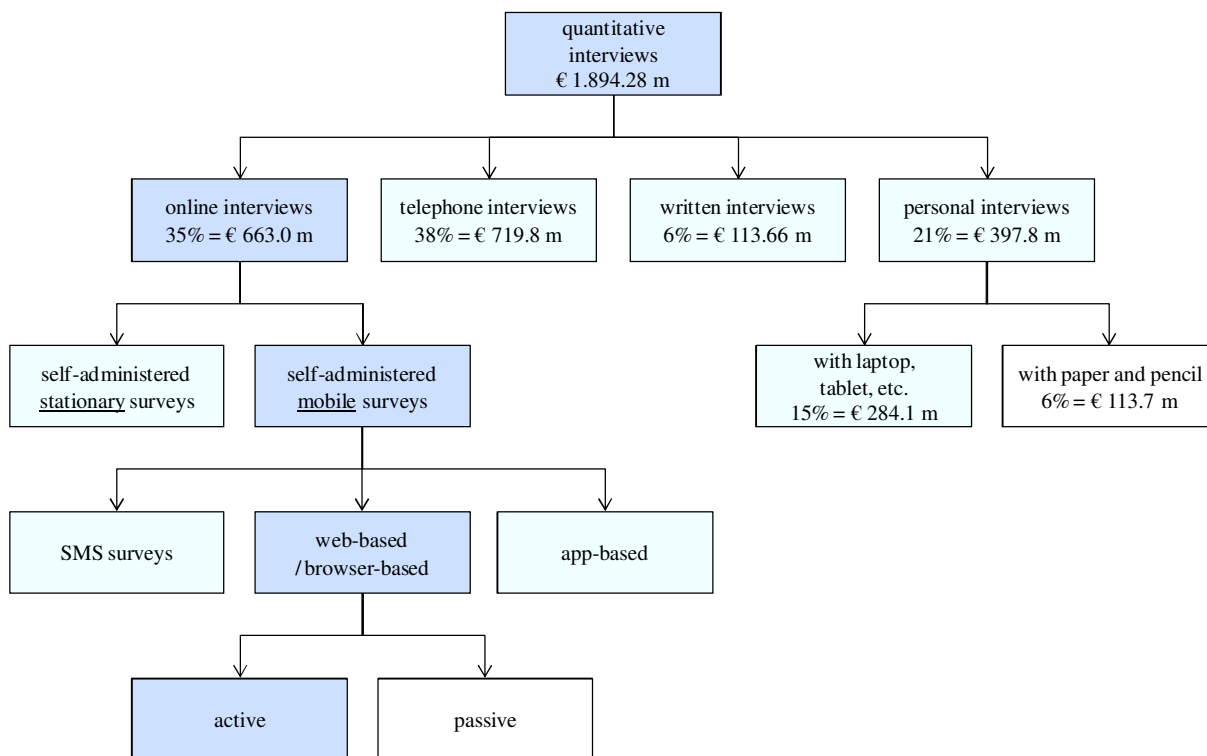


Based on ADM (2013).

As it is shown in Figure 2-3, quantitative studies can be conducted in personal, on the telephone, in written form (paper and pencil), or online. ADM (2013) claims that 35% of all quantitative interviews realized by their members in Germany in 2012 have been conducted in the latter mode (approx. € 663 m). At this, mobile devices can not only be deployed in self-administered online interviews but also in personal or telephone interviews conducted by an interviewer (*Bosnjak et al. 2013, p. 2*). Therefore, some authors regard interviewer-administered surveys conducted on mobile devices as MMR, because interviewer guidelines and questionnaires may be provided online on a tablet or smartphone in order to support interviewers conducting personal interviews, *e.g.* with anglers at their fishing sites (*Dayton, Pels and Driscoll 2011*). This is not contradictory to the definitions by Zerr (2003, *pp. 8-24*) or AMSRS, CASRO and MRS (2013, *pp. 9-10*) as long as no laptops are used. In contrast,

despite the fact that they are feasible over VoIP on the internet accessed on mobile devices, interactive voice response surveys with interviewer-guided, partly, or fully automated survey dialogues (Bosnjak *et al.* 2013, p. 2) are excluded from MMR due to their similarities to surveys conducted the “old-school” way, via landline telephony (Maxl 2009, p. 12). Most importantly, however, online interview – such as self-administered surveys – may be conducted on both stationary and mobile devices. In case they are conducted on mobile devices they are regarded as MMR⁶⁴. At this, self-administered mobile surveys can be performed in three different ways: by SMS (Short Messaging Service), web-based, or app-based (Pferdekämper and Batinic 2009, p. 122). Similar, Buskirk and Andrus (2012b, pp. 3-9) suggest that mobile web surveys can be implemented and conducted making use of several approaches.

Figure 2-3: ADM Member Institutes’ Turnover by Type of Quantitative Study / Classification of Online Interviews



Based on ADM (2013). No data available for self-administered stationary and mobile surveys and subordinate hierarchical levels. Classification of current study is highlighted by shade of grey.

⁶⁴ Otherwise they are “only” OMR.

In SMS surveys researchers ask survey questions via one or several short messages (SMS)⁶⁵. Subsequently, participants are supposed to answer the questions in the same way by returning one or several SMS (*Townsend 2005, p. 41*). Although SMS are widely accepted across mobile phone users such surveys quickly became outdated. The reason is mainly because questions asked by SMS are limited to 160 characters only⁶⁶ and, hence, scales and grids were vividly educible in this mode. Furthermore, respondents' answers were often asynchronous and time delayed and, therefore, not relatable to an individual question in case several answers came in simultaneously. In addition SMS do not support sophisticated multimedia applications. Finally, in comparison to the costs of mobile data volume, SMS are currently too expensive for both participants without a flat tariff as well as researchers (*Maxl 2009, pp. 19-22; Townsend 2005, p. 40; Zahariev et al. 2009, p. 1*).

In turn web-based mobile surveys (or mobile web surveys) fundamentally function the same way as stationary web surveys, with the exception that they are conducted on mobile devices, of course (*Li and Townsend 2009, pp. 164-5*). After being invited to a survey, e.g. by postal mail, SMS or e-mail, participants submit their answers online in a synchronous, real-time web session through their mobile browser. All questions are presented in standardized and structured mobile online questionnaires which, in contrast to SMS surveys, also support multimedia content and other sophisticated functions such as branching (*Li and Townsend 2009, pp. 164-5; Romano 2009, pp. 248-9; Townsend 2005, p. 40*). At this, Li and Townsend (2009, pp. 164-5) make a distinction between active mobile web surveys, which adapt their survey content to the mobile device and browser on which they are accessed on, and passive mobile web surveys, which do not. The prior are comparable to the adjustment of web pages to the requirements of mobile devices by means of creating special mobile versions of the website. In case a survey is not adapted to a particular mobile device, respondents will frequently have to zoom in or out and scroll horizontally or vertically in order to view the entire survey content, question, or scale (*Zahariev et al. 2009, p. 5*). The authors estimate that browser-based mobile web surveys have the greatest future potential to establish themselves as a standard instrument in the toolbox of mobile market researchers (*Li and Townsend 2009, pp. 164-5*).

Moreover, mobile surveys can also be conducted by means of an executable survey application (a so called "app") previously downloaded and installed on advanced mobile devices,

⁶⁵ Or more sophisticated enhanced messages (EMS) or multimedia messages (MMS) which are even more expensive than SMS.

⁶⁶ It is possible to join several SMS into one long SMS. However, then the survey becomes even more expensive (*Maxl 2009, pp. 19-22*).

such as smartphones or tablets (*Buskirk and Andrus 2012b, pp. 3-9*). App-based surveys (or mobile app surveys) function very similar to web-based surveys. Here, participants who were invited by SMS, e-mail or internal app notification functions⁶⁷ (*Callegaro 2013, pp. 318-9*) submit their answers to a previously downloaded survey through the application. In contrast, participants of mobile web surveys only do so by means of their mobile web browser.

One advantage of app-based mobile surveys is that they do not rely on stable mobile internet connections all the time. They only require the participant to download the app as well as the relevant survey and to upload the completed questionnaire later, in order to submit it. However, a connection is not required while completing a survey, so that break-offs due to a lack of connectivity are neglectable (*Wells, Bailey and Link 2013c, p. 4*). Consequently, data transfer costs are reduced in comparison to a permanent connection as it is used in mobile web surveys (*Maxl 2009, p. 22*). Furthermore, loading times of survey pages are minimized because they do not have to be downloaded in real-time (*Buskirk and Andrus 2012b, pp. 3-9*). Moreover, an app can leverage all of the mobile devices' functions – e.g. GPS, camera, etc. – for market research purposes, which web-based surveys cannot (*Callegaro 2013, pp. 318-9*). In addition, the researcher has greater control how survey content is displayed on the mobile screen. For instance, horizontal and vertical scrolling or, in case the device is turned, vertical screen orientation can be ruled out by software. All the same, different multimedia content can be displayed more reliably (*Buskirk and Andrus 2012b, pp. 3-9*).

It is worth mentioning that there are also a few drawbacks of mobile app surveys. For instance, recent studies show that 56% of all internet users still do not use apps, although this share has vastly decreased during the last years (*Van Eimeren 2013, p. 388*). Moreover, apps have to be downloaded and installed on mobile devices before a survey can be taken. In addition, before the survey can be downloaded or uploaded the app has to be granted data transfer permissions by the user. Furthermore, users have to search and find the survey app among an average of 22 other applications stored on smartphones (or even 26 on tablets) (*Müller 2013, pp. 414-5*). All of this may already be too complicated for some inexperienced users or at least require an additional amount of effort from those who are more experienced with mobile devices and, hence, constitute a general participation barrier (*Pferdekämper and Batinic 2009, pp. 123-4*). Moreover, a survey app may not be deleted from the phone by the device owner before survey invitations are distributed by researchers. Users may prefer to utilize the devices' limited storage space for other applications or data, which are more important or useful to

⁶⁷ Similar different pre-notification and reminder functions may be executed by the app.

them at the moment and, thus, simply delete it (*Maxl 2009, p. 22*). Finally, the biggest problem of app-based research – and also the reason why this approach was chosen not to be deployed in this study – is the diversity of mobile operating systems (OS)⁶⁸. Several apps in different programming languages have to be developed and tested in order to conduct one mobile app survey on different types of devices. Consequently, this approach is accompanied by higher development costs than mobile web surveys (*Buskirk and Andrus 2012b, pp. 3-9*). Moreover, even if several apps would have been developed, most likely a survey would be displayed by all apps in different ways (*Wells, Bailey and Link 2013c, pp. 4-5*). Therefore, in order to overcome this problem, some researchers rely on so called dedicated device studies. Here, one selected, uniform type of smartphone with a pre-installed, sometimes undeletable version of an app is complimentary distributed among participants (*Li and Townsend 2009, pp. 166-7*). However, such an approach is prohibitive in this study, as it would lead to even higher costs.

At this point, it has to be mentioned that in addition to data collected by means of interviewing or surveying also different kinds of passive data can be gathered on mobile devices (*ESOMAR 2012, p. 11*). AMSRS, CASRO and MRS (*2013, p. 11*) define passive data collection as “*the capture of data from a respondent’s or participant’s mobile device without them doing anything active to provide it*”. This may include survey related paradata – e.g. the number of survey logins a participant attempted, timestamps set to measure response time, or user agent string of the device accessing the survey – (*McClain, Crawford and Dugan 2012, p. 3*) as well as data captured from the participants’ mobile devices – e.g. geolocation data, social media data, other app data, or even web browsing history. Depending on the given legislature researchers are regularly required to ask participants for their informed consent in order to gather the latter type of personal data (*AMSRS, CASRO and MRS 2013, pp. 11-4*). At this, it depends on the survey solution used by the researcher which type of passive data can be gathered (*McClain, Crawford and Dugan 2012, p. 3*). It is highlighted that the mixed use of survey and passive data can unleash synergies during the later process of data analysis (*Li and Townsend 2009, p. 174*). Collecting paradata may be regarded as MMR, as it is an activity which utilizes the internet on mobile devices as a means of research (*Zerr 2003, pp. 22-4*). Finally, for the sake of completeness, it also has to be mentioned in this context that mode experiments – as the one conducted in this doctoral study – are regarded as MMR just as well as they include activities that utilize the internet on mobile devices as an object of research.

⁶⁸ Q.v. Section 2.4.2.3.

2.4 Stationary and Mobile Web Survey

In the beginning of this section, at first, the diverse facets of stationary web surveys – their core strengths and weaknesses – are reviewed. Thereafter, stationary web surveys are mirrored against mobile web surveys in order to carve out the strengths and weaknesses of the latter as depicted in literature. At this, sole focus is put on quantitative self-administered web- and app-based mobile surveys, which in the opinion of the author – as explained above – will likely constitute the most promising branches of MMR in the future. Subsequently, several possible interesting fields of application will be suggested to interested readers by example.

2.4.1 Stationary Web Surveys Compared to Other Established Survey Modes

According to a detailed overview by Zerr (2003, pp. 12-4) stationary web surveys offer several advantages as well as some disadvantages in comparison to other survey modes. As one advantage, for instance, the author highlights that in contrast to all interviewer-administered surveys the absence of interviewers in self-administered stationary web surveys prevents unwanted interviewer effects⁶⁹ (Romano 2009, pp. 251-2) and saves potentially incurring interviewer costs (Zerr 2003, pp. 12-3). Besides, respondents are not dependent on an interviewer to complete a questionnaire. They may flexibly choose a convenient time to do so whenever they have access to the internet. In this way target groups, which are otherwise hard to reach, may eventually be surveyed much easier (*Id.*, p. 13).

Furthermore, as opposed to surveys conducted by paper and pencil, web surveys allow for diverse multimedia features, such as images and videos, to be embedded into the questionnaire (*Id.*). Moreover, the fact that not all questions are visible to the respondent at once as well as the possibilities of setting filters and randomizing items, questions, answers, and even pages largely prohibits various types of context and order effects, as well as other bias (*Id.*). In addition, web surveys ensure higher data quality by means of automatic, real-time plausibility checks. All the same, human data errors are foreclosed by the fact that they do not require to manually transfer surveyed data from completed paper questionnaires into electronic datasheets for the purpose of evaluation (*Id.*).

Finally, web surveys may be generated and uploaded online quickly. Survey data is immediately available shortly after it has been inputted by respondents. Besides, questionnaires do

⁶⁹ E.g. social-desirability through a perceived lack of anonymity.

not have to be replicated offline, printed in large quantities, and sent out by costly postal mail. Therefore, even large sample sizes become easily manageable. With the exception of prepaid, unconditional incentives the variable share in total costs is vanishingly low in this mode. Therefore, the larger the sample size at hand the more attractive this mode becomes to researchers (*Id.*). Consequently, at the end of the day web surveys are a cheaper and faster alternative to other survey modes (*Zerr 2003, pp. 12-4*).

However, there are also a few drawbacks of web surveys. For instance, it has been reported by *Zerr (2003, p. 13)* that for different technical reasons, which are uncontrollable to researchers, data transmission may be interrupted or even disrupted leading to survey non-response or drop outs. Moreover, a lack of necessary hardware capabilities and (up-to-date) software⁷⁰, as well as the presence of diverse measures of data safety (e.g. firewalls), that are safeguarding but sometimes also disturbing communication, may lead to similar consequences (*Id.*).

Finally, also coverage error⁷¹ constitutes a noteworthy problem in some web surveys. Due to the fact that even in highly developed countries, as e.g. Germany, a non-negligible share of inhabitants still are and to some extent will remain offliners in the future (*Van Eimeren and Frees 2013, pp. 359-60*) web surveys cannot grant full representativeness among the entire population. Beyond that, they even cannot be representative for the smaller subgroup of internet users because a sampling frame – an exhaustive list of the population of internet users in Germany as well as most other countries – does not exist. Consequently, a random, representative probability-based sample cannot be drawn. Web surveys are only representative for sufficiently describable, definable, listed groups of internet users (*Id.*) – e.g. the customers from a database of an online retailer, or a university's student database (*Zerr 2003, pp. 13-4*). Therefore, it has been attempted to recruit representative offline survey panels as well as online access pools in the past. However, these samples are highly prone to other biases due to recruitment methods used (e.g. selection bias) (*Romano 2009, pp. 249-51*).

⁷⁰ E.g. the lack of random access memory or a recent, preinstalled version of Adobe Flash or JavaScript in order to display a complex animation or special type of scale.

⁷¹ "Coverage error results from all members of the population not having a known, nonzero chance of being included in the sample and from those excluded differing from those included" (*Dillman, Smyth and Christian 2009, p. 17*).

2.4.2 Mobile Web Surveys Compared to Stationary Web Surveys and Possible Areas of Application

In this section stationary and mobile web surveys will be compared to each other in order to highlight the strengths and weaknesses of the latter mode. At this, the comparison focuses on quantitative self-administered web- and app-based mobile surveys as the most promising field of MMR. Moreover, a selection of possible areas of applications is presented to the reader.

2.4.2.1 Advantages Compared to Stationary Web Surveys

In general mobile web surveys offer similar advantages as stationary web surveys (*Romano 2009, pp. 249-51*). However, these advantages sometimes go beyond those of stationary web surveys. *Zerr (2003, p. 13)*, for instance, suggested that stationary web survey respondents are not bound to interviewers' time schedules and, hence, may rather flexibly choose the time they want to reply to a present survey request. This strength also holds true for mobile web survey, but in addition mobile respondents are also able to choose the location in which they want to answer such a request freely. In contrast to stationary devices, mobile devices are not place bound and can therefore be deployed literally everywhere (*Bailey et al. 2011, p. 3*). This is particularly interesting for researchers because smartphones accompany many of their users all day long (*Müller 2013, pp. 410-1*) for a long lapse of time. Therefore, mobile web surveys are not only well suited for cross section but especially longitudinal studies, in which researchers have to retain contact with their mobile subjects for a long period of time⁷² (*Van Heerden et al. 2013, p. 2*). For instance, in diary studies subjects continuously provide information on how they use their daily time (*Lai et al. 2010, p. 2*).

Similar, mobile devices may be connected to the internet in places where else stationary devices cannot and, hence, allow to survey people even in the most far-off rural, secluded areas where landline internet grid expansion is uneconomic. More than this, mobile app surveys can also be used to survey people in regions where a connection to the stationary or mobile internet cannot be established and no power outlet may be found (*Tagesspiegel 2013*). Due to exchangeable battery packs even jungle dwellers may be surveyed (*Schöttelndreier 2013, pp. 58-9*). In this way the geographical coverage area of surveys is broadened and – in case of combined usage of the stationary and mobile method – the representativity of web surveys

⁷² However, it has been reported by the same source (*Van Heerden et al. 2013, p. 5*) that the “natural loss” of phones given out to young subjects by researchers in South Africa amounts to approximately 1/3 after a period of just 4 months.

enhanced (*Bailey et al. 2011, p. 3*). In addition, new potentials to survey people may be tapped in developing countries, where a large share of people cannot afford a computer but only a less expensive smartphone (*Thunig 2009, p. 23*), or countries in which the smartphone penetration among the population is relatively high (e.g. UAE 74%, South Korea 73%, Saudi Arabia 73%, Singapore 72%, Norway 68%) (*Google 2014*). In India e.g. mobile internet data traffic recently surpassed its stationary counterpart (*Swinton and El Kaliouby 2012, p. 1*).

Mobile devices usage is not place or time bound. Their users can be instantly reached on-the-go in different places at different times as long as they got their devices turned on and battery power lasts. For this reason mobile web surveys are frequently ascribed to deliver results quicker than any other survey mode (*Thunig 2009, p. 22*). Hence, mobile web surveys are well suited for studies on current issues for which immediate results are required (*Pferdekämper and Batinic 2009, p. 121*). This characteristic complies with the growing demands for quick results of professional research firms' clients (*Tarkus 2009, p. 157*). In addition, the mobility of devices paired with excellent accessibility minimizes the time span between the subjects' contact with the relevant stimulus in the field and their answering to survey questions about the given subject on their mobile device. Li and Townsend (*2009, p. 168*) refer to the time and location a mobile web survey took place as its context. Therefore, authors regard such surveys as "*immediately situational*" (*Cape 2013, p. 51*).

The results obtained with mobile web surveys are said to be influenced by the situational context the survey was completed in and, thus, exhibit a higher validity (*Pferdekämper and Batinic 2009, p. 121*). Furthermore, this "*in-the-moment*" data (*Bailey et al. 2011, p. 3*) is not interfered by the time lag between stimulus and response and, hence, largely free of recall or retrospective call bias, as it is a result of the immediate, on site contextual impressions gathered by the subject (*Bailey et al. 2011, p. 3; Lai et al. 2010, p. 2; Maxl 2009, pp. 16-7; Petras, Duan and Dan 2013, p. 2*). In contrast, stationary web surveys are referred to as a mode of "*coming to terms with the past*" (*Thunig 2009, p. 22*) in which results may be biased by erroneous recall of past memories on stimuli (*Lai et al. 2010, p. 2*). In this way mobile web surveys are potentially capable of capturing the formation of an opinion right at the moment of truth (*Woppmann and Zimmermann, 2013, p. 56*). This is particularly important for B2C companies in the retail or media sectors. These companies may survey their customers or

viewers right at the point of sale (POS) or in front of their television set (*Thunig 2009, p. 22*)⁷³.

It has been noted by *Zerr (2003, pp. 13-4)* that coverage constitutes a general problem in web surveys⁷⁴ and, thus, also in mobile web surveys. Similar to stationary web surveys mobile web surveys are neither representative for the entire population nor its subpopulation of onliners (*Forster 2009, p. 22*). That is because not everybody owns a mobile phone with access to the internet as well as the fact that there is no sample frame for the population of mobile onliners (*Mavletova 2013, p. 726*). Additionally, *Busse and Fuchs (2009, p. 218)* ascertain that there are socio demographic differences between mobile internet users and the general population. In particular, mobile internet users are younger, better educated, and have a higher income at their disposal – all of which characterizes early adopters (*Id., p. 219*). Consequently, as these segments are highly overrepresented in mobile web surveys, surveying in this mode leads to a stronger relative coverage error⁷⁵ in comparison to other survey modes (*Id., p. 233*).

In contrast to stationary web surveys, for the population of mobile internet users web surveys may be representative in case random sampling of mobile phone numbers and SMS have been used to distribute invitations among them⁷⁶. This procedure is similar to the random dialing techniques frequently applied in telephone surveys (*Fuchs and Busse 2009; Mavletova 2013, p. 726*). Another benefit of this procedure is that in case a study targets only mobile device owners or mobile internet users the researcher can ensure by the use of mobile web surveys and by controlling of user agent strings⁷⁷ that only subjects from the target group will be surveyed. In this way other subjects who may only pretend to belong to the targeted segment, e.g. in order to receive an incentive for participating in the survey (*Okazaki 2007, p. 654*), may be excluded from the study.

⁷³ At this point, for the sake of completeness, it has to be mentioned that in-the-moment studies may lead to different types of biased results. For instance, *Shea and Johnson (2012, pp. 18-24)* noted that subjects who were asked to answer a short mobile in-the-moment survey, whenever they ate a snack reported a smaller amount of snacks eaten per day than a control group which had to report the sum of daily snacks eaten in a stationary web survey one time only at the end of the day. The researchers hypothesize that the frequent in-the-moment reporting of eaten snacks made subjects more conscious about their immoderate snacking behavior and, consequently, made them eat a smaller amount of snacks (*Shea and Johnson 2012, pp. 18-24*).

⁷⁴ Q.v. Section 2.4.1.

⁷⁵ *Id.*

⁷⁶ SMS invitations are required because mobile internet users do not always use mobile e-mail services on their devices (*Nicolai 2009, pp. 206-7*).

⁷⁷ Q.v. Section 4.5.1: Amongst other, these strings contain information about browser, platform, and operating system installed on participants' devices. They may be recorded by the survey software. Consequently, an analysis of user agent strings enables the researcher to identify with what type of device – mobile, tablet, or stationary – individual participants had accessed the survey (*Frederick and Lal 2009*).

Conversely, the willingness to participate in landline telephone surveys as well as the reachability of telephone users has continuously decreased in recent years. Moreover, it is particularly difficult to survey target groups such as business people, those earning a high income, as well as the young (*Pferdekämper and Batinic 2009, p. 116; Thunig 2009, p. 23*). In addition, it has been reported by the European Commission (2011, p. 25) that the share of households not owning a landline telephone – so called “mobile only households” (*Townsend 2005, p. 40; Maxl 2009, pp. 11-2*) – amounts to 28% in Europe, 11% in Germany, and can even amount up to 80% in other countries (e.g. Finland) (*European Commission 2011, p. 25*). Not reaching and, thus, not surveying these groups by means of common survey modes would most likely imply heavy biases in the study results. That is because they may differ from the general population regarding different demographic variables (*Townsend 2005, p. 42*). However, as mentioned above, mobile internet usage is particularly appealing to some of these groups (*Pferdekämper and Batinic 2009, p. 121; Thunig 2009, p. 23*) so that their systematical absence in surveys can be largely avoided. Therefore, the combined use of mobile web surveys and other survey modes increases the coverage of studies aiming at the entire population. Buskirk and Andrus (2012b, p. 5) see this as the key benefit of mobile web surveys. They claim that the probability of survey participation is maximized in case researchers offer several answer modes to participants. In this context Millar and Dillman (2012, pp. 4-5) show that there are subgroups in the population that prefer answering surveys on their smartphones rather than in other modes. All the same, other authors propose multi-mode-approaches and highlight their benefits (*Li and Townsend 2009, p. 178; Thunig 2009, p. 25; Townsend 2005, p. 42*). Finally, as explained before, mobile web surveys also boast representativity by broadening the geographical scope of surveys (*Bailey et al. 2011, p. 3*).

Stationary web surveys allow for different multimedia features to be embedded into the questionnaire (*Zerr 2003, pp. 12-3*). So do mobile web surveys (*Pferdekämper and Batinic 2009, p. 121; Woppmann and Zimmermann 2013, p. 56*). However, while it is rather straightforward to view pictures, videos, or even listen to audio files on stationary devices, recording the same in order to transfer them to the researcher constitutes a problem. On one hand, stationary devices are not by default equipped with such features as cameras or microphones. On the other hand, those devices are less mobile in comparison to mobile devices so that required data cannot be recorded everywhere. Therefore, users of stationary devices will additionally have to own other compatible recording devices, transfer recorded data to their stationary device, and then send it to the researcher. This procedure is associated with greater effort and costs than required from users of mobile devices. The latter can conduct all of the prior steps on

their mobile device and do not have to own costly additional devices (*Maxl 2009, p. 13*). In this way mobile web survey respondents can easily record diverse type of data about their behavior and surrounding and transfer it to the researcher (*Li and Townsend 2009, p. 168*). This data then may be combined with and, thus, enhance regular survey data (*Tjostheim 2009, p. 196*). Or expressed in other, more flourish words „*mobile research captures pictures, voice and videos so we can see and hear the emotion in the statistics*“ (*Graham 2012, p. 17*).

Besides the possibility to record images, videos and audio data mobile devices offer other additional features which will enhance survey data to a great extent. For instance, it is possible to use mobile devices as a scanner. In this way respondents may register barcode labels on products with the device's own camera (*Buskirk and Andrus 2012b, p. 5; ESOMAR 2012, p. 11*). While consumers which are registered in shopper panels usually use home scanners in order to scan their regular purchases, such devices fail to register impulse purchases on-the-go (*Townsend 2005, p. 44*). For example, consumers normally do not use the scanners when they spontaneously buy a small bottle of beverage at a newspaper kiosk downtown whenever they are immediately driven by their thirst. Hence, such purchases cannot be registered with existing home scanning devices. Furthermore, cameras in mobile devices can be used in order to automatically trigger mobile web surveys whenever a QR code is scanned or any object is recognized in a photographic image by software (*Maxl 2009, pp. 33-5*). Without using a camera surveys can also be triggered by Near Field Communication (NFC), Bluetooth, and other radio transmission technologies (*Id. 2009, pp. 27-9*) on-site at the location designated for research, e.g. directly at the POS (*Townsend 2005, p. 45*).

In addition to triggering surveys Bluetooth technology can be used to connect a mobile device to other external devices which, just as well, may provide relevant data. At this, the range of compatible devices is extensive. For instance, it has been reported that mobile devices can be connected to a Nike+ Fuelband SE which records the users level of physical activity and fitness level, e.g. walking speed, frequency, and distance (*Keating 2012, p. 9*). All the same, the device internal accelerometer may be utilized to record changes in direction and velocity of the phone and, thus, physical activity. All of this data may then be connected with other (mobile) health survey data and transferred to the researcher by the mobile device (*Id.*). In this way it is even possible to match respondents' heart rates – which can be used as a proxy for the respondents' mood – with single survey questions. In similar ways survey data may be combined with weather or climate data (*Maxl 2009, pp. 29-30*).

Finally, most mobile devices are also equipped with Global Positioning Systems (GPS). Using GPS in mobile app surveys offers several benefits to the researcher. First, similar to a time stamp, survey data may be enhanced with a location stamp by means of geolocation. This gives information to the researcher where the survey was actually taken (*Li and Townsend 2009, p. 168; Townsend 2005, p. 44*). In this way, for instance, researchers can connect results of customer satisfaction data to particular store locations which a customer frequently visits. Second, by means of geovalidation (*AMSRS, CASRO and MRS 2013, pp. 9-10*) researchers can reconstruct whether the survey was taken on-site or some other place. This allows researchers to control for possibly occurring recall bias. Third, geofencing (*Bailey et al. 2011, p. 11; Li and Townsend 2009, p. 168*) allows researchers to draw virtual fences around locations. In case a subject with an active survey app on its mobile device either enters or leaves this virtually fenced area, a survey will be triggered on his mobile device (*AMSRS, CASRO and MRS 2013, pp. 9-10*). For this purpose, several different invitation tools (SMS, e-mail, custom alarms, etc.) are suitable (*Lai, Link & Vanno 2012, p. 2*). In this way a survey can be automatically started almost at any location in this world. For instance, shoppers can be surveyed about their shopping experience immediately after leaving a store.

2.4.2.2 Possible Areas of Application

In their essay Li and Townsend (2009, pp. 174-8) named several areas in which MMR may be applied in research. All of these make use of the variety of advantages MMR offers to researchers. One of these fields is mobile advertising research. Mobile devices are frequently used by consumers to search for information on products or to conduct purchases on the mobile web. At this, most of them notice mobile advertising (*Google 2013*). It has been estimated that spending for mobile advertisement will amount to € 105.1 m in 2013 in Germany. This is approximately 70% more compared to spending in 2012 (*BVDW 2013a, p. 7*). Moreover, as mobile device users are generally younger, better educated, and have a higher income at their disposal (*Busse and Fuchs 2009, p. 218*) they are part of an important target group for the advertizing industry (*Pferdekämper and Batinic 2009, pp. 130-1*). With the growing relevance of mobile advertizing the importance of measuring its effects, without the necessity for the respondent to switch the device on which the ad was displayed on in order to answer a survey, will also increase (*Li and Townsend 2009, p. 175*). Thus, it has been suggested that both awareness and recognition test may be conducted on mobile devices because it is possible to display multimedia images and videos on them (*Tarkus 2009, p. 151*). At this, mobile web

survey data may be paired with metadata collected on the mobile device containing information about source and exposure to the ad or even search engine data. In this way an evaluation by website on which the ad was shown, ad type, as well as access time and location will be possible for researchers (*Li and Townsend 2009, pp. 174-8*).

However, MMR is not only limited to the testing of mobile ads. It may be used for media research on the usage of diverse kinds of media, e.g. the internet, magazines, radio, and also television (*Thunig 2009, p. 25*). For instance, mobile devices are frequently used by consumers as a so called “*second screen*” while watching television (*Barczewski 2013, p. 52*). Therefore, MMR is also well suited to measure television usage or to test television advertizing campaigns (*Lai et al. 2013, p. 3*). Most impressing Swinton and El Kaliouby (*2012, pp. 2-9*) found differences between the emotional responses to TV commercials measured by face recognition and facial coding technology through mobile devices when compared with traditional ad testing approaches.

Moreover, MMR is also well suited for mobile website profiling. For instance, mobile web intercept surveys can be used in order to survey the demographics of visitors of mobile web sites (*Li and Townsend 2009, p. 176*). Because no mode changes are necessary, researchers can ensure that only survey data from true websites visitors will be collected. This data may be further enhanced by metadata, e.g. information about which pages of the website were visited and the time spent by the user on the website. In this way website operators may increase their attractiveness regarding advertisers, as they develop demographic profiles of their visitors (*Id.*).

In addition, location-based research may be conducted on mobile devices (*Barczewski 2013, p. 52*), for instance, at the POS or immediately after a service experience (*Li and Townsend 2009, p. 176*). Here, mobile web survey apps may be triggered – e.g. by Bluetooth – at different points in the store where certain products of interest or sales promotions are located (*Forster 2009, p. 23*). In addition, mobile apps can trace the path a customer walked through the store, communicate with the scanning cash register at the end of the store visit in order to retrieve purchase data. Subsequently, a survey may be triggered after a payment was accepted. In this way different type of data may be combined, even that of repeated store visits by one customer or loyalty card data (*Li and Townsend 2009, pp. 178-9*). Moreover, customer satisfaction may be measured in a (fast food) restaurant chain right after the customers finished their meals. At this, mobile vouchers for subsequent visits may serve as incentives for participation. All the same, with MMR the opinions of consumers visiting events – as e.g. sports,

concerts or trade fairs – can be surveyed on-site while attending or directly subsequent to it. The GPS functions of mobile devices – geolocation, geovalidation, and geofencing – will help to ensure that only true event visitors are surveyed (*Thunig 2009, p. 25*).

Finally, MMR may be applied in diverse forms of qualitative research, e.g. mobile diaries (*Dennig and Keim 2013, p. 54; Keim and Dennig 2013*), blogs (*Maxl 2009, pp. 31-3*), as well as digital ethnography studies (*Lai et al. 2010*). Longitudinal studies like the latter, for instance, profit from a realization on mobile devices. Here, researchers may retain contact with their mobile subjects over a long period of time (*Van Heerden et al. 2013, p. 2*) and at the same time survey them repeatedly in-the-moment within a different or same situational context. In this way, they minimize retrospective bias (*Lai et al. 2010, p. 2*). Most importantly, data collected in such studies may be enriched by the use of different additional features of mobile devices. For instance, the camera function of the phone will enable subjects to add audio, photo, and video data to their responses. Further, all of this qualitative data may be combined with multimode quantitative survey results and paradata (*Townsend 2005, p. 43*).

In this section only a small selection of possible applications for MMR has been presented. Therefore, this enumeration is by no means exhaustive. There are certainly many other interesting, sophisticated fields in which MMR may be applied. Thus, a detailed reflection on this topic is beyond the scope of this study.

2.4.2.3 Disadvantages Compared to Stationary Web Surveys

Despite its previously discussed manifold strengths, mobile web surveys are also prone to some major disadvantages compared to other survey modes. One problem frequently mentioned in this context is the diversity of mobile devices, in particular mobile phones. It leads to incompatibilities (*Li and Townsend 2009, p. 161*) and substantially contributes to the complexity with which surveys are conducted (*Barczewski 2013, p. 52*). For instance, it does not allow for a standardization of survey display and, hence, for some users it may cause a suboptimal survey experience (*Zahariev et al. 2009, p. 3*). In this way it makes the researcher lose a certain amount of control over the survey process and adds a potential source of bias and costs to it (*Maxl 2009, p. 14; Peytchev and Hill 2010*). At this, it has been frequently highlighted that the diversity of devices is higher for mobile devices than for stationary devices like PCs and laptops (*Zahariev et al. 2009, p. 2*).

Currently, in total 570 different mobile phones have been launched by ten major and a multitude of smaller manufacturers on the German market within the period of the last four years (from 2010 to 2013) (*Areamobile 2014*). Moreover, the technological development in this sector makes rapid progress and, thus, new and better models are launched to the market continuously (*Pferdekämper and Batinic 2009, pp. 120-1*). Besides brand and price these phones differentiate themselves from each other in various distinct aspects⁷⁸:

For instance, they have different mobile operating systems (OS). In contrast to the OS market for stationary devices the market for mobile OS has been very fragmented in the past (*Zahariev et al. 2009, p. 2*). However, recently a trend of concentration of the market in favor of Google's Android OS may be observed. According to Gartner (*2013*) the worldwide mobile OS market share in terms of installed units (on a total of 250.2 m phones sold in Q3 of 2013) was divided among four major suppliers: Google's Android (81.9%), Apple's iOS (12.1%), Microsoft's Windows Phone (3.6%), and RIM's BlackBerry OS (1.8%)⁷⁹. Here, the share of Android OS grew by 9.3% during the last 12 months⁸⁰. Previously in this chapter⁸¹ it has been pointed out that different mobile systems require several mobile web survey apps to be programmed in different programming languages. This will add up to the costs of the survey and likely lead to inconsistent display of the survey in different apps (*Buskirk and Andrus 2012b, pp. 3-9; Wells, Bailey and Link 2013c, pp. 4-5*).

Moreover, mobile phones exhibit different types of mobile web browsers, screen resolutions, screen sizes, and input methods which will likely bring about similar problems of displaying and answering the survey consistently. Here, the mobile web browsers⁸² pre-installed in Android OS (26.8%) and iOS (21.62%) followed by Opera (14.97%), UC (11.63%), Chrome (7.97%), and the Nokia browser showed the largest worldwide market shares in terms of usage in January 2014 (*StatCounter 2014a*)⁸³. The combined market share of the six most popular mobile browsers amounts to 82.99%. In contrast, the six most popular stationary web

⁷⁸ At this point, for the sake of completeness, it has to be mentioned that also the performance of the devices central processing unit (CPU) (e.g. number of cores, clock speed, etc.) memory features (e.g. random-access and read-only memory), data transfer capabilities (e.g. maximum HSDPA and HSUPA, as well as ability to access GPRS, UMTS, LTE, WLAN networks), as well as battery and other features not named here may add up to a devices capability to serve for mobile survey purposes (*Areamobile 2014; Busse and Fuchs 2009, p. 217; Mavletova 2013, p. 728*).

⁷⁹ In total other OS – including Samsung Bada (0.3%) and Symbian (0.2%) – amount for .6% of market share (*Gartner 2013*).

⁸⁰ Increase in percentage points.

⁸¹ Q.v. Section 2.3.

⁸² Most of which are mobile HTML browsers (*Pferdekämper and Batinic 2009, pp. 120-1*).

⁸³ Further mobile browser market shares (*StatCounter 2014a*): BlackBerry (2.65%), NetFront (2.27%), IEMobile (2.12%), Other (9.97%).

browsers account for 98.66% market share (*StatCounter 2014c*)⁸⁴. Consequently, the mobile web browser market is more diverse than its stationary counterpart. Additionally, the capabilities of mobile web browsers are more limited than those of stationary browsers. For instance, they display content differently, sometimes violate web standards, or do not display dynamic content at all. Some are incompatible to Adobe Flash and JavaScript or their users have disabled some of their functions (*Zahariev et al. 2009, p. 2*). In this way not all types of survey questions and scales available on stationary devices may be implemented into web surveys conducted on mobile devices (*Buskirk and Andrus 2012b, pp. 2-3*).

In addition, even more complexity is added by the variation of screen size of mobile phones. Screen size is usually assessed as the diagonal of mobile screens (*Buskirk and Andrus 2012b, pp. 2-3*) and varies from approximately 2 to 5 inches (*Areamobile 2014*). In contrast, small laptop computers have screen sizes of at least 10 inches and screens of PCs may even be a multiple thereof larger⁸⁵ (*Callegaro 2010*). In case a screen size is too small not all information contained in the questionnaires may be displayed without further action by the user, e.g. zooming out or scrolling (*Forster 2009, p. 23; Zahariev et al. 2009, p. 5*). However, it is uncertain whether all survey respondents are willing or able to perform this additional effort as it might annoy them (*Lai et al. 2010, p. 3*). In turn, not seeing all information will affect respondents' reading comprehension of the questions phrased in the questionnaire (*Peytchev and Hill 2010, p. 320*). Moreover, they may only select response options which are visible to them (*Stapleton 2013, p. 2*).

Additionally, screen resolutions⁸⁶ on mobile phones are even more diverse than browsers used (*Buskirk and Andrus 2012b, pp. 2-3*). Here, resolutions of 480x320 (12.75%), 568x320 (11.14%), 800x480 (7.86%), 1280x720 (6.68%), as well as 320x240 pixels high times pixels wide (6.53%) (*StatCounter 2014b*)⁸⁷ were most frequently used worldwide. However, other resolutions still account for a total share of 55.04% which is not to be scoffed at. At this, a screen resolution of 1280x720 displays six times more pixels than the most frequently used resolutions of 480x320. Consequently, also screen ratios vary stronger on mobile phones in

⁸⁴ Chrome (46.55%), IE (24.63%), Firefox (20.3%), Safari (5.02%), Opera (1.33%), 360 Safe Browser (0.83%), Other (1.34%) (*StatCounter 2014c*).

⁸⁵ It is possible to connect a large television set (currently up to 90 inches) or even a video projector to a stationary device.

⁸⁶ Screen sizes are not strongly correlated to screen resolutions, because even large (small) screens can have a poor (high) resolution. However, they are an indicator for screen ratio, which is the proportion of width and height of the screen (*Callegaro 2010*).

⁸⁷ Further shares of screen resolution (*StatCounter 2014b*): 360x640 (4.75%), 800x600 (3.83%), 320x240 (3.42%), 1080x1920 (1.8%), 128x160 (1.56%), 540x960 (1.52%), other (38.16%).

comparison to stationary devices. For the latter 16:9 has emerged as popular standard with about 75% of market share (*IDC 2013*). Moreover, screen resolutions are also higher for PCs and laptops than for mobile devices (*Callegaro 2010*). In addition screen width of stationary devices usually exceeds height whereas the opposite holds true for mobile devices. Nevertheless, with help of the accelerometer mobile screen layout may be flipped from “portrait” to “landscape” mode (*Buskirk and Andrus 2012b, pp. 2-3; Maxl 2009, pp. 13-4*). However, this is not possible on all devices (*Wells, Bailey and Link 2013c, p. 5*). All of this does not contribute to a standardized display of a survey on mobile devices.

Callegaro (2010) constitutes that, although there is a need for standardization, due to the stronger variability of mobile components in comparison to their stationary counterparts a survey experience can hardly be held constant across different mobile and stationary devices. It has been attempted to moderate this variability by means of active mobile web surveys which adapt their survey content to the screen size of the mobile device and browser on which they are accessed on (*Li and Townsend 2009, pp. 164-5*).

In addition, mobile phones differ regarding the input capabilities offered. Besides using their screen in order to display content the majority of mobile phones also allow their users to utilize their screen as an input mode. At this, 503 of the 570 mobile phones (88.2%)⁸⁸ launched on the German market within the last four years (from 2010 to 2013) showed a finger or stylus touch capable input mode, a so called touchscreen (*Areamobile 2014*). Here, a miniature virtual full QWERTY keyboard is displayed on screen. Users may type by touching the keys displayed on screen. In this context Dayton, Pels and Driscoll (2011, p. 21) state that entering long texts through touchscreen miniature keyboards may be time-consuming and frustrating. In addition it is hard to see content on a touchscreen on-the-go in the sun as the glossy screen reflects a large amount of sunlight. Moreover, Peytchev and Hill (2010, p. 320) add that less items are correctly selected, less information is gathered, and less attention is paid to the information displayed on devices with smaller screens. Overall the survey task is perceived as more difficult, or complex, as compared to other survey modes. All of this does not benefit the results of mobile web surveys.

Moreover, 75 of 570 (13.2%) of all mobile phones launched between 2010 and 2013 were equipped with a miniature, full QWERTY keyboard and 60 of 570 (10.5%) feature phones with a 10-key mobile keyboard (*Areamobile 2014*). Thus, some devices were even equipped

⁸⁸ Own calculations.

with two input modes, e.g. the Blackberry Q10 offers a touchscreen as well as a miniature, full QWERTY keyboard. Besides, some devices offer additional keys, a miniature joystick, a small trackball⁸⁹, or combinations of the prior for navigation (*Maxl 2009, pp. 13-4, Peytchev and Hill 2010, p. 326; Tarkus 2009, pp. 138-9*). Cazes et al. (2010, p. 2) emphasize that smartphones with touchscreens are better suited for surveying than feature phones with 10-key mobile keyboards.

In contrast, standard input modes for nearly all PCs and laptops are large, full QWERTY keyboards combined with either a computer mouse or touchpad for navigation (*Maxl 2009, pp. 13-4; Tarkus 2009, pp. 138-9*). These differences in input mode may affect the respondents' interaction with the survey and answers chosen (*Peytchev and Hill 2010, pp. 320*). Although some newer computer screens also offer touch input by touchscreen, with a market share of currently .3%, however, these are yet far from being considered as standard features nowadays (*IDC 2013*).

In summary Zahariev et al. (2009, p. 2) emphasizes the importance of standardization of the mobile web survey research process claiming that “*providing a uniform and robust respondent experience across a variety of devices, on different browsers, with different display and input capabilities is the most significant challenge of mobile data collection for marketing research*”. The particular impact of diversity of devices on the results of a mobile web survey, however, is for the most part unknown so far (*Mavletova 2013, p. 728*).

Furthermore, there are severe differences between the data transfer rates (or bitrates) of mobile and stationary internet connections. At this, mobile internet connections are said to be slower than their stationary counterparts (*Tarkus 2009, p. 139*). For instance, grid-bound broadband internet connections (e.g. DSL, FTTx, CATV, or Powerline) with data transfer rates of more than 6 Mbits/s were potentially available to 85.7% of the German population in 2013. In contrast wireless broadband internet connections (e.g. UMTS/HSDPA, LTE, WiMAX, WLAN) with data transfer rates of more than 6 Mbit/s were provided for only 48.9% of the population. Even more striking is the fact that while for grid-bound broadband data transfer rates of more than 16 Mbit/s were potentially available to 75.7%, only 4.6% of the German population could make use of such data transfer rates by means of wireless broadband (*TÜV 2013*). While stationary devices can potentially utilize both grid-bound and wireless broadband, mobile devices are limited to wireless internet connections only. Conse-

⁸⁹ The Sony Ericsson Xperia Play even offers a gamepad (*Areamobile 2014*).

quently, on average the data transfer rates of mobile devices will be lower in comparison to those available to stationary devices (*Tarkus 2009, p. 139*). In case data transfer is slower, survey pages will likely need longer to build up and, hence, response time will increase.

Just like the transfer speed, connection costs may also contribute to a vast differentiation between stationary and mobile internet. In this context it has been claimed in the past that costs may be a crucial barrier to the distribution of mobile internet (*e.g. Maxl 2009, p. 14*) and for subjects to start survey participation (*Romano 2009, pp. 262-3*). Romano (2009, pp. 262-3) illustrates how in the early days of mobile WAP internet people were scared of high costs occurring whenever their mobile connected to the internet. However, recent studies (*Google 2014*) state that the vast majority of 75.4% of all smartphone owners in Germany have already booked some sort of flat rate tariff⁹⁰ for which costs are independent of the amount of data used. Consequently, it is likely that they consider the participation in a mobile web survey as being free of (variable) costs⁹¹ (*Romano 2009, pp. 262-3*). Only 6.4% of mobile owners still rely on volume based tariffs and 9.5% on pre-booked volume packages⁹². In contrast, almost all users of stationary devices pay flat tariffs for their internet connection⁹³ (*Van Eimeren and Frees 2009, p. 350*). Therefore, some respondents may consider the use of stationary internet as lower priced in comparison to the use of the mobile web, and therefore be more willing to participate in surveys.

2.5 Mobile Market Research as a Research Gap

It has been highlighted in previous sections⁹⁴ that internet usage on mobile devices becomes continuously more important in Germany and also worldwide. As a consequence, Mobile Market Research (MMR) – in particular mobile web or mobile app surveys – will likely gain further relevance in the near future. Despite the growing importance of mobile web surveys nowadays, researchers lack broad knowledge about this relatively new survey mode. It has been shown in the course of this chapter that mobile web-enabled devices – such as

⁹⁰ Either a full flat rate or one with a cap.

⁹¹ Only a fixed, monthly flat rate independent of data volume used has to be paid by the subject whether he or she participates in the survey or not.

⁹² In particular: volume based tariff 6.4%, volume package 9.5%; flatrate with volume cap 10.1%; flatrate with speed cap 46.2%; full flatrate 19.1%; other type of tariff 2.6%; don't know / no answer 6.1% (*Google 2014*).

⁹³ Already 87% of all stationary internet users booked a flat rate tariff in order to access the internet in 2009 (*Van Eimeren and Frees 2009, p. 350*). Unfortunately, newer data is not available. However, it may be assumed that this share has further increased even further as – to the best knowledge of the author of this study – none of the major grid-bound broadband providers offer volume based tariffs in 2014 anymore.

⁹⁴ Q.v. Section 2.1.

smartphones or tablets – differentiate themselves from stationary web-enabled devices – as e.g. PCs or laptops – in many relevant aspects⁹⁵. Therefore, it would be reckless to assume web surveys conducted on mobile devices will not differ from those conducted on stationary devices in at least some facets. Hence, it has been warned to blindly transfer scientific results as well as best practices from stationary to mobile web survey research (*Buskirk and Andrus 2012b, p. 1; Callegaro 2010*) or simply follow some “well-meant advice” from market research industry “gurus” that are not built on scientific examinations. Nonetheless, just the opposite has been done so far (*Stapleton 2013, p. 1*). Therefore, Buskirk and Andrus (*2012b, p. 1*) demand that “*current best practices must be adapted, expanded and modified for surveys on mobile devices*”.

In order to circumvent this problematic issue at short sight, some researchers suggested the ex post exclusion of mobile participants from data evaluation in stationary web survey (*Callegaro 2010*). With a trend towards continuously growing mobile participation rates, however, this proposition forecloses itself in the long run. Quite the contrary, researchers will have to show that mobile web surveys are complementary to stationary web surveys so that both may be used in mixed-mode studies in the future (*Mavletova 2013, p. 726*). Moreover, exclusion would have a negative impact on the coverage and representativity of the given study⁹⁶.

New research methods require scientific examination and comparison to already established ones (*Romano 2009, p. 248*). MMR will yet have to face such tests in order to establish itself in the toolbox of researchers worldwide. At this, it stands to reason to compare it to stationary OMR first, because the similarities of both methods are not far to seek⁹⁷. In this context, Macer (*2012, p. 569*) subsumes the current situation as follows: “*With mobile survey participation, participants seem to be well ahead of the researchers in embracing mobile communications, and researchers would be misguided to believe this is behavior they can control. It is an area where more research needs to be done, as it challenges many assumptions about online survey design.*” Likewise, other researchers point out that little research has been done in this field so far. (e.g. *De Bruijne and Wijnant 2013, p. 483; Dennig and Keim 2013, p. 54; Forster 2009, p. 23; Li and Townsend 2009, p. 172; Macer 2012, pp. 567-71; McGeeney and Marlar 2013, p. 3; Millar and Dillman 2012, pp. 2-5; Peytchev and Hill 2010, pp. 319-20; Stapleton*

⁹⁵ Q.v. Section 2.4.2.1 and 2.4.2.3.

⁹⁶ Q.v. Section 2.4.2.1.

⁹⁷ Q.v. Section 2.4.2.1.

2011, p. 3; Wells, Bailey and Link 2013c, p. 2). Consequently, demand for further scientific research in order to close this research gap already exists.

Amongst other important variables, further research on the outcome rates of mobile web surveys is required because all studies in this field conducted so far lack the required scientific rigor.

2.6 Outcome Rates in Mobile Market Research

The following sections highlight the importance of outcome rates for mobile web survey research and give an overview of so far published articles, papers, books and conference proceedings focusing on the comparison between web surveys conducted on mobile and stationary devices.

2.6.1 Importance of Outcome Rates in Survey Research

Outcome rates focus on the number of individual responses or participants in a survey. In case the outcome rates of a survey are high, a large share of the sample participated in the survey. In the opposite case only a few sample members chose to complete the survey and the share of participants is small. There are many ways to calculate survey outcome rates. Most popularly in survey research literature, they may be calculated as response rates or participation rates. The American Association for Public Opinion Research (AAPOR) defines response rates of a survey as *“the number of complete interviews with reporting units divided by the number of eligible reporting units in the sample”* (AAPOR 2011, p. 5). In contrast participation rates are defined as *“the number of respondents who have provided a usable response divided by the total number of initial personal invitations requesting participation”* (AAPOR 2011, p. 38)⁹⁸. At this point it is important to note that all of these definitions have one “common denominator”: outcome rates may be regarded as the aggregated result of individual level Survey Response Behavior (SRB) – in particular participation or non-participation in a survey – of a chosen sample.

In survey research low outcome rates are regarded as problematic mainly for three reasons: First, due to a lack of respondents data analysis may be limited to a few types of statistical

⁹⁸ Outcome rates and their operationalization are discussed at broad in Section 4.5.3 of this study.

evaluation methods which are suitable for small samples only (*Wagner and Kemmerling 2010, p. 359*). Second, in case outcome rates are low only a small proportion of subjects from the sample responded to the survey. With a small share of respondents, however, it becomes harder to generalize the results of the survey not only for the entire sample but also for the population it was randomly drawn from (*Green 1996, pp. 171-2*). Consequently, the survey's inferential value and representativity may severely suffer (*Furse and Stewart 1984, p. 80; Groves, Cialdini and Couper 1992, p. 475*). Third, low outcome rates may foster nonresponse error. Among coverage, measurement, and sample errors it constitutes one of several sources of survey error (*Hoonakker and Carayon 2009, pp. 351-2*). Nonresponse error occurs in case survey respondents differ – e.g. in their attitudes – from nonrespondents in a nonrandom way (*Diamantopoulos, Schlegelmilch and Webb 1991, pp. 327-8; Furse and Stewart 1984, p. 80; Hoonakker and Carayon 2009, pp. 351-2*). Whenever this subgroup – or a substantial part of it – systematically fails to respond to the survey, nonresponse error will occur and the results of the survey will be biased (*Green 1996, pp. 171-2*). Consequently, for the reasons mentioned above outcome rates are an indicator for the quality of results obtained in a survey. Moreover, the problem aggravates as the outcome rates of classic survey methods have been continuously declining over time (*Hoonakker and Carayon 2009, pp. 365-6*).

Different approaches to counteract nonresponse error have been discussed in literature. For instance, it was suggested to minimize nonresponse error by several adjustments conducted in the phase of survey evaluation, e.g. weighting of cases, imputation, and selection bias models (*Groves, Cialdini and Couper 1992, p. 475; Kalton 1983, pp. 69-75*). As such procedures are all based on certain untestable assumptions, e.g. about the frequency of subgroups in the population, they are all prone to error. Therefore, it is frequently suggested instead to minimize nonresponse and, hence, nonresponse error by the optimization of survey process and design (*Groves, Cialdini and Couper 1992, p. 475; Diamantopoulos, Schlegelmilch and Webb 1991, pp. 327-8*). In this way response rates will be maximized and nonresponse error reduced.

2.6.2 Literature Review on Outcome Rates in Mobile Market Research

Several experimental studies which focus on the comparison of outcome rates of mobile and stationary web surveys have already been conducted. McGeeney and Marlar (*2013, pp. 7-18*), for instance, tested whether response rates differ in case the possibility to complete the survey on a mobile device is (“web + mobile”; RR=46.29%) or else is not (“web only”; RR=46.42%)

explicitly stressed in an e-mail invitation⁹⁹. In their experiment a large probability based sample (N=36,252) has been randomly drawn from a major nationwide representative mail and online panel in the USA. They found no significant difference regarding outcome rates between both groups (OR=.995).

In another mode experiment Wells, Bailey and Link (2012, p. 9; 2013c, pp. 1-8) compared the outcome rates of a mobile app survey (CR=58%) with those of an identical web survey (CR=61%). They found a trivial (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) mode effect (OR=.883) but no significances have been tested. At this, the sample (N=1,416) has been randomly drawn from the subset of smartphone users of an online panel. Both participants in the web and mobile app survey mode received an e-mail invitation. The invitation designated for the mobile app survey group contained an instruction how to download the survey app, while at the same time the invitation for the group participating in the web mode contained only a link to the web survey. In the course of the evaluation of the study the authors analyzed the user agent strings of web survey respondents. At this, they found that 22.6% of respondents did not answer in the desired stationary mode, but on a smartphone or even a tablet. Hence, results in this group are likely confounded to a non-neglectable extent.

Similarly, De Bruijne and Wijnant (2013, p. 487) assigned 440 available subjects from a Dutch online panel to two experimental conditions. The subjects were then invited by e-mail and asked to participate in a web survey either on a stationary (N=223) or a mobile device (N=217). At this, the mobile device group included both phones and tablets users. Notably the authors claimed that “*assuming that many respondents [...] viewed their invitational e-mail on a computer, the task would be more demanding for them if they needed to switch to another device*” (Id., p. 487). At this, they pointed out that outcome rate differences may not only be due to the survey mode but also to the interaction of the survey as well as invitation mode. Unfortunately, not all respondents answered on the device desired by the researcher and, therefore, have simply been excluded from the study. For instance, 12.2% of all stationary and 52.8% of all mobile web survey respondents answered in an undesired mode. After this exclusion 61% of those invited to participate on a stationary and 47% to participate on a mobile device completed the survey. This equals to a small size (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) mode effect (OR=.567). However, to come straight to the point, these results are likely biased by the prior exclusion of participants.

⁹⁹ In case respondents accessed the survey on a mobile device the “web + mobile” group participated in an active mobile web survey. In case the other group („web only“) accessed on a mobile device they participated in a passive web survey (Buskirk and Andrus 2012a, p. 11).

In another mode experiment Buskirk and Andrus (2012a, p. 11) compared the outcome rates of active mobile web surveys to those of a stationary web surveys. The entire sample of 1,310 subjects was randomly drawn from the subset of Apple iPhone owners in an US online panel. Consequently, all mobile participants participated on similar smartphone models. The authors discovered outcome rates of CR=22.8% for the mobile and CR=67.9% for the stationary web survey which is a large (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) effect size (OR=.140). Unfortunately, the authors neither indicate the significance of this difference nor how the panelists were invited in each experimental condition.

In contrast, in a study by Saunders et al. (2012, pp. 3-15) 1,510 subjects completed an initial recruitment web survey. Moreover, the authors asked their subjects to indicate whether they prefer to participate in a stationary or a mobile web survey¹⁰⁰. Then, one week later, in a second step all subjects were invited in an invitation mode in accordance to their stated preferences to either a stationary or mobile web survey. At this, the invitation mode was undisclosed to the reader. Here, 86% of subjects who indicated a preference for stationary web surveys and 76% of subjects who preferred mobile web surveys complied with the survey request. Unfortunately, researchers did not indicate the significance of this small size (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) mode effect (OR=1.940). Moreover, the authors mention that not all subjects participated in the survey mode they previously preferred.

Similarly, in a first step of her experiment Mavletova (2013, pp. 728-33) conducted a recruitment survey on stationary devices to which panelists from a Russian online access panel were invited. Panelists who herein indicated that they were also users of the mobile internet qualified for the second step of the experiment. Here, respondents were randomly assigned to either a stationary (N=740) or mobile (N=2,100) web survey condition. Respondents assigned to the prior condition were asked if they were willing to participate in a stationary web survey and received an e-mail invitation upon opting in (N=722). In contrast, those assigned to the latter condition were asked if they wanted to participate in mobile web survey and, subsequently, asked for their mobile phone number. Upon opting in (N=1,234) they received an invitation to the same survey by SMS. After completion of the survey the author analyzed the user agent strings of all participants in both conditions. Respondents who answered on a device not desired in a condition were excluded from analysis. At this, the author found a completion rate¹⁰¹ of CR=81.9% for the stationary and CR=40.1% for the mobile condition

¹⁰⁰ Approximately 40% participated on stationary and 60% on mobile devices (Saunders et al. 2012, p. 3).

¹⁰¹ Regarding the number of invitations send out in every condition.

(OR=.148). This corresponds to a large (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) mode effect. Mavletova (*2013, p. 728*) hypothesized that this may be due to the fact that mobile web surveys are “*more labor-intensive and time-consuming*” than stationary web surveys which is in keeping with Social Exchange Theory (SX)¹⁰².

All of the experimental studies which were briefly presented above showed different types of limitations. This doctoral study aims to overcome all of these at one and the same time. First, there are several limitations regarding the online sample chosen for these experiments. Besides the fact that some samples are rather restricted in their extent – e.g. that of De Bruijne and Wijnant (*2013*) with approximately 220 subjects per group – it is particularly disturbing, that not all subjects have been recruited solely for the purpose of the study. Several authors report that they rather recruited subjects from existing online panels, e.g. Wells, Bailey and Link (*2012*). However, long-term members of online panels are already used to a regular participation in online studies on the stationary web and are, hence, more experienced with this mode than with mobile web surveys. Only Mavletova (*2013, pp. 737-8*) claimed that the outcome rates of mobile web studies with such subjects may be biased, especially when their outcome rates are compared to those of stationary web surveys.

Moreover, some studies do not explicitly control whether subjects in the sample are both users of the stationary as well as mobile internet and whether they own both stationary and mobile devices. Self-evidently, subjects that do not use the mobile internet, for instance because they do not own a mobile device, lack the possibility to participate in a mobile web study. In contrast, members of an online panel likely have access to a stationary device connected to the stationary web and, hence, may easily participate in a stationary web survey. Consequently, outcome rates of such studies may again be biased by the underlying sample.

In addition, despite their obvious differences¹⁰³, some studies explicitly add tablet users to the group of mobile device users while others do not. Therefore, not all effects are comparable across different experiments. Furthermore, researchers like Buskirk and Andrus (*2012a*) chose only owners of a designated device – in their case Apple iPhone – as members of their sample. However, it has already been shown in literature that there are differences between the demographics, attitudes and behavior of iPhone users in comparison to users of other smartphones (*Gerpott, Thomas and Weichert 2012; Zahariev et al. 2009, pp. 9-10*). Consequently, the results of such designated device studies are not completely generalizable.

¹⁰² Q.v. Section 3.1.

¹⁰³ Q.v. Section 4.5.1.

In order to overcome the limitations of previous studies, this research will be conducted with a comprehensive sample recruited only for this purpose. Moreover, in a preliminary study it will be tested whether recruited subjects use the stationary and mobile internet and, hence, are eligible to be part of the main sample. In addition the study is not limited to the users of one designated device. Quite the contrary, it is optimized for all types of mobile phones. However, for reasons explained later in this study, tablet users are not eligible to participate¹⁰⁴.

Second, there are also several limitations regarding the experimental groups compared in these studies. For instance, in some studies stationary web surveys have not been compared to mobile web surveys. In McGeeney and Marlar's (2013) study respondents were able to self-select the survey mode which they wanted to participate in during the recruitment stage. Hence, in their experiment the outcome rates of a stationary web survey were compared to those of a mixed-mode study, and not a mobile web survey. Moreover, there are also studies in which the subjects can self-select the experimental group and, hence, the mode they want to participate in, e.g. Saunders et al. (2012). The problem of self-selection regarding representativity in web surveys has been discussed by Zerr (2003, p. 19). Such quasi experiments originate biased outcome rates as respondents will likely select the answer mode which "suits them best". Consequently, in web surveys outcome rates will be higher in case respondents are invited to their preferred survey mode compared to the case in which they were randomly assigned to experimental conditions (Olson, Smyth and Wood 2012, p. 621). At this, SX¹⁰⁵ would suggest that respondents choose the mode that offers them the highest net benefit.

Wells, Bailey and Link (2012) compared a mobile app survey to a stationary web survey. Generally, there are no objections to research mobile app surveys which constitute one possibility to conduct MMR on mobile devices. However, as mentioned before in this chapter¹⁰⁶, there are non-neglectable differences between mobile app and mobile web surveys (Callegaro 2013, pp. 318-9). For instance, respondents will previously have to download and install the survey application, which likely constitutes a hurdle to participation (Buskirk and Andrus 2012b, pp. 3-9). Consequently, one may not simply draw inferences from the outcome rates of mobile app surveys about those of mobile web surveys.

¹⁰⁴ Id.

¹⁰⁵ Q.v. Section 3.1.

¹⁰⁶ Q.v. Section 2.3.

Furthermore, many studies conducted so far did not ensure that the stationary condition have not been confounded by respondents on mobile devices and vice versa. Moreover, some did not ensure that both experimental groups were not confounded by tablet respondents by admitting them to their studies, although tablets differentiate themselves from both stationary devices and mobile phones¹⁰⁷ (*Wells, Bailey and Link 2013b, pp. 2-9*). For these reasons subjects invited to the stationary condition in such studies could have participated in the survey on an undesired mobile device – e.g. a tablet or a smartphone – or even some other internet enabled device. In this case the results of the comparison would be biased.

In contrast, other researchers – e.g. De Bruijne and Wijnant (2013) or Mavletova (2013) – explicitly control user agent string for respondents that participate in an undesired mode and exclude them from the study. However, they only do so ex post, after the study has been conducted. In the opinion of the author of this study, the aforementioned procedure is not the “be-all and end-all” to this problem. In case respondents answer in a mode undesired by researchers they can either do so intentionally or unintentionally. An unintentionally undesired response may occur, e.g. in case the respondent did not notice that the researcher asked for participation in a particular mode, or in other word, the respondent did not notice the experimental manipulation. To the best knowledge of this author none of the studies conducted a manipulation check in this regard so far. This problem will likely aggravate if the respondents were recruited from an online panel. Because such respondents are used to comply in the stationary web mode (*Mavletova 2013, pp. 737-8*) they may simply read over the researchers’ instructions to answer on a mobile and instead answer on a stationary device – as always. Likely, the results of such studies are biased. Here, in order to overcome this shortcoming, the researcher should ensure that the experimental manipulation has been noticed by the respondent in first place. However, this is only hard to accomplish. Alternatively, undesired respondents should once again be pointed towards the requirement that the survey has to be taken in a different mode and not be admitted to the questionnaire web page as long as they try to access it in the undesired mode. In this way the bias of outcome rates by exclusion of subjects that would have answered the survey in the desired mode in case they noticed the manipulation is entirely precluded.

Within her study Mavletova (2013) only asked the subjects chosen for the mobile condition for their mobile phone number, but not panelists in the stationary condition. However, this constitutes a shortcoming regarding parallelization of experimental condition. As only sub-

¹⁰⁷ Q.v. Section 4.5.1.

jects selected for the mobile condition had to disclose this very sensitive information, it is likely that some of those who were highly concerned about data safety issues dropped out and, hence, were not included in the major study. In case this drop out was systematical it could lead to a severe bias of study result.

In order to overcome these limitations of the previous studies only stationary web surveys will be compared to mobile web surveys in this study. Furthermore, great importance is attached to the parallelization of experimental conditions as well as the different devices subjects participated on within each condition. At this, subjects who intend to participate on devices undesired for a particular mode were pointed towards the required mode and not admitted to the survey as long as they did not switch their device. Furthermore, in many studies previously conducted subjects have been invited to passive mobile web surveys. As such surveys are not optimized for the display on mobile devices they induce a suboptimal user experience. Consequently, active mobile web surveys have been compared with stationary web surveys in this study¹⁰⁸.

Third, some studies conducted so far disregarded or underestimated the influence which the mode on invitation may exert on outcome rates of web surveys in different modes. Wells, Bailey and Link (2012), for instance, invited both the mobile and stationary experimental group to the survey with a similar invitational e-mail. On the contrary, Mavletova (2013) invited subject in the stationary condition by e-mail and those in the mobile condition by SMS. However, what may intuitively seem unproblematic at first sight may lead to a severe bias of outcome rates.

In general 75% of e-mail users in Germany sent and received e-mails at least once a day in 2012 and 14% at least once a week¹⁰⁹ (BVDW 2013b, p. 6). In contrast, only 17% of users of web enabled mobile devices in Germany did so at least on a daily and 16% at least on a weekly basis during the same period of time (BVDW 2012, p. 17). In addition, a different study shows that in general 34% of subjects within the age group of adolescents between 12 and 19 years of age in Germany sent and received e-mails at least once or several times per week (mpfs 2013, p. 36) and only 19% of mobile phone owners in that age group did so on their mobile devices (*Id.*, p. 56).

¹⁰⁸ Q.v. Section 4.5.1.

¹⁰⁹ 14% do so at least once a week, 5% once a month, 3% even less often (BVDW 2013b, p. 6).

Consequently, there are varying probabilities with which invitational e-mails sent by researchers are received on different devices. Therefore, *ceteris paribus*, assuming that both e-mails received on stationary and mobile devices show the same salience, it is more likely that subjects will notice the invitation shorter to the time it was sent by the researcher on stationary than on mobile devices. In case the field time of a study lasts less than a week more subjects should notice the invitation in the stationary than in the mobile mode.

Moreover, it is not ensured that subjects will receive invitational e-mails in the same mode in which they are required by the researcher to conduct the web survey in. In case an invitational e-mail is received by a subject on a stationary device, but the researcher intended the survey to be conducted on a mobile device it would be more demanding for subjects to switch to a mobile device in order to participate in the survey than to do so in the stationary mode and vice versa (*De Bruijne and Wijnant 2013, p. 487*). The prior, for instance, would have to transfer the link sent by e-mail and received on the stationary device to a mobile device which requires some additional effort. According to SX^{110} (*Blau 1964; Dillman 1978; Homans 1961; Thibaut and Kelley 1959*) additional effort and costs will lower response rates. Hence, it may not be ruled out that invitations by e-mails exert a different impact on the outcome rates of stationary than on mobile web surveys.

Additionally, the same study as cited before also indicated that 82% of mobile phone owners sent and received SMS on their phone at least once or several times a week (*mpfs 2013, p. 56*). Thus, the probabilities of receiving SMS on mobile phones also differ from the probabilities of receiving e-mails on stationary and mobile device. As a consequence, the problem of receiving the invitation on the device the survey is intended by the researcher to be answered on, as explained above, is further complicated. Both SMS and e-mails will likely exert a different salience dependent on the device they were received on. This is because different types of functions which notify subjects of newly incoming messages are available on different devices. Finally, as a general rule, an average SMS is comprised of far less characters than an e-mail. Consequently, less relevant information about the web survey may be included in an SMS invitation than an e-mail invitation. For all of the reason above it may not be ruled out that invitations by SMS exert a different impact on the outcome rates of stationary and mobile web surveys than e-mail invitations.

¹¹⁰ Q.v. Section 3.1.

Therefore, in this study both survey and invitation modes are included as part of the experimental manipulation. Moreover, the anticipated ease of switching of the device on which an invitation is received on to the device the survey is taken on as well as the salience of different notification functions available on stationary and mobile devices were considered in this study. To the best of the knowledge of this author no other research has been conducted on the impact of the mode of invitation on the outcome rates of mobile web surveys and compared to those of stationary web surveys.

Finally, for the sake of completeness, it is a further strength of this study to control whether e-mail and SMS were actually delivered to their intended recipients. In this way it is prevented that not retrieved SMS were deleted from the mobile network operators' servers after their "validity period" expired. A similar procedure has only been applied by a few researchers (*Van Heerden et al. 2013, p. 4*).

The next chapter turns to the topic of SRB as outcome rates are the aggregated result of individual level behavior. The topic is analyzed by means of a literature review. At first, the Social Exchange Theory, a popular theory relevant for the explanation of survey participation, will be introduced. Thereafter the AICR model explains survey participation as a four staged process. Finally, three categories of factors influencing participation will be shown to the interested reader.

3 Survey Response Behavior

Survey Response Behavior (SRB) is an umbrella term comprising different forms of human behavior in the context of surveys. At this, one may differentiate between at least two broad categories of observable SRB (*Cavusgil and Elvey-Kirk 1998, p. 1166*):

- SRB as potential subjects' behavior of *whether or not* they participate in a survey, e.g. operationalized as an outcome rate of a survey¹¹¹
- SRB as participants' behavior of *how* they participate in a survey, e.g. operationalized as the level of effort and thought devoted to completion, which is known as data quality¹¹²

Ever since the first publication of major marketing research journals in the 1960s, articles on the conceptualization of SRB are rare and most often empirically untested (*Albaum, Evangelista and Medina 1998, p. 116*; *Brüggen et al. 2011, p. 370*; *Cavusgil and Elvey-Kirk 1998, p. 1165*; *Evangelista, Albaum and Poon 1999, pp. 227-44*; *Green 1996, p. 180*; *Groves, Cialdini and Couper 1992, pp. 476-7*). It was not until 2002 that Helgeson, Voss and Terpening (2002) first tested a suitable conceptualization of Mail-SRB, which is also adaptable to online and mobile web survey research (*Hoonakker and Carayon 2009, p. 361*). Their AICR model¹¹³ is similar to the AIDA model, which is a hierarchical model, well-known in advertising effects research (*Palda 1966, p. 13*; *Madden and Dillon 1982, pp. 482-3*).

AICR displays the recipient's decision to complete a survey as a process, rather than a distinct decision (*Furse and Steward 1984, p. 84*). It consists out of four process stages: attention, intention, completion, and return (*Helgeson, Voss and Terpening 2002, p. 307*)¹¹⁴. In this way AICR embraces both SRB as potential subjects' behavior whether or not they participate in a survey, as well SRB as participants' behavior of how they participate in a survey. At this, the Theory of Planned Behavior (*Fishbein and Ajzen 1975*) and the related Technology Acceptance Model (*Davis 1989*) illustrate the intention to participate in a survey (*Bosnjak, Metzger and Gräf 2010, pp. 351-2*; *Bosnjak, Tuten and Wittmann 2005, pp. 493-5*). In addition, Helgeson, Voss and Terpening (2002, pp. 306-7) considered various variables influencing SRB in their conceptualization, such as survey design, respondent, as well as situational factors (*Groves, Cialdini and Couper 1992, pp. 477-9*). All of these have different impact on the

¹¹¹ Q.v. Sections 2.6.1, 2.6.2 and 4.5.3.1.1.

¹¹² Q.v. Section 4.5.3.1.2.

¹¹³ The abbreviation was chosen by this author.

¹¹⁴ Feld et al. (2013, p. 144) have developed a similar process called "direct mail response funnel". Its process steps are: opening of the mailing, interest, ultimate response.

final behavioral outcome of the decision process (*Helgeson, Voss and Terpening 2002, p. 308*).

3.1 Social Exchange Theory

In order to explain the movement of recipients from prior to later stages of the response process the AICR model makes use of the Social Exchange Theory (SX) (*Blau 1964; Dillman 1978; Homans 1961; Thibaut and Kelley 1959*) as a basic model of SRB¹¹⁵ (*Childers and Skinner 1985, pp. 39-53; Groves, Cialdini and Couper 1992, pp. 475-95*). To the best knowledge of the author SX offers the most suitable explanation for potential subjects' behavior of *whether or not* they will participate in a study, as it is induced in the experiment conducted in the course of this doctoral study. While the latter behavioral category – potential subjects' behavior – constitutes the primary research objective of this study, nevertheless, SX is also suitable to explain some facets of *how* participants behave while completing a survey.

According to Social Exchange Theory (SX) (*Blau 1964; Dillman 1978; Homans 1961; Thibaut and Kelley 1959*) SRB may be interpreted as an exchange, a voluntary reciprocal social transaction of tangible and intangible efforts and rewards between researcher and potential recipient (*Greer, Chuchinprakarn and Seshadri 2000, p. 98; Homans 1961; Hoonakker and Carayon 2009, p. 359*). An social exchange will only occur if it is equitable for both parties involved (*Cavusgil and Elvey-Kirk 1998, p. 1168; Skinner, Ferrell and Pride 1984, pp. 108-11*). This is the case whenever the expected net benefit of the transaction is positive for both researcher and potential recipients. In particular, the sum of expected benefits associated with the survey has to outweigh the sum of its expected costs (*Hoonakker and Carayon 2009, p. 359*). Sending out a survey offer implies that the researcher involved will expect a positive net benefit from doing so, e.g. from collecting the recipients' survey data at a predetermined

¹¹⁵ Nevertheless, it takes more than one theory to fully understand the broad field of SRB. Fortunately, theories applied in this field do not show a competing, but rather a complementary character. For instance, Albaum and Smith (2012, p. 189) point out that more than one theory may be used to explain behavior in a survey research project. They exemplify that different theories may be used in one study to explain the effect of different factors influencing survey response. It is therefore the favorable feature of this SX that it is not opposed to other survey response theories but, quite the contrary, integrates the Cognitive Dissonance Theory (q.v. Annex CXI) (*Festinger 1954; Festinger 1957; Furse and Stewart 1984; Hackler and Bourgette, 1973*) and Self-Perception Theory (q.v. Annex CXII) (*Allen, Schewe and Wijk 1980; Bem 1972; Tybout and Yalch, 1980*) under its umbrella. Together the aforementioned constitute the three most cited and, hence, most important theories applicable to survey research (*Albaum, Evangelista and Medina 1998, p. 116; Evangelista, Albaum and Poon 1998, pp. 227-44*).

level of effort. Therefore, the focus of this section should be put on the recipients' side of the transaction.

At the beginning of the survey process, the researcher invites potential recipients to participate in a survey. This invitation communicates a set of survey design factors previously specified by the researcher, e.g. the researcher offers a small monetary incentive to the subjects to participate in a web survey which takes approximately 10 minutes to complete. For potential recipients, in turn, this invitational offer to a survey constitutes a bundle of efforts and rewards (*Balderjahn 1993, pp. 19-29*) which are closely associated with benefits and costs they yield from participation. For instance, they can benefit from the small incentive. However, completion will cost some of their time in exchange. In order for a survey to be completed and returned, potential recipients have to evaluate, by means of SX, that the expected benefits of participation are greater than its costs (*Albaum, Evangelista and Medina 1998, p. 119*). In addition, in order for a survey to be completed and returned, recipients have to trust that the amount of benefits and costs promised by the researcher is – exactly the same as expected – not at odds with truth. In turn, the survey will not be completed and returned if its expected costs outweigh the expected benefits or subjects do not trust the researchers' information. In the course of a study, participants' first subjective impressions of some design factors, e.g. survey length, are displaced by actual experience. Consequently, the perception of these design factors changes and therefore has to be continuously reevaluated throughout the entire survey process.

In this context several meta analyses (*Church 1993, p. 62; Göritz 2006, pp. 63-4; Yammarino, Skinner and Childers 1991, p. 628*) have shown that e.g. prepaid¹¹⁶ monetary and nonmonetary incentives as well as promised lotteries – which all are regarded as benefits for the potential respondent – increase outcome rates of surveys in different survey modes¹¹⁷. Additionally, an extensive review of diverse other means of adding benefits¹¹⁸, reducing costs¹¹⁹, and estab-

¹¹⁶ In turn, postpaid incentives do not increase response rates because SX is not applicable as the transaction becomes an economic rather than a social exchange (*Dillman, Smyth and Christian 2009, p. 20*).

¹¹⁷ Q.v. Section 3.3.1.2.

¹¹⁸ E.g. in case researchers provide information about the survey, ask for help and advice, show positive regard, say thank you, support group values, give tangible rewards, make the questionnaire interesting, provide social validation, inform people that opportunities to respond are limited (*Dillman, Smyth and Christian 2009, pp. 21-5*).

¹¹⁹ E.g. in case researchers make it convenient to respond, avoid subordinating language, make the questionnaire short and easy to complete, minimize requests to obtain personal and sensitive information, emphasize similarity to other requests or tasks to which a person has already responded (*Dillman, Smyth and Christian 2009, pp. 25-7*).

lishing more trusts¹²⁰ in the survey process is given by Dillman, Smyth and Christian (2009, pp. 22-30). These authors present several empirical references for the positive impact of several of these factors on outcome rates of surveys and, hence, more support of SX as a theory that explains whether or not potential subjects participate in surveys. Thus, SX offers an explanation for subjects' behavior of *whether or not* they will participate in a survey. Researchers aiming to improve outcome rates, e.g. response rates, should maximize the benefits and minimize the costs expected by potential recipients, and at the same time establish trust, that their expectations about benefits and costs are worthy of belief (Greer, Chuchinprakarn and Seshadri 2000, p. 98; Hoonakker and Carayon 2009, p. 359).

Finally, Goetz, Tyler and Cook (1984, pp. 153-4) also found evidence that prepaid incentives increase data quality of surveys – operationalized as item non-response and response error – because they raise the attention subjects pay while completing a survey. All the same James and Bolstein (1990, p. 346) claim that “*larger monetary incentives tended to produce [...] a greater degree of effort expended in completing the questionnaires, as measured by the number of short answers and comments provided, and the number of words written*”. All of this supports SX as a theory that also explains *how* participants complete a survey.

It should be mentioned at this point – and referred to a later section of this chapter¹²¹ – that potential subjects and, thus, also participants of surveys differ among each other. Moreover, prior receive their survey invitation under various circumstances. Hence, respondent as well as situational factors (Greer, Chuchinprakarn and Seshadri 2000, p. 98; Groves, Cialdini and Couper 1992, pp. 477-9) will influence the evaluation of benefits and costs associated with the survey just as well.

3.2 AICR Model as Conceptualization of Survey Response Behavior

The decision process, whether or not to participate in a survey, is initiated by the reception of an initial stimulus sent by the researcher. This action may be interpreted as persuasive communication towards the recipient (Childers and Skinner 1985, pp. 41-2). Stimuli may arrive in diverse forms, e.g. as a survey invitation with a link attached to it (Furse and Steward 1984, pp. 84-7; Helgeson, Voss and Terpening 2002, p. 307). They transfer visual design as well as

¹²⁰ E.g. in case researchers provide sponsorship by legitimate authority, provide a token of appreciation in advance, make the task appear important, ensure confidentiality and security of information (Dillman, Smyth and Christian 2009, pp. 27-9).

¹²¹ Q.v. Section 3.3.2.

clues on a set of survey design factors to potential respondents, e.g. the mode which the researcher chose to conduct the survey in. At this, attention is understood as the focus and concentration of the limited resources of the potential recipients' consciousness toward the stimulus in order to process selected information (*Lachman et al. 1979, pp. 186-92; Styles 2006, pp. 1-3*).

3.2.1 Attention

Reception occurs whenever potential recipients are exposed to, become aware of, and start paying attention to the stimulus (*Busch and Houston 1985, p. 645*). According to Feld et al. (2013, p. 143) visual design factors drive the recipients willingness to open and read the initial stimulus. Recipients may examine the invitational message and process the information which is included in it. Therefore, attention to the stimulus is a necessary condition for creating an intention to participate in a survey (*Helgeson, Voss and Terpening 2002, p. 309*). Consequently, gaining attention is a crucial factor for high outcome rates (*Bosnjak et al. 2008, p. 216*). In line with this, attention and intention are considered as pre-behavioral stages of the AICR model, while completion and return will make up the model's behavioral stages (*Helgeson, Voss and Terpening 2002, pp. 307-8*). At this, Feld et al. (2013, p. 143) claim that the pre-behavioral stages of the process remain an unobservable "black box" (*Id., p. 143*) as researchers focus on response as behavioral variable so far, rather than the process that leads to it.

Every stimulus has to pass the recipients' attention filter, which is a screening mechanism protecting them from irrelevances. All contacts that fail to do so will be deleted, ignored, or indefinitely postponed. Respondents will pay more attention to stimuli with greater salience (*Diamantopoulos, Schlegelmilch and Webb 1991, p. 330; Furse and Steward 1984, pp. 84-7; Hoonakker and Carayon 2009, p. 363*). In this context Feld et al. (2013, p. 143) claimed that the rise of direct mailings to consumers makes it increasingly harder to compete for their limited attention. This certainly holds true for corporate and non-profit market researchers who frequently use the same marketing channels as direct mailers.

In the case of web surveys conducted on stationary and mobile devices the use of several different attention drawing notification functions may foster the probability of reception of the

stimulus. Research conducted in the course of this study¹²² indicated that the amount of attention paid to newly incoming e-mails and SMS on mobile phones will likely differ when different types of notification functions – e.g. notification sounds, vibrating alerts, symbols¹²³, and lighting effects¹²⁴ – are activated by the user. All the same, the amount of attention paid to newly incoming e-mails on stationary devices, as PCs or laptops, will likely increase with the use of pop-up windows¹²⁵, notification symbols¹²⁶, and sounds. Hence, recipients who deploy these attention grabbing functions more frequently will have greater chances of perceiving e-mails or SMS as these are more likely to pass their attention filters (*Diamantopoulos, Schlegelmilch and Webb 1991, p. 330*). Consequently, this immediacy of perception may be interpreted as a proxy for attention gained by an e-mail or SMS. As attention is a prerequisite of intention to participate in a survey (*Helgeson, Voss and Terpening 2002, p. 309*), a measure of immediacy of perception (ip) of SMS and e-mails on mobile and stationary devices will be included as a covariate into the Multiple Binary Logistic Regression model used in this study.

3.2.2 Intention

In case the stimulus will grab their attention, potential respondents will concentrate their cognitive resources (*Lachman et al. 1979, pp. 186-92; Styles 2006, pp. 1-3*) and more or less consciously begin to evaluate the invitation as well as the information about the features of the requested task provided in it by means of SX. Invitations may contain different features presented at different levels of salience. Potential respondent will attribute a different amount of importance to the individual features an invitation may contain. Therefore, features will vary by the leverage they have on SRB. This is the main idea of the Leverage-Saliency Theory (*Groves, Singer and Corning 2000*).

The different survey features and information about them provided on the invitation may be processed under high or low conditions of elaboration. While under the latter condition potential respondents will mainly pay attention to peripheral clues, e.g. as the credibility of the source providing the survey, the former condition will induce them to analyze the content of the invitation closely (*Van Kenhove, Wijnen and De Wulf 2002; Brüggem et al. 2011, p. 373*). At this, they will evaluate the effort, monetary costs, as well as the positive or negative reac-

¹²² Q.v. Section 4.6.

¹²³ E.g. when a small envelope is shown on the display.

¹²⁴ E.g. the shining/blinking of an LED.

¹²⁵ A small window appears e.g. in the corner of the screen.

¹²⁶ A small image, e.g. an envelope appears in a corner of the screen.

tions of their social environment as consequences of participation, for instance (*Steffenhagen 1996, pp. 33-4*). Further, they will make judgments about their first subjective perception of some survey design factors, e.g. the length of the survey (*Helgeson, Voss and Terpening 2002, p. 310*). Assuming that this evaluation will have a negative outcome – that is e.g. the survey is perceived as too long – the recipient will refuse to engage in completion, delete, ignore, or indefinitely postpone it (*Furse and Steward 1984, p. 85*). In case of a positive outcome, e.g. that survey length is perceived as “just right”, the recipient might develop an intention to perform the survey task.

According to Fishbein and Ajzen (*1975, pp. 12-3*), behavioral intentions are defined as the potential respondents’ beliefs about themselves toward performing a certain behavior, e.g. participating in a survey. Their Theory of Planned Behavior (TPB) views behavioral intention as precursor, determinant, and best estimator of consequent actual behavior. Bosnjak, Tuten and Wittmann (*2005, pp. 493-5*) make use of TPB to explain survey participation in a web-based access panel survey. In their model the potential recipients’ behavioral intention to complete a survey is determined by their attitude towards survey completion, the social pressure of others to complete (or not complete) the survey, which is referred to as subjective norm, as well as perceived behavioral control (PBC). The latter refers to the potential respondents’ perception of the complexity, or in other words, the ease or difficulty of performing a given survey task. Additionally the authors extend TPB by adding moral obligation to participate in a survey as a fourth determinant of behavioral intention. In total the four proposed factors explained 69.5% of the variance of behavioral intention to participate in a survey, which after all accounts for only 17% of the variance of actual participation (*Id., p. 500*). A replication study using the same factors explained 82% of the variance of behavioral intention to participate in a survey. Unfortunately, the researchers were not able to measure actual participation due to adverse conditions (*Heerwegh and Loosveldt 2009, p. 189*).

Moreover, in order to model mobile web survey participation Bosnjak, Metzger and Gräf (*2010, pp. 351-4*) make use of the Technology Acceptance Model (TAM) by Davis (*1989*), which is conceptually related to TPB. According to TAM a behavioral intention to complete a mobile web survey is determined by the potential recipients’ attitude towards survey completion as well as the perceived usefulness and ease of its use. The latter is closely related to the PBC construct known from TPB. Furthermore, the authors extend Davis’s (*1989*) TAM by including a subjective norm, anticipated or perceived enjoyment, and perceived trustworthiness, which refers to data safety and anonymity, as well as self-congruity as predictors of in-

tention. The last construct, self-congruity, refers to the compatibility of the intended behavior of completion to the potential recipients' actual or desired self-image. Finally, perceived costs are also included in the model but not further specified in the deliberations. Therefore, for the respondents of their study the actual costs of participating in a mobile web survey remain rather vague. In total the eight factors explained 81.1% of the variance of intention to participate in a survey, which in turn explained just 16% of the variance of actual behavior (*Bosnjak, Metzger and Gräf 2010, pp. 356-7*).

According to Steffenhagen (1996, pp. 119-22) behavioral intentions are formed against the backdrop of an evaluation of effort, monetary costs and positive or negative reactions of one's social environment as consequences of potential participation. Furthermore, true pressing intentions are accompanied by high commitment and tied to a certain time frame. However, none of the studies cited above confronts respondents with clues about what their actual consequences of participation could be. For example, the authors rather chose to use a broad, fuzzy costs term than specify what exact elements of costs participants may face. These costs, for instance, may include that those participants who are not subscribers of a mobile internet plan or flat rate tariff, will be charged an additional fee on their telephone bill. Here, the amount paid by respondents will depend on the actual data volume transferred for the purpose of participation in a survey. Consequently, behavioral intention measured in these studies likely overestimates the number of actual respondents to the survey. Hence, it is not able to explain a substantial part of the variance of actual survey participation. In contrast, providing potential recipients with more detailed information about the requirements and consequences of their participation, e.g. the costs associated with it, as well as specifying a fixed point in time the study will take place, might improve the explanatory power of the model. Furthermore, the model could benefit from adding a measure of commitment or involvement.

The extent by which a factor will influence the formation of behavioral intentions may differ for different survey modes. For instance, PBC, which refers to the potential respondents' perception of the complexity of performing a given survey task, may differ by mode. One reason for this may be that the screens and keyboards on mobile devices are usually smaller¹²⁷. Therefore, potential respondents may perceive it as more complex to perform a survey task on a mobile phone than on a personal computer (*Peytchev and Hill 2010, pp. 320*) so that their survey satisfaction might be affected (*de Bruijne and Wijnant 2013, p. 492*). Hence, it is im-

¹²⁷ Other reasons are presented in Sections 2.4.2.1 and 2.4.2.3.

portant to differentiate between a behavioral intention to participate in a stationary web survey and a behavioral intention to participate in a mobile web survey.

In this context, Olson, Smyth and Wood (2012, p. 612) define consumers' mode preferences as "*positive attitudes toward certain modes and neutral or negative attitudes toward other modes*". They show that in case panelists prefer web surveys to other modes, providing them with their preferred mode will increase response rates in comparison to providing them with unfavored modes (OR=2.42) (Olson, Smyth and Wood 2012, p. 621). This result is a highly significant medium size mode effect nearly at the edge to a large effect (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192).

In the course of this study, panelists were asked to state their intention to participate in surveys conducted in different survey modes. The fact that intention to participate in a survey may differ by mode is taken into account when a measure of the self-stated intention to participate in web surveys (pp) is calculated and included as an independent variable into the Multiple Binary Logistic Regression model.

3.2.3 Completion and Return

Prompting potential respondents to desirable behavioral outcomes, e.g. completing and returning of a survey, are the major objectives of survey research and the two final stages of the AICR model. While the prior stages of the AICR model are considered as pre-behavioral, completion and return will make up the model's observable behavioral stages (Helgeson, Voss and Terpening 2002, pp. 307-8).

During the completion phase respondents will gather more and new information about the survey. For instance, they may find out that the survey is longer than initially presumed. Consequently, their first subjective perception of survey design factors is displaced by actual experience. Respondents will subconsciously reevaluate the costs and benefits of participation – again, by means of SX. When the outcome of the reevaluation changes from positive into negative, compared to the initial evaluation, immediate survey drop out or other undesirable behavior may result. Otherwise the survey will be further completed (Helgeson, Voss and Terpening 2002, p. 312).

Tourangeau (1987, pp. 151-3) claims, that while completing a survey, respondents will interpret its questions, retrieve relevant information from their memory, process this information,

and report answers to the questions asked. The effort exerted in this procedure will determine the quality of data the researcher will obtain (*Krosnick 1991, p. 229; Rogelberg et al. 2001, p. 4*). Besides the dominating focus on outcome rates – in particular response rates – data quality and response speed of a survey have frequently been investigated in literature. At this, data quality¹²⁸ refers to the “*degree of effort and thought devoted to the questionnaire by the respondent who completes it*” (*Houston and Ford 1976, p. 398*). It therefore relates to the completion phase of the AICR model. The variable is frequently measured e.g. in terms of item omission, completeness of answer, and response error (*McDaniel and Rao 1980, p. 265*). Consequently, item nonresponse is one possible indicator for data quality. In turn, response speed¹²⁹ refers to the time lag between the invitational contact and the respondents’ reply (*Houston and Ford 1976, pp. 398-400*). The measure should not be mistaken with the response time¹³⁰ which is an indicator for the respondents’ processing time of a survey. It assesses how much time they have spent to complete parts of a questionnaire. It may be measured for individual items, pages, as well as the entire questionnaire (*Bassili and Fletcher 1991, p. 331*).

After the survey has been completed, it has to be returned to the researcher. Helgeson, Voss and Terpening (2002, p. 313), claim that not returning a completed survey constitutes an enormous cognitive dissonance¹³¹ for the respondent and, hence, will rather be an exceptional behavior. It is a distinctive feature of online and mobile web surveys that, in contrast to postal surveys, the return of a survey does not require an unduly effort from the respondents. In particular responses do not have to be carried to a postbox, but may easily be transferred by the internet. In the majority of cases survey data is transferred simultaneously as respondents complete the survey. Therefore, for online and mobile web surveys completion and return phases can hardly be distinguished.

In this study, response or nonresponse are operationalized as the participation rate of a survey¹³². In general, nonresponse has to be differentiated into unit and item nonresponse (*Groves et al. 2009, pp. 192-210*). The former relates to the loss of entire survey units, or in terms of the AICR model, potential respondents who do not return their questionnaires. It is a measure determining the outcome rate of a survey. In contrast, the latter has no connection to outcome rates, as it solely refers to missing responses to individual questions, so called items

¹²⁸ Q.v. Section 4.5.3.1.2.

¹²⁹ Id.

¹³⁰ Id..

¹³¹ Q.v. Annex CXI.

¹³² Q.v. Section 4.5.3.1.1.

(Bosnjak, Tuten and Wittmann 2005, p. 490). Although some items were left unanswered, the entire questionnaire unit still may be returned.

Outcome rates are of particular importance for survey researchers as low unit response may lead to nonresponse bias which threatens the validity of a survey (Hoonakker and Carayon 2009, pp. 351-2). This bias occurs when respondents – respectively their answers – systematically differ from non-respondents (Diamantopoulos, Schlegelmilch and Webb 1991, pp. 327-8). As this difference is usually not measurable, it is assumed that a lower response rate increases the probability of nonresponse bias (Manfreda et al. 2008, pp. 99-100) and, thus, decreases the representativity of a survey (Furse and Steward 1984, p. 80). Nonresponse is a non-neglectable threat, in particular for web surveys (Manfreda et al. 2008, p. 79) because their outcome rates are frequently reported as lower than those of other modes¹³³.

For the sake of completeness, it should be mentioned in the end that completion and return are not the only relevant behavioral outcomes in a survey process. This fact may be considered as the “blind spot” of the AICR model. For instance, the respondents’ request for the results of the study (Helgeson, Voss and Terpening 2002, p. 313) constitutes another possible behavioral variable. Furthermore, similar to recommendation and repurchase behavior in Consumer Behavior research (Trommsdorff 2008, pp. 282-301), former participants may recommend to participate in a survey to their peers or develop a willingness to participate in similar future surveys on their own.

All the same, survey stimuli will cause immediate and long-lasting unobservable effects. For instance, frequent survey contacts may have an impact on attitudes toward survey research in general (Rogelberg et al. 2001, p. 4), the attitude toward the research organization, the researcher conducting the study (Helgeson, Voss and Terpening 2002, p. 310), and other psychographic variables as e.g. the interest or involvement toward the survey topic. However, so far the impact of surveys on unobservable behavioral variables has widely been neglected in survey research.

Focus was put on observable instantaneous and final behavioral effects in SRB in this study. Due to its importance in previous research and professional practice, outcome rates – in particular participation rates – were chosen as primary object of this study for which hypotheses¹³⁴ have been developed. Subsequently, participation has been operationalized as the de-

¹³³ Q.v. Section 3.3.1.1.2.

¹³⁴ Q.v. Chapter 5.

pendent variable of the Multiple Binary Logistic Regression model estimated¹³⁵. Furthermore, numerous objects of secondary interest have been included in this study. In particular, data quality and response speed have been explored. Additionally, the recommendation behavior of participants and their willingness to participate in similar future surveys have been examined¹³⁶. For these dependent variables of secondary focus, however, neither hypotheses have been developed nor a literature review conducted, as this would have disproportionately extended the scope of the study.

3.3 Factors Influencing Survey Response Behavior

In order to increase outcome rates – in particular participation or response rates – researchers incorporate certain design factors into their surveys. Here, the term “*design factor*” does not only refer to the general imaging of the survey, e.g. the color of the questionnaire, but also includes all aspects of survey configuration or implementation procedures, as contacts (e.g. invitations, pre-notifications, reminders) as well as their mode or the mode the survey is conducted in. Numerous survey design factors are potential candidates which may be implemented into models of survey participation. Therefore, it is particularly important to closely examine only those variables, which exert differential effects on survey participation (*Steffenhagen 1996, p. 13*). At this, in particular SX helps to explain why certain techniques are very likely to boast outcome rates while, at the same time, other techniques are not likely to do so.

The effects of individual inducement techniques may be influenced by the characteristics of the sample investigated and the circumstances under which results are generated. Therefore, respondent as well as situational factors play an important role in SRB. So far survey research literature aiming to improve outcome rates was mainly stimulus-response driven. This explains the extensive body of literature on survey design factors. Unfortunately, at the same time, the impact of respondent and situational factors on survey response has largely been neglected (*Van Kenhove, Wijnen and De Wulf 2002, pp. 293-4*). While numerous scientific experiments on design factors have been conducted, there is a lack of publications on respondent and situational factors.

Nevertheless, several respondent and situational factors play an important role in the respondents' evaluation of benefits and costs associated with the survey. Hence, they influence the

¹³⁵ Q.v. Section 4.5.3.1.1.

¹³⁶ Q.v. Section 4.5.3.1.2.

probability of respondents' participation in this study. In contrast to design factors, for which experimental manipulation is hypothesized to cause differences in outcome rates in this study, respondent and situational factors are not accounted for response rate differences across groups due to randomization. Here, they solely function as covariates in the Multiple Binary Logistic Regression model which was estimated. It is important to include several of these covariates in a study because a lack of control on these variables may bias the estimates of impact of other independent variables (*Feld et al. 2013, p. 145*). Furthermore, a lack of these variables may lead to unobservable heterogeneity¹³⁷ and, hence, to an underestimation of odds and logged odds in a Multiple Binary Logistic Regression model (*Urban and Mayerl 2011, pp. 351-2*). As a consequence of randomization, these factors exert the same influence on all experimental groups used in this study. The following sections will provide an overview of a selection of important survey design, respondent and situational factors which may influence participation.

3.3.1 Survey Design Factors

At the beginning of the AICR process¹³⁸, researchers invite potential recipients to participate in a survey. This invitation communicates first clues about the characteristics of a set of survey design factors previously specified by the researcher. Later, in the course of the survey their first subjective perception of these characteristics will be displaced by actual experience¹³⁹.

For researchers the characteristics of survey design factors specified in the invitational offer constitutes a bundle of efforts and rewards (*Balderjahn 1993, pp. 19-29*). Potential recipients, in turn, individually evaluate these as benefits and costs of their participation in accordance to SX. Characteristics perceived as benefits raise net benefit and, hence, the probability of survey participation. Vice versa characteristics perceived as cost, lower net individual benefit and, consequently, decrease the probability of participation. Therefore, survey design factors are also referred to as inducement techniques (*Helgeson, Voss and Terpening 2002, p. 306; Greer, Chuchinprakarn and Seshadri 2000, p. 98*). For instance, including a small pre-paid monetary incentive will most likely increase the benefit of participating in a survey in comparison to a situation without an incentive paid (*Yammarino, Skinner and Childers 1991, pp.*

¹³⁷ Q.v. Section 6.1.3.6.

¹³⁸ Q.v. Section 3.2.

¹³⁹ Id.

614-5). At the same time a questionnaire of short length, *ceteris paribus*, will cause lower costs for respondents compared to a similar long questionnaire. Here effort, energy, time, and sometimes even money spent to complete and return the survey will add up to their respondents costs (*Greer, Chuchinprakarn and Seshadri 2000, p. 98; Helgeson, Voss and Terpening 2002, p. 308*).

The literature on survey design factors is very extensive as numerous factors have been manipulated as independent variables in experimental studies. So, several extensive literature reviews and meta-analyses have been conducted for mail surveys already. The design factors habitually researched here included pre-notifications, follow-ups and repeated contacts, sponsorship, appeals, the use of reply and return envelopes, postage, personalization, monetary and nonmonetary incentives, survey appearance, anonymity, length, deadlines, different topics, the type of sample used, the offer of survey results, the use of the foot-in-the-door technique¹⁴⁰, different cover letters, as well as different questionnaire colors (*Armstrong and Lusk 1987; Fox, Crask and Kim 1988; Goyder 1982; Harvey 1987; Heberlein and Baumgartner 1978; Kanuk and Berenson 1975; Linsky 1975; Yammarino, Skinner and Childers 1991; Yu and Cooper 1983*). Although there is a lack of consensus about the effectiveness of most of these design factors in mail surveys (*Albaum, Evangelista and Medina 1998, p. 115*), authors agree that the number and mode of contacts – that is pre-notifications, invitations, and follow-up reminders – as well as monetary and nonmonetary incentives are the most effective means to increase response rates (*Yammarino, Skinner and Childers 1991, p. 613*). Moreover, the mode a survey is conducted in has substantial impact on response rates (*Manfreda et al. 2008, p. 79; Shih and Fan 2008, p. 265*).

3.3.1.1 Contacts and Survey Mode

In the context of survey research pre-notifications, invitations, and follow-up reminders are all regarded as contacts between researchers and potential recipients (*Heberlein and Baumgartner 1978, pp. 450-1*). Preliminary notifications – also called advance notifications, advance letters, or pre-contacts – are informational messages which are sent to potential recipients prior to the survey (*Groves, Cialdini and Couper 1992, p. 475*) announcing that a survey will take place a later point in time. In contrast, invitations are messages to potential recipients inviting them to a survey. They contain a cover letter or a short message with a link to a web

¹⁴⁰ Q.v. Annex CXII.

survey¹⁴¹. Finally, follow-up reminders are messages sent to non-respondents a certain time after they received an initial invitation and failed to comply. Similar to invitations, reminders may include a link to a web survey¹⁴². All three, pre-notifications, invitations, and reminders, may be delivered to the recipient via different modes. For instance, mailings such as postcards or letters, e-mails or even SMS may serve as contact modes. It has been hypothesized that potential respondents may classify request to participate in a survey differently, dependent on the mode of contact used by the researcher (*Furse and Steward 1984, pp. 84-7*).

Besides the influence of pre-notifications, invitation, and reminders, as well as the mode they are delivered in, there is strong evidence that the researchers choice of the mode a survey is conducted in, e.g. a survey by mail, stationary or mobile web, will have an impact on response rates (*Manfreda et al. 2008, p. 79; Shih and Fan 2008, p. 265*). However, due to the novelty of web surveys on mobile devices there are unfortunately no studies conducted under scientific settings which compare the response rates – or other outcome rates – of e-mail and SMS invitations in mobile web surveys. This study aims to close this research gap.

3.3.1.1.1 Contact Mode

In their meta-analysis of 73 articles Schlegelmilch and Diamantopoulos (1991) found that the impact of pre-notifications differs by the mode they are delivered in. At this, on average mail pre-notifications increase response rates by 7.9% (OR=1.38). In turn telephone and personal pre-notifications lead to an increase by 22.7% (OR=2.53) and 10.7% (OR=1.63)¹⁴³ respectively (*Schlegelmilch and Diamantopoulos 1991, p. 249*). However, only the effect of telephone pre-notifications may be regarded as medium effect here. All other effects researched were trivial in size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*).

Bosnjak et al. (2008, p. 220) conducted an experiment in order to compare the mode effects of survey pre-notifications by SMS and e-mail. The authors argued that SMS pre-notifications will cause higher saliency and, hence, attention and legitimacy with the potential respondents than e-mails and, therefore, also higher response rates. In a Binary Logistic Regression model they found highly significant evidence of small effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) that using SMS pre-notifications increased response rates (OR=1.95) of

¹⁴¹ In case of a mail survey the printed survey questionnaire is sent with the invitation.

¹⁴² Or include the printed questionnaire in case of a reminder mail.

¹⁴³ Only 4 articles.

a three-wave access panel survey. At the same time they found no significant difference between the condition where an e-mail pre-notification is used and the control group without pre-notification (OR=1.20) (*Bosnjak et al. 2008, p. 220*).

Moreover, a meta-analysis of 38 studies conducted in three different online panels showed that weighted average response rates increased by 16.1% after sending out a reminder (*Göritz and Crutzen 2011, pp. 245-6*). All the same, in a meta-analysis of three epidemiological studies researchers found that SMS reminders cause higher mail survey response rates than postcard reminders (OR=1.49) (*Edwards et al. 2009, p. 8*). This is a small size effect (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*).

Porter and Whitcomb (2007, pp. 640-2) have shown in two identical studies with different samples that a combination of paper pre-notifications and reminders (21.4% and 61.6%) causes higher web survey response rates than a combination of e-mail pre-notifications and reminders (16.8% and 58.6%). The response rates of the study were 4.6% (OR=1.348) and 3% (OR=1.133) higher for paper than for e-mail pre-notifications and reminders¹⁴⁴. However, both effects are only trivial in size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*).

Further, using two Binary Logistic Regression models, Bosnjak et al. (2008, p. 220) found highly significant evidence of a medium effect size that e-mail invitations cause higher response rates in stationary web survey than SMS invitations (OR=2.83 and OR=2.89). All the same, two invitations to a stationary web survey by e-mail (32.6%) cause highly significantly ($p < .01$) higher response rates than two similar invitations by postcards (20.9%; OR=1.831) (*Kaplowitz et al. 2011, p. 344*). Finally, for the sake of completeness, it has to be mentioned that Maxl et al. (2010, p. 10) found no significant difference between WAP-push (RR=1.4%) and SMS invitations (RR=1.0%) to a mobile web survey (OR=1.406). However, the response rates in this early mobile experiment were extraordinary small and therefore of small validity¹⁴⁵. Moreover, this effect is trivial just beyond the edge to a small effect (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*).

The mode of contact serves as one of two experimental factors within this study. At this, invitations are systematically manipulated at two levels. All subjects who registered and qualified

¹⁴⁴ This difference, however, has not been tested for significances and would not justify the use of the paper mode as letters and postcards are much more expensive than e-mails.

¹⁴⁵ Dykema et al. (2012, p. 365) found marginally significantly lower response rates for e-mail invitations (8.6%) than for mailed invitations (12.9%) (OR=.635). This is a small size effect (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). However, for a rather small total sample size of N=186 used in their study this 4.3% percent point difference equals an absolute difference of four participants only.

as panelists received either an SMS or e-mail containing a short invitation to take part in the main study¹⁴⁶. To the best of this researcher's knowledge no other similar scientific study has been conducted which compared stationary and mobile web surveys yet. Putting focus on the mode of invitations, however, it is foregone to manipulate pre-notifications and reminders as adding more experimental groups would inflate complexity as well as the sample size necessary for significance testing¹⁴⁷.

3.3.1.1.2 Survey Mode

In their meta-analysis of 24 experimental studies on the impact of survey mode manipulations Manfreda et al. (2008, p. 79) found that the weighted average of stationary web survey response rates is 11% lower than that of other survey modes, and in particular 12% lower compared to mail surveys (*Id.*, p. 96). Their result is propped by another meta-analysis of 39 papers by Shih and Fan (2008, p. 257), that found an average response rate of 45% for mail surveys and 34% for stationary web surveys (OR=1.59) and, hence, a similar difference in response rates. This is a small size mode effect (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). The authors point out that these differences may be traced back to several unfavorable characteristics of web surveys (*Manfreda et al. 2008, pp. 81-2*), as e.g. growing privacy and security concerns, as well as the lack of applicable techniques to improve outcome rates. In accordance to SX these characteristics will increase the costs of participation, and consequently lower potential participants' net benefit and, hence, probability of participation. Therefore, it is reasonable to assume that the choice of survey mode will also affect the outcome rates in stationary and mobile web surveys, as substantial differences exist between these two modes¹⁴⁸.

Following a similar logic Olson, Smyth and Wood (2012, p. 621) showed that panelists receiving a mail invitation to a survey are more likely to answer in case the mode of this survey is their preferred survey mode. At this, the authors show two highly significant response rate differences between panelists who were offered their preferred mode and those preferring another mode for stationary web surveys (OR=2.420; $p<.0001$) and phone surveys (OR=1.562; $p<.001$). Both are small size mode effects (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). Furthermore, they show an insignificant difference for mail surveys

¹⁴⁶ Q.v. Section 4.5.

¹⁴⁷ Q.v. Section 4.7.

¹⁴⁸ Q.v. Sections 2.4.2.1 and 2.4.2.3.

(OR=1.224; $p>.05$), however, the sample was rather small here ($N=297$). All the same, a Binary Logistic Regression model, estimated by the authors, which comprised different survey modes, showed a highly significantly higher participation (OR=1.381; $p<.0001$) for panelists who received an invitation to their preferred survey mode than those that received an invitation to another mode (*Id.*, p. 611). However, this was only a trivial effect (*Id.*). Assuming that panelists prefer a mode that has the least “unfavorable characteristics”, or – in other words – the one that offers the largest net benefit, their results are consistent with SX.

Finally, it has to be mentioned at this point that an extensive review of the impact of survey mode on outcome rates of stationary web surveys in comparison to mobile web surveys has already been performed in Section 2.6.2. It will therefore not be repeated again here. In addition to the contact mode as one experimental factor in this study, the survey mode has also been systematically manipulated at two levels. All subjects who registered and qualified as participants were either invited to take part in a stationary or mobile web survey¹⁴⁹.

3.3.1.1.3 Mixed-Mode Surveys

Sometimes the contact mode differs from the mode a survey is conducted in. For example, an invitation sent offline by postal mail may contain a link to a stationary web survey. In this case the survey is referred to as mixed-mode survey (*Hoonakker and Carayon 2009, p. 353*) because panelists have to switch modes – here, from an offline contact to a stationary web survey – in order to access the survey. In contrast, in case the mode is not switched – e.g. when an invitational SMS received on a smartphone contains a link to a mobile web survey – the survey is referred to as “single mode” or “unimode” survey (*Israel 2012, p. 3*). Finally, as a specialty of this study, surveys in which some panelists participate in mixed mode and others in unimode surveys are referred to as “partially mixed mode”¹⁵⁰. This is, for instance, the case when some panelists receive an invitational e-mail with a link to a stationary web survey on stationary devices while, at the same time, other panelists, participating in the same survey, receive it on their mobile devices. Thus, only the latter group has to switch modes from mobile to stationary in order to access the survey.

Dillman and Messer (2010, p. 559) distinguish four distinct types of mixed-mode surveys:

¹⁴⁹ Q.v. Section 4.1.

¹⁵⁰ This term was chosen by the author of this study.

- respondents are contacted in one mode, and data is collected in another mode (type I)
- data is collected in one mode, and further more specific questions are answered in another mode (type II)
- data is collected in different modes for different respondents at the same time (type III)
- one mode is used on one occasion, a different mode is used in a later point in time to survey the same respondents (type IV)

In this study the term “mixed-mode” solely refers to type I surveys. However, as both contact and survey modes are manipulated, only panelists in some experimental groups have been invited to mixed-mode surveys (*Dillman and Messer 2010, p. 559*). At the same time different respondents were invited to unimode surveys and – as a specialty of invitations sent e-mail – surveys which are partially mixed mode in other groups¹⁵¹.

In this context making use of SX, Bosnjak et al. (2008) claim that switching modes from mobile SMS invitations to a stationary web survey causes higher costs for invited panelists than remaining in the same mode by using online e-mail invitations to a stationary web survey. They argue:

“Taking into account the steps required on the respondent’s part following an invitation¹⁵², predictions appear more complex. Whereas in most situations, a simple click on the URL placed in the body of the e-mail¹⁵³ suffices to reach the survey, considerably more effort is needed in an SMS invitation situation. When receiving an SMS invitation¹⁵⁴, the respondent needs to get access to the¹⁵⁵ internet and type in the web address (URL) manually¹⁵⁶. As a result, the advantage of SMS in terms of awareness may be offset by the high burden posed on the respondent, favoring e-mail as an invitation mode.” (Bosnjak et al. 2008, p. 216)

Similarly, De Bruijne and Wijnant (2013, p. 487) claimed that for subjects viewing an invitation e-mail on a computer “the task would be more demanding for them if they needed to switch to another device” (*Id.*, p. 487). This would explain why in the study of Bosnjak et al.

¹⁵¹ Q.v. Section 4.5.1.

¹⁵² To a stationary web survey.

¹⁵³ Received on a PC/laptop.

¹⁵⁴ On a mobile phone or smartphone.

¹⁵⁵ Stationary.

¹⁵⁶ In order to access the survey on a stationary device.

(2008), as well as in the one by Kaplowitz et. al (2011, p. 344), which comprised two waves of each e-mail and postcard invitations, response rates of web surveys were significantly higher for e-mail invitations than for other offline modes of invitations. However, it has not been considered in these studies that subjects may access links sent in invitational e-mail or SMS on mobile devices just as well. This shortcoming of previous studies is corrected in this doctoral dissertation.

3.3.1.2 Incentives

Last but not least already quite small monetary incentives of up to \$.50 improve mail survey response rates by 18.4% while incentives of \$ 1.00 or more increased them by only 12.2% (Yammarino, Skinner and Childers 1991, p. 628). However, prepaid cash incentives may not be physically attached to invitational e-mails which are most frequently used as contact mode in stationary web surveys. In the latter mode they may only be delivered in mixed-mode contacts, e.g. when the invitation to a web survey is sent by postal mail.

A meta-analysis by Church (1993, p. 62) showed that monetary and nonmonetary prepaid incentives increase response rates of mailed surveys by 19.1% and 7.9% respectively. In another meta-analysis Göritz (2006, pp. 63-4) included 28 studies comparing nonmonetary incentives and two studies comparing monetary incentive to a non-incentive control group. She found that material incentives increased the chances of participation in web studies by 19% (OR=1.19). At this, she also showed a positive effect of including nonmonetary incentives (OR=1.19) as well as offering a lottery (OR=1.19) on response rates. Nevertheless, all of these effects are only trivial in size (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192). All the same, Hubbard and Little (1988, p. 227) showed an 11.3% increase in response rates when a \$ 200 lottery has been included in comparison to a non-incentive control group (OR=1.58). This, in turn, is a small size effect (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192).

Incentives do not serve as moderator of response rate differences between survey modes. In case an incentive is used it does not increase the difference between a stationary web survey response rate and one conducted in another mode (Manfreda et al. 2008, p. 79; Shih and Fan 2008, p. 265). For this reason, the effects of incentives in online and mobile web survey outcome rates are not further researched in this paper. During the recruitment phase, however, potential participants were promised to enter a lottery in which they could win nonmonetary

incentives for their participation and recommendation of the study to others¹⁵⁷. Here, amongst others, tablet PCs were raffled as main prizes. Previous research has shown that nonmonetary incentives as well as lotteries have an impact on response rates in web surveys (*Church 1993, pp. 71-2; Göritz 2006, p. 64; Hubbard and Little 1988, p. 227*). Therefore, a measure of involvement in the incentive (ii) has been included as covariate in the Multiple Binary Logistic Regression model estimated in the course of this study.

3.3.2 Respondent Factors

According to Leverage-Saliency Theory (*Groves, Singer and Corning 2000*) the impact of different survey design factors is determined by the characteristics of the respondent (*Roose, Lievens and Waage 2007, p. 423*). Factors associated with consumers may be classified into four categories: demographic, socioeconomic, psychographic, as well as behavioral characteristics (*Steffenhagen 1996, pp. 17-28; Steffenhagen 2008, pp. 41-4*). Every category emphasizes a different dominant perspective on the same potential respondents. In other words, all of these categories constitute different points of views on the characteristics of potential survey respondents. For instance, it has been shown in some studies that the demographic characteristics age and gender as well as the socioeconomic characteristic income have an impact on outcome rates¹⁵⁸. Among multiple psychographic variables behavioral intention to participate in surveys is assumed to be the best estimator of consequent actual survey participation. In the same category of characteristics, it has been shown that topic involvement influences outcome rates¹⁵⁹. Furthermore, the frequencies of potential respondents' mobile and stationary internet usage as behavioral characteristics could influence the chances of participation in web surveys¹⁶⁰.

3.3.2.1 Demographic and Socioeconomic Characteristics

Green (1996, pp. 179-80) reported that age, gender, and income have an impact on response rates in her literature review on several demographic and socioeconomic factors. She specified that there is ambiguous evidence for an effect of age on response dependent on the popu-

¹⁵⁷ Q.v. Sections 4.2. and 4.3.

¹⁵⁸ Q.v. Section 3.3.2.1.

¹⁵⁹ Q.v. Section 3.3.2.2.

¹⁶⁰ Q.v. Section 3.3.2.3.

lation examined. While some studies find no effect of age on response rates (*Franzen and Lazarsfeld 1945; Landry et al. 1988*) others report of a negative relationship, found in sampled age groups from 15 to older than 70 (*Craig and McCann 1978*) and 62 to 93 years of age (*Kaldenberg, Koenig and Becker 1994*). On the contrary, other researchers reveal a positive relationship between these variables in sampled age groups of below 30, 30 to 59, and above 60 years of age (*Dalecki, Ilvento and Moore 1998*) and younger graduates of medical schools (*Sobal et al. 1990*). Furthermore, there is some evidence that response rates of women tend to be higher than of man (*Dalecki, Ilvento and Moore 1998; Gannon et al. 1971; Green 1991; Hogan 1985*). However, other studies do not report significant gender differences in response rates (*Craig and McCann 1978; Franzen and Lazarsfeld 1945; Landry et al. 1988; Sobal et al. 1990*). Finally, other researchers (*Jones 1979; Ognibene 1970*) found a positive relationship between income and response rates (*Green 1996, pp. 179-80*).

In a recent study Olson, Smyth and Wood (2012, p. 623) revealed a highly significant impact of age (OR=1.028) and education (OR=1.747 in favor for graduate degree compared to high school degree) as well as a significant impact of gender (OR=1.336 in favor for women over men) on response rates. At this, elder subjects, subjects with a graduate degree, and female subjects were more likely to participate in the survey. However, while the effect of education was small the impact of age was only of a trivial effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*).

Nevertheless, due to the fact that it may not be fully excluded that age and gender have an impact on response rates, these variables were included as covariates into the Multiple Binary Logistic Regression model estimated in the course of this study. In contrast, an income variable has not been included in the model as subjects may not answer truthfully or drop out of the survey when confronted with such a question (*Duncan and Petersen 2001, p. 248*). Estimations have shown that a large sample size will be necessary in order to show significant effects in the course of this study¹⁶¹. Hence, a high dropout rate would be fatal for its validity. Bell (1984, pp. 211-4) claims that high dropout rates most frequently occur with older age groups with high income. This would exacerbate the problem as these age groups are strongly underrepresented in this study¹⁶². Furthermore, a variable indicating the level of education has not been included in this study due to little variability, as 87.9% of all participants in the main

¹⁶¹ Q.v. Section 4.7.

¹⁶² Q.v. Section 4.6.

study were recruited in German-speaking universities, universities of applied sciences, and colleges in Germany, Austria and Switzerland¹⁶³.

3.3.2.2 Involvement as a Psychographic Characteristic of Respondents

Involvement in the survey topic is another important psychographic characteristic of respondents that influences their SRB (*Van Kenhove, Wijnen and De Wulf 2002, pp. 293-301*). Topic involvement is the perceived relevance (*Zaichkowsky 1985, p. 342*) or importance (*Mittal 1995, p. 664*) of a survey topic in survey research literature. As the formation of involvement is based upon interest, needs, and values (*Van Kenhove, Wijnen and De Wulf 2002, pp. 293-301; Zaichkowsky 1985, p. 664*) it is a motivational construct. At this, the magnitude of involvement is positively related to the subjectively perceived benefits and costs associated with the survey topic. It increases with the importance of the motives, monetary costs, and other risks, e.g. social and functional risk, which may be associated with the topic.

Topic involvement may vary over time. Whenever involvement is temporary and conditional upon a particular situation it is referred to as situational involvement. On the contrary, in case the magnitude of involvement is stable on a long-term basis in diverse situations enduring involvement is present (*Richins, Bloch and McQuarrie 1992, pp. 143-4*).

There are only a few studies on the influence of topic involvement in survey research. In an experiment Van Kenhove, Wijnen and De Wulf (2002, pp. 293-301) found that response rates (50.5%) of a survey on clothes (high involvement product) were higher than the response rates (33.5%) of the same survey on fast food (low involvement product) (OR=2.03). This is a small size effect (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). Further, this research has shown that the involvement of survey respondents is significantly higher than the one of non-respondents in a survey on a high involvement product. On the contrary, the involvement of these groups did not differ for a low involvement product (*Van Kenhove, Wijnen and De Wulf 2002, pp. 293-301*).

For these reasons a measure of topic involvement (it) was included as covariate in the Multiple Binary Logistic Regression model in this study. At this, the product class involvement for headphones, which were the topic of the main study, has been assessed. Furthermore, regard-

¹⁶³ Id.

ing incentives as a survey design factor, a measure of involvement in the incentive (ii) has also been included as covariate in the model.

3.3.2.3 Behavioral Characteristics of Respondents

Studies have shown that there are substantial differences in the internet usage behavior of mobile and stationary internet users in Germany (*Bertsch, Huth and Arenz 2011; Mohr et al. 2011; Rothstock, Rehm and Knab 2011*). For instance, 62.2% of users surfed the stationary web several times a day, while only 41.6% of users did so on the mobile internet in 2011 (*Rothstock, Rehm and Knab 2011, p. 14*). Additionally, the group of mobile internet users is on itself very heterogeneous. For example, the length of mobile internet usage by user differed considerably in 2011. While 40.1% surfed the mobile web only up to 20 MPD, 22.9% of users spend more than 90 MPD online (*Rothstock, Rehm and Knab 2011, p. 25*). In contrast, only 29% of all users spent less than one, 35% spent one to two, and 35% more than two hours per day on the stationary internet (*Bertsch, Huth and Arenz 2011, p. 13*).

Moreover, not all internet users have the same purpose of usage. 56% of all mobile internet users accessed it for business purposes, while only 25% also did so privately in 2011 (*Mohr et al. 2011, p. 14*). Finally, mobile internet usage was not equally distributed among different age groups and genders. While for the age range of 14 to 39 years more than 33% of people were users, only 15% of those who are 50 or older use the mobile internet (*Id., p. 9*). Further, 37% of men and 17% of women used the mobile web. Similar holds true for stationary internet users. Here, 80% of men and 65% of women are users (*Id., p. 11*). Of those approximately 90% in the age group of 14 to 49 years were users, while at the same time only 24% who are 65 years of age or older used it (*Bertsch, Huth and Arenz 2011, p. 9*). All the same, stationary internet users differ by the activities they perform online (*Oehmichen and Schröter 2010, pp. 461-6*).

It has been mentioned earlier that some studies on demographic factors found significant effects of age (*Craig and McCann 1978; Dalecki, Ilvento and Moore 1998; Kaldenberg, Koenig and Becker 1994; Sobal et al. 1990*) and gender variables (*Dalecki, Ilvento and Moore 1998; Gannon et al. 1971; Green 1991; Hogan 1985*) on response rates¹⁶⁴. Furthermore, in a recent study Olson, Smyth and Wood (2012, p. 623) found a significant impact of internet access on response rates. At this, subjects who reported to have access to the internet were

¹⁶⁴ Q.v. Section 3.3.2.1.

more likely to participate in a survey than those who did not have access to the web (OR=1.584). This was an effect of small size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). In their study also cell phone ownership had an impact on response rates (OR=1.19), but that was only a trivial size effect (*Id.*).

Moreover, the figures presented above indicate that there are substantial differences between mobile and stationary internet users in Germany. Furthermore, the groups of mobile internet users and stationary internet users are on itself very heterogeneous, e.g. in terms of age and gender. Consequently, behavioral measures as mobile and stationary internet usage may have an important impact on response rates just as well. Therefore, also these measures of behavioral characteristics, as e.g. internet usage behavior, should be incorporated as covariates into a Multiple Binary Logistic Regression model of SRB. For this reason, measures of the frequency of mobile and stationary internet usage (iu) as well as e-mail services usage (eu) were included into the model used in this doctoral study at hand.

3.3.3 Situational Factors

Every form of survey contact, e.g. pre-notifications, invitations, or reminders, may be interpreted as persuasive communication toward the respondent. Consequently, relevant situational factors for SRB may be derived from existing advertisement effect literature. From this line of literature the parallel may be drawn that participation in and outcome of a survey may be influenced by the location a contact takes place. For instance, potential respondents may react differently to survey contacts received inside or outside of their home or work area (*Steffenhagen 1996, pp. 15-6*). In line with this, Diamantopoulos, Schlegelmilch and Webb (1991) show that there are important conceptual differences between consumer and industrial populations regarding the participation in surveys. For instance, potential respondents at work will not spend their own leisure time but company time on answering a survey. On one hand, paying attention and complying with the survey request at work may constitute an interruption or distraction to the potential respondents' workflow and, hence, decrease the chances of participation (*Id., p. 329*). On the other hand, the magnitude of impact will likely differ depending on whether the potential respondent receives the stimulus on his or her own or in another person's company (*Steffenhagen 1996, pp. 15-6*).

While taking a survey the likelihood of an interruption or other distractions, for instance, by customers, colleagues, or superiors in a work environment (*Diamantopoulos, Schlegelmilch*

and Webb 1991, p. 329) as well as family members in a home environment, may have an impact on SRB. All the same, the pursuit of different parallel activities as, e.g. attending to a meeting at work, or watching television at home, will constitute a distraction to potential survey respondents and have similar effects (*Steffenhagen 1996, pp. 15-6*). Distractions or other external interferences, in turn, may be responsible for a lower data quality or the termination of a survey (*Pol 1992, pp. 356-9*). In addition, users of mobile internet connections may be affected by a variety of distractions associated with different locations, even weather conditions or road traffic.

Furthermore, corporate policies may forbid or restrict organization members to participate in all external survey requests. At this, it is obvious that company employees are reluctant to provide confidential information, and sometimes even any information at all, to outsiders. Moreover, it has to be noted that members of an institution may also delegate surveys to their subordinates (*Diamantopoulos, Schlegelmilch and Webb 1991, p. 329*). All the same, family members may pass on surveys to other members of the family unentitled or incapable to answer. This is especially harmful when researchers are trying to survey a representative sample relying on sampling methods, as e.g. the Kish Grid or the next- or last-birthday methods (*Battaglia et al. 2008, p. 460*).

While they are receiving a survey contact, the mood of potential respondents may influence the willingness to participate in a survey and survey response (*Groves, Cialdini and Couper 1992, p. 485; Steffenhagen 1996, p. 16*). Heide and Grøhaug (1991, pp. 568-73), for instance, found systematic differences in respondents' evaluations of a distant travel destination after manipulating mood with either a positive, neutral, mildly and very negative movie. At this point it has to be noted that the mood is not included into the respondent factors, as it is a situational condition or temporary state rather than an enduring attitude (*Id.*).

Another important situational variable for survey participation is the frequency of different survey and non-survey requests the respondent is exposed to. For instance, a researcher's survey request may perish if the potential respondents are frequently confronted with numerous other similar requests of other researchers or random messages by advertisers (*Steffenhagen 1996, pp. 177-81*). At this, the potential respondents may, either not pay enough attention to the survey request and, thus, not notice it among the multitude of other requests they receive. Further, they may be reluctant to comply with this request because they are oversurveyed (*Groves, Cialdini and Couper 1992, p. 421; Rogelberg et al. 2001, p. 4; Schleifer 1986, pp. 19-22*). In case of the latter they have already complied with a large number of similar survey

requests in a reasonable period of time and are, thus, not willing to participate in further surveys.

Finally, various macroeconomic characteristic of a country or society may also influence SRB (*Groves, Cialdini and Couper 1992, p. 478*). Strategic management literature suggests analyzing companies' situations by means of PEST-analyses of political, economic, social, and technological factors (PEST) (*Henry 2008, pp. 48-58*). These factors will likely have an impact on SRB just as well, because they aggregate individual respondents' behavior on a macro level and set the framework for surveying the population. For instance, legislature may limit survey contacts to certain modes. Moreover, GDP per capita income levels will influence the availability of web-enabled devices on which web surveys may be conducted. Further, an age distribution in favor for younger people will constitute a favorable ground for mobile and stationary web surveys. Finally, the availability of high speed mobile internet connections (e.g. UMTS or LTE wireless communication standards) will likely influence the speed in which questionnaires will be displayed on mobile devices and enhance user experience.

As this paragraph has shown, there are manifold potential candidates which may be included as situational factors into a model of SRB. An inclusion of several of these variables would certainly go beyond the constraints of this study. But already including one variable as location, for example, might overstep the mark, because a seemingly endless range of dummy variables could be incorporated as manifestations of location into the model. For instance, the location where the survey is taken by the participant may be operationalized as a vast list of places (at home, at work, at university, at the gym, etc.). The same holds true for variables as mood, distractions, corporate policies, or macroeconomic characteristics. In addition variables as macroeconomic characteristics do not differ for individual respondents in case the sample is drawn from one economy only. Furthermore, it has been assumed that persons who registered to participate in the study are not oversurveyed, because they otherwise would not have signed up from the outset. Therefore, this study it has been foregone to include a situational variable into evaluation.

4 Preparation of the Experiment and Its Conduct

The present empirical study consists of two distinct phases. Its first phase comprised all recruitment activities as well as a preliminary study¹⁶⁵. In this way the researcher recruited a first preliminary sample frame of panelists and collected several behavioral data as independent variables¹⁶⁶. Diverse procedures of data cleaning¹⁶⁷ were then stepwise applied to the dataset for the first time in this study, in order to reduce it in size and enhance its quality. Subsequent to a pretest¹⁶⁸ with a small number of panelists, as well as pre-notifications sent out in different modes other additional data cleaning procedures¹⁶⁹ as well as procedures of missing value replacement¹⁷⁰ have been applied for a second time prior to the main study. Thereafter the main study¹⁷¹ – which constitutes the second study phase – has been conducted by inviting all members of the smaller, reduced preliminary sample frame (after pre-notification) to a web survey. At this, data on panelists' Survey Response Behavior (SRB) – *whether or not* and *how*¹⁷² they participated in the main study survey – were collected as dependent variables. After applying different procedures of data cleaning¹⁷³ for the third time after the main study survey has been conducted, main study data regarding the dependent variables was linked¹⁷⁴ with the behavioral data¹⁷⁵ collected in the previous study phase. Subsequently, outliers were removed¹⁷⁶ and the remaining panelists labeled as final sample frame. The sample frame was then carefully reviewed¹⁷⁷. From the latter an evaluation sample (of an optimum size) and with it a holdout sample have been randomly drawn¹⁷⁸ for the purpose of evaluation and validation. As it is the main purpose of this study to research participation in stationary and mobile web surveys, both datasets of participants and non-participants were included in the evaluation, holdout, and pretest sample. In contrast, all subjects included in the evaluation sample, who actually completed the main study survey, will be referred to as completed sample.

¹⁶⁵ Q.v. Sections 4.2 and 4.3.

¹⁶⁶ Q.v. Section 4.3.1, Table 4-2.

¹⁶⁷ Q.v. Section 4.3.2.

¹⁶⁸ Q.v. Section 4.4.

¹⁶⁹ Q.v. Section 4.5.4.1.

¹⁷⁰ Q.v. Section 4.5.4.2.

¹⁷¹ Q.v. Section 4.5.

¹⁷² Q.v. Chapter 3.

¹⁷³ Q.v. Section 4.5.4.3.

¹⁷⁴ Q.v. Section 4.5.1.

¹⁷⁵ Q.v. Section 4.3.1, Table 4-2.

¹⁷⁶ Q.v. Section 4.5.4.4.

¹⁷⁷ Q.v. Section 4.6.

¹⁷⁸ Q.v. Section 4.7.

It will be crucial to precisely differentiate between the terms “survey population”, “sample frame”, “sample”, and “completed sample” multiple times in this study. For the sake of better understanding of the following chapters, it is of utmost importance to introduce the definitions of these terms according to Dillman, Smyth and Christian (2009, pp. 42-3) to the reader here. As the definitions presented in Table 4-1 are rather self-explanatory no further annotation will follow. However, it is noteworthy that it will be differentiated between sample frames of different sizes in accordance with the progress of the study and the procedures of data cleaning and outlier removal performed. These different sample frames are called first preliminary, preliminary (before pre-notification, after pre-notification, as well as before outlier removal), and final sample frame. A detailed description of the composition of these five sample frames is given in Annex XXXI of this study.

Table 4-1: Definitions of Survey Population, Sample Frame, Sample, and Completed Sample

<i>terms</i>	<i>definitions according to Dillman, Smyth and Christian (2009, pp. 42-3)</i>
survey population	“all the units (individuals, households, organizations) to which one desires to generalize survey results”
sample frame	“list from which a sample is to be drawn in order to represent the survey population”
sample	“all units of the population that are drawn for inclusion in the survey”
completed sample	“all of the units that complete the questionnaire”

4.1 Overview of the Study Procedure

In the first study phase – which started on June 10th, 2012 and lasted until September 17th, 2012 – a first preliminary sample frame of 37,351 datasets¹⁷⁹ has been recruited¹⁸⁰ from a survey population of an unknown size and simultaneously surveyed in a preliminary study¹⁸¹, which was part of the registration procedures. The study was intended to measure various

¹⁷⁹ Q.v. Annex XXXI.

¹⁸⁰ Q.v. Section 4.2.

¹⁸¹ Q.v. Section 4.3.

independent variables¹⁸² which seem relevant for the explanation of survey participation, and thus, created anonymized behavioral profiles of individual participants. Therefore, the preliminary study may be referred to as a so-called “*profile survey*” (Zahariev *et al.* 2009, p. 2). This first preliminary sample frame was then reduced to a preliminary sample frame (before pre-notification) of 10,311 panelists¹⁸³ by applying several procedures of data cleaning¹⁸⁴. This whole circumstance is displayed in Figure 4-1, as well as Annex XXXI. It will be further described in the following.

From the latter frame 600 panelists¹⁸⁵ were randomly drawn to be included in a preliminary pretest sample (before pre-notification). After applying further procedures of data cleaning¹⁸⁶, 543 panelists¹⁸⁷ qualified for the preliminary pretest sample (before outlier removal). With these panelists a pretest¹⁸⁸ of the main study has been conducted. Thereafter, seven cases were marked as outliers¹⁸⁹ and immediately removed so that a pretest sample of 536¹⁹⁰ was finally left for evaluation (of the pretest). Based on the results of this evaluation later an optimum sample size of 5,124 survey units has been calculated for the evaluation sample of the main study and drawn from the final sample frame¹⁹¹.

Applying the same procedures of data cleaning as in the pretest¹⁹² further datasets were removed from the remaining preliminary sample frame (before pre-notification) of 9,711¹⁹³. In this way 8,596 panelists¹⁹⁴ qualified for the preliminary sample frame (after pre-notification) with which the main study – the second study phase – has been conducted. The main study¹⁹⁵, in turn, consisted of a web survey experiment, which compared combinations of different survey and invitation modes regarding the amount of survey participation they induced. At this, the participation rate served as primary dependent variable among other less important, secondary variables of interest¹⁹⁶.

¹⁸² Q.v. Section 4.3.1, Table 4-2.

¹⁸³ Q.v. Annex XXXI.

¹⁸⁴ Q.v. Section 4.3.2.

¹⁸⁵ Q.v. Annex XXXI.

¹⁸⁶ Q.v. Section 4.5.4.1.

¹⁸⁷ Q.v. Annex XXXI.

¹⁸⁸ Q.v. Section 4.4.

¹⁸⁹ Q.v. Section 4.5.4.4.

¹⁹⁰ Q.v. Annex XXXI.

¹⁹¹ Q.v. Section 4.7.

¹⁹² Q.v. Section 4.5.4.1.

¹⁹³ Preliminary sample frame (before pre-notification) - pretest sample (before pre-notification) = 10,311 - 600 = 9,711.

¹⁹⁴ Q.v. Annex XXXI.

¹⁹⁵ Q.v. Section 4.5.

¹⁹⁶ Q.v. Sections 4.5.3.1.1 and 4.5.3.1.2.

After the main study survey ended data of the preliminary and main study were linked and further procedures of data cleaning and removing all outliers¹⁹⁷ applied so that 8,468 datasets of panelists¹⁹⁸ were left as final sample frame. The optimum sample size of 5,124 panelists – stratified (*Hair et al. 2011, pp. 171-3*) by four experimental groups¹⁹⁹ of 1,281 subjects each – was then randomly drawn from this frame and labeled as evaluation sample²⁰⁰. The latter served as sample for the univariate and multivariate evaluation of outcome rates, the primary focus of research²⁰¹. In turn, the completed sample of 1,487 datasets – all subjects included in the evaluation sample, who actually completed the main study survey – was used to evaluate the secondary focus of research – among other data quality and response time²⁰². The remaining 3,344 panelists²⁰³ in the final sample frame were marked as holdout sample. In total the evaluation, holdout, and pretest sample amount to 9,004 panelists. They are simply referred to as “sample”, because all of these panelists were eligible for and, hence, invited to the main study²⁰⁴. For the evaluation of the study, the independent variables assessed during the first study phase, were linked²⁰⁵ with their dependent counterparts measured within the second study phase before outliers were removed²⁰⁶. Subsequently, data were evaluated by means of Multiple Binary Logistic Regression Analysis²⁰⁷ as well as diverse univariate hypothesis testing procedures.

Within the framework of this study it is appropriate to follow a two phase study design, as this approach mirrors online access panels at best. These types of panels are frequently used in survey practice. Similar to the recruitment for online access panels panelists recruited during the first phase of this study were confronted with a preliminary questionnaire which aimed to create anonymized panelists’ profiles containing their sociodemographic and psychographic information as well as internet usage data²⁰⁸. During the second study phase, panelists were surveyed again, in order to measure – among other – participation rates which were the researcher’s actual topic of interest (*Göritz 2003, p. 230*). Finally, the data gathered in both

¹⁹⁷ Q.v. Sections 4.5.4.3, as well as 4.5.4.4 and 6.1.3.5.

¹⁹⁸ Q.v. Annex XXXI.

¹⁹⁹ Q.v. Section 4.5.3.2.1.

²⁰⁰ Q.v. Section 4.7.

²⁰¹ Q.v. Section 4.5.3.1.1.

²⁰² Q.v. Section 4.5.3.1.2.

²⁰³ Final sample frame - evaluation sample = 8,468 - 5,124 = 3,344.

²⁰⁴ The same main study questionnaire has been used in the pretest. Therefore members of the pretest sample were also added to the “sample”.

²⁰⁵ Q.v. Section 4.5.1.

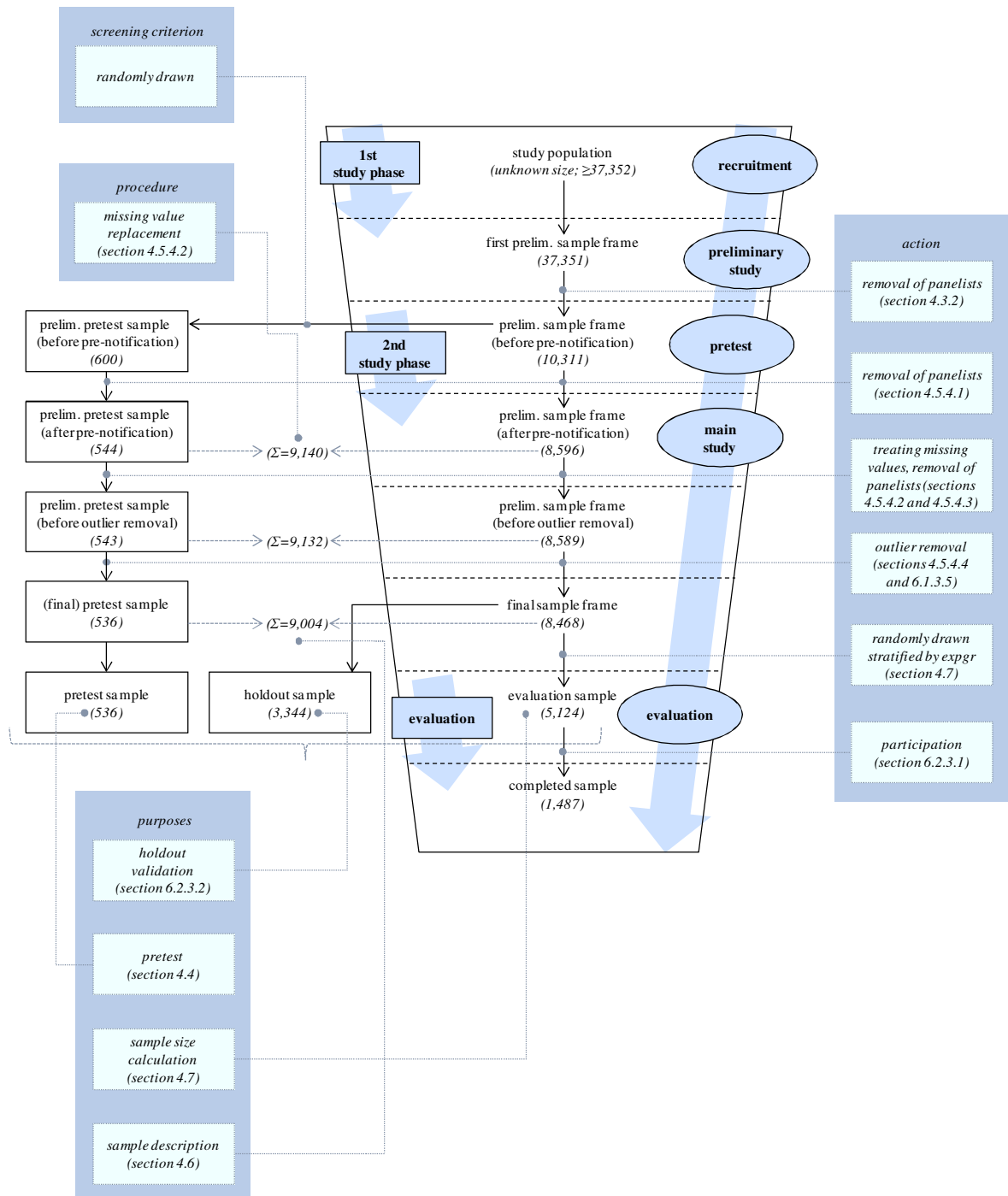
²⁰⁶ Q.v. Section 4.5.4.4.

²⁰⁷ Q.v. Sections 6.1.2 and 6.2.

²⁰⁸ Q.v. Section 4.3.1, Table 4-2.

phases were linked by means of a primary key²⁰⁹ (Stafford 2010, pp. 786-8) and subsequently evaluated. Similar procedures may be found for surveys conducted with members of online access panels.

Figure 4-1: Study Population, Screening Criteria, and Samples



²⁰⁹ Q.v. Section 4.5.1.

In the following sections the detailed procedure of both study phases will be depicted in chronological order. At this, persons recruited and included in all preliminary and final sample frames, as well as evaluation, pretest, and holdout sample are referred to as “panelists” or “subjects”. On the contrary, the terms “participants” and “respondents” were reserved only for the completed sample – persons who actually responded to the survey by clicking on the link included in the invitation and completing the survey.

4.2 Recruitment Activities

In order to invite persons to participate in the research panel manifold recruitment activities have been carried out within the first phase of the study which started on June 10th, 2012 and ended on September 17th, 2012.

These activities included:

- sending invitational e-mails to people on several existing distribution lists of numerous dean’s and principal’s offices of private and public university colleges as well as universities of applied sciences in Germany, Austria, and Switzerland²¹⁰,
- the physical distribution of poster and flyer advertisements within private and public university colleges as well as universities of applied sciences in Germany²¹¹,
- the physical distribution of 100,000 printed invitation letters within the population of Aachen, Germany²¹²,
- the posting of invitations on diverse German-language websites and online forums²¹³,
- e-mail invitations sent to former participants of previous surveys conducted by the Marketing chair at RWTH Aachen University²¹⁴,
- online invitations sent to a circle of the researcher’s acquaintances via the social networks Facebook and XING. Additionally, the acquaintances were asked to distribute an online advertisement with a hyperlink (abbr. link) to the study among their social network²¹⁵.

Examples of different types of invitations sent out and advertisements used in the course of recruitment activities may be found in Annex I to Annex XI of this study. Moreover, a tabular

²¹⁰ Q.v. Annex III.

²¹¹ Q.v. Annex IX to Annex XI.

²¹² Q.v. Annex I and Annex II.

²¹³ Q.v. Annex V and Annex VI.

²¹⁴ Q.v. Annex IV.

²¹⁵ Q.v. Annex VII and Annex VIII.

comparison of different invitation forms is included in Annex XII. The share of sources from which the sample²¹⁶ used in this study has been recruited from is displayed in Table 4-12 in Section 4.6.

All types of invitations to the registration website included the same explanation of study procedures and data protection regulations. Likewise, the same incentive was deployed throughout all recruitment activities. In parallel, everyone interested in the study was hinted at its non-commercial and purely academic character and promised to receive an insight into the study results. Finally, also the researcher's contact data has been included in every invitation in order to raise trust in the research project.

Although the researcher intended to standardize invitations, some aspects differed for each recruitment activity employed. All of this has been done "on the fly", in order to continuously improve recruitment materials used. Here, for instance, different layouts have to be used for paper letters²¹⁷, e-mails²¹⁸, and forum entries²¹⁹. In particular, the paper letters²²⁰ showed a quick-response (QR) code linked to the recruitment website, the university's logo, as well as the supervisor's photograph and signature imprinted in the letterhead, which other invitation forms did not include. Furthermore, the level of personification of the salutation differed. For instance, e-mails sent to students²²¹ included the name of their university in the salutatory address, while other invitations contained a simple impersonal "Hello" or a polite "Dear Sir or Madam". At this, recommendations via e-mail²²² included the name and e-mail-address of the person recommending participation to the recipient.

Further, for some activities employed, the designated sender of the invitation was the researcher, in others it was the researcher's supervisor asking for participation. In addition, invitations differed regarding the indicated length of the registration and moment in time when the main study was planned to take place. Moreover, for some activities clues about the length of the study, its target group, and topic were not included. For several invitations posted in online forums²²³ it was impossible to highlight important text elements. Finally, for other ac-

²¹⁶ Union of pretest, holdout, and evaluation sample.

²¹⁷ Q.v. Annex I and Annex II.

²¹⁸ Q.v. Annex III and Annex IV.

²¹⁹ Q.v. Annex V and Annex VI.

²²⁰ Q.v. Annex I and Annex II.

²²¹ Q.v. Annex III.

²²² Q.v. Annex XXIX.

²²³ Q.v. Annex V and Annex VI.

tivities a special hint that data will not be handed on to third parties, was not included in the invitation²²⁴.

Besides invitations, different online and offline advertisements²²⁵ were used to route potential panelists to the recruitment website. All advertisements showed images of the researcher and the incentive, the university's logo, a QR code linked with the recruitment website, as well as an appeal to participate in the study. Additionally, all poster advertisements²²⁶ gave clues about the length of the survey and the primary target group.

All recruitment activities listed above were aimed to prompt potential panelists to visit a recruitment website²²⁷ (<http://www.MOBISTUDIE.de>) built with Unipark, a common software for web surveys, offered by QuestBack²²⁸. Here visitors were asked to sign up for the main study which was conducted at an undefined later point in time in the summer of 2012. At this, they had to complete a short online recruitment questionnaire in which they all were asked for their age, gender, e-mail-address, and mobile phone number²²⁹. This is a distinct advantage over the recruitment procedure of Mavletova (2013) who only asked subjects assigned to the mobile condition for their mobile phone number.

Customized hyperlinks (abbr. links) were used for every recruitment activity, so that registrations could be traced back to the source of recruitment. By this the effectiveness of individual activities can be determined. In order to facilitate the panelists' memory of registering, the own new brand name "MOBISTUDIE" has been chosen to label all activities connected with the study.

All panelists who completed the follow up preliminary questionnaire²³⁰ were encouraged to join the study's Facebook page and to give Twitter and e-mail recommendations to others to participate in the study²³¹. In particular, panelists were asked to forward a short message²³² (a so called "retweet"), which contained a link to the registration website, to their Twitter network²³³. Furthermore, registered panelists were asked to enter up to ten e-mail addresses of

²²⁴ Nevertheless, it is understood that data had not been handed on even if there was no particular hint included.

²²⁵ Q.v. Annex VII to Annex XI.

²²⁶ Q.v. Annex IX and Annex X.

²²⁷ Q.v. Annex XIII to Annex XXX.

²²⁸ The website had been deactivated and abandoned after the end of the study.

²²⁹ Q.v. Annex XIV.

²³⁰ Q.v. Annex XV to Annex XXIV.

²³¹ Q.v. Annex XXVI.

²³² Q.v. Annex XXX.

²³³ However, due to a reassessment of success expectations and costs in the course of the study recruitment activities within the panelists' social networks on Facebook and Twitter were not further pursued.

other persons into the online recommendations form²³⁴ on the recruitment website. The researcher then also invited the owner of these addresses by e-mail²³⁵ to participate in the survey. In this way, a total of 13,445 addresses were contacted.

As an incentive for compliance to the registration request, participation in a lottery for a chance to win a tablet computer has been awarded²³⁶. Additionally, for compliance to a Twitter recommendation request, the participation in a lottery for a chance to win another tablet computer has been offered²³⁷. Further, panelists who entered one or more other person's e-mail addresses into the online recommendations form were awarded with additional chances to win € 50 gift certificates of a nationwide retail chain for consumer electronics²³⁸.

In total 37,351 datasets were recruited for the first preliminary sample frame. However, the size of population as well as its sub-populations (e.g. university students) from which datasets were recruited is unknown and, thus, cannot be quantified. Consequently, the probability of panelists joining the panel cannot be calculated. Within the standard definitions of the American Association for Public Opinion Research (AAPOR) panels showing the above characteristics are referred to as Non-Probability Internet Panels (*AAPOR 2011*)²³⁹.

4.3 Preliminary Study

4.3.1 Setup and Procedure

Immediately after their registration for the main study, all panelists were asked to participate in a follow-up preliminary study by completing a 10 page preliminary web questionnaire on the recruitment website²⁴⁰. This questionnaire aimed to measure eight distinct categories²⁴¹ of independent variables. As the preliminary study was conducted parallel to the recruitment activities, hence, it also lasted from June 10th, 2012 to September 17th, 2012.

²³⁴ Q.v. Annex XXVI.

²³⁵ Q.v. Annex XXIX.

²³⁶ Q.v. Annex XIV.

²³⁷ Q.v. Annex XXIV.

²³⁸ Id.

²³⁹ Q.v. Section 4.5.3.1.1.

²⁴⁰ Q.v. Annex XXIV to Annex XXVIII.

²⁴¹ Variable Categories A to H, Table 4-2.

At first, panelists were asked how frequently they use the stationary and mobile internet²⁴², as well as e-mail-services on different devices²⁴³. In case the panelists did not use both the mobile and stationary internet they were immediately directed to the end of the questionnaire. All others had to rate the level of their agreement to statements about different aspects related to the benefits and costs of internet usage on stationary and mobile devices²⁴⁴. It is noteworthy, that panelists were explicitly not asked to rate statements about stationary and mobile web surveys but stationary and mobile internet and its usage. This has been decided by the researcher, because the overall experience of panelists with mobile web surveys had been anticipated as low²⁴⁵, so that panelists' ratings might rather be speculative and biased by item or even unit non-response. Additionally, they were asked to rate six statements regarding the net benefit of stationary and mobile internet usage²⁴⁶ at the end of each answer block.

Further, panelists had to estimate the level of agreement to statements on their probability of participation in stationary and mobile web surveys²⁴⁷ in the summer of 2012. Moreover, they were asked how frequently they used different notification functions²⁴⁸, as e.g. notifications symbols and sounds, of computers and mobile phones. They were questioned about their level of agreement to statements on the immediacy of perception of newly incoming messages on different devices²⁴⁹, e.g. if they usually outright notice newly incoming SMS or e-mails on their mobile phones. All the same, they had to state the level of their agreement to statements on the ease of accessing web surveys on different devices²⁵⁰, e.g. if it is simple to open a newly incoming link, which they received via SMS on their mobile phone in the browser of their PC or laptop. In case panelists indicated that they did not use e-mail-services on different devices in the beginning of the survey²⁵¹ the corresponding items were not shown in its later parts²⁵² due to a skip pattern implemented into the survey instrument. This resulted in planned missing values²⁵³ for these items as their values were undefined.

²⁴² Variable Category A, Table 4-2; q.v. Annex XV.

²⁴³ Variable Category B, Table 4-2; q.v. Annex XV.

²⁴⁴ Variable Category C, Table 4-2; q.v. Annex XVI to Annex XIX.

²⁴⁵ Only few respondents answer web surveys on mobile devices; q.v. Section 2.2.

²⁴⁶ Variable Categories C1 and C2, Table 4-2; q.v. Annex XIX.

²⁴⁷ Variable Category D, Table 4-2; q.v. Annex XX.

²⁴⁸ Variable Category E, Table 4-2; q.v. Annex XXI and Annex XXII.

²⁴⁹ Variable Category F, Table 4-2; q.v. Annex XXIII.

²⁵⁰ Variable Category G, Table 4-2; q.v. Annex XXIII.

²⁵¹ Variable Category B, Table 4-2; q.v. Annex XV.

²⁵² Variable Categories E to G, Table 4-2; q.v. Annex XXI to Annex XXIII.

²⁵³ Q.v. Section 4.5.4.2.

Table 4-2: Variables Measured in Preliminary Questionnaire

<i>variable category</i>	<i>category description</i>	<i>variable label</i>
A	frequency of internet usage	
A1	▪ on a PC/laptop	iu_p
A2	▪ on a mobile phone/smartphone	iu_m
B	frequency of e-mail usage	
B1	▪ on a PC/laptop	eu_p
B2	▪ on a mobile phone/smartphone	eu_m
C	level of agreement to statements on the benefits and costs of internet usage	
C1	▪ on a PC/laptop	$bc_{p1} - bc_{p21}$
C2	▪ on a mobile phone/smartphone	$bc_{m1} - bc_{m21}$
D	level of agreement to statements on the probability of participation in web surveys	
D1	▪ on a PC/laptop	pp_p
D2	▪ on a mobile phone/smartphone	pp_m
E	frequency of usage of different notification functions	
E1	▪ for SMS on mobile phone/smartphone	$un_{sm1} - un_{sm4}$
E2	▪ for e-mail on mobile phone/smartphone	$un_{em1} - un_{em4}$
E3	▪ for e-mail on PC/laptop	$un_{ep1} - un_{ep3}$
F	level of agreement to statements on the immediate perception of messages in different modes	
F1	▪ of SMS on mobile phone/smartphone	ip_{sm}
F2	▪ of e-mail on mobile phone/smartphone	ip_{em}
F3	▪ of e-mail on PC/laptop	ip_{es}
G	level of agreement to statements on the ease of accessing web survey with	
G1	▪ invitation sent by SMS, received on mobile phone / smartphone, link accessed on mobile phone/smartphone	ea_{smm}
G2	▪ invitation sent by SMS, received on mobile phone/smartphone, link accessed on PC/laptop	ea_{smp}
G3	▪ invitation sent by e-mail, received on mobile phone/smartphone, link accessed on mobile phone/smartphone	ea_{emm}
G4	▪ invitation sent by e-mail, received on mobile phone/smartphone, link accessed on PC/laptop	ea_{emp}
G5	▪ invitation sent by e-mail, received on PC/laptop, link accessed on PC/laptop	ea_{epp}
G6	▪ invitation sent by e-mail, received on PC/laptop, link accessed on mobile phone/smartphone	ea_{epm}
H	level of agreement to statements on product class involvement	
H1	▪ in the incentive used (here: tablet PC)	$ii_1 - ii_5$
H2	▪ in the topic of the main study (here: audio headphones)	$it_1 - it_5$

Finally, panelists had to indicate their level of involvement in tablet PCs²⁵⁴, which served as the incentive to support recruitment, as well as headphones²⁵⁵, which were the topic of the later main study. An overview of the variables measured in the preliminary questionnaire is

²⁵⁴ Variable Category H1, Table 4-2; q.v. Annex XXIV.

²⁵⁵ Variable Category H2, Table 4-2; q.v. Annex XXIV.

given in Table 4-2. Additionally, detailed depiction and screenshots of the preliminary questionnaire may be found in the Annex XV to Annex XXIV of this dissertation.

The questionnaire has been developed conducting 14 in-depth interviews (*Hesse-Biber and Leavy 2011, pp. 93-131*) with a convenience sample of persons from the university's environment, who claimed to use both mobile as well as stationary internet. The questions were then compared to – and, if necessary, complemented with – questions found in existing academic literature (*Bosnjak, Metzger and Gräf 2011; Bosnjak, Tuten and Wittmann 2005*). Additionally, for measurement of product class involvement in questionnaire category H, a German translation (*Trommsdorff 2008, p. 57*) of Zaichkowsky's (1985) Personal Involvement Inventory modified by Mittal (1995) have been used. Subsequently, the resulting questionnaire was discussed in expert interviews (*Flick 2009, pp. 165-9*) with two doctoral students, who specialize in mobile development in the discipline of computer science, and afterwards adjusted to the study's purposes.

All questionnaire items were measured on 7-point-rating-scales with an additional “don't know” answer option. The latter has been included to avoid the error of central tendency – in particular – on scales with an odd number of points (*Basham, Jordan and Hoefer 2010, p. 61*). For the measurement of frequency of usage the extreme values of the scales were labeled “all-day” (1) and “never” (7) for categories A and B, and “always” (1) and “never” (7) for category E (*Schriesheim and Novelli 1989, p. 70*). In all other categories for the measurement of the level of agreement to a statement the extreme scores were labeled “completely agree” (1) and “completely disagree” (7) (*Haley and Case 1979, p. 22*). In order to ease interpretation, all scores and scales were inverted before evaluation. The order of items used throughout categories C to G was randomized within each variable category. Furthermore, within the category C, the order of parts C1 and C2 was randomized. Within category H statements from categories H1 and H2 were alternated. All of this has been conducted to avoid response order effects (*Krosnick and Presser 2010*).

4.3.2 First Data Cleaning after the Preliminary Study

During the first study phase in total 37,351 page visits were recorded on the recruitment website²⁵⁶. These visits constituted the datasets of the first preliminary sample frame. Thereafter,

²⁵⁶ Q.v. Section 4.2.

in order to ensure high quality of data used during the latter study phase and evaluation, diverse procedures of data cleaning have been conducted. It has to be highlighted at this point that all of these procedures have been solely performed on the dataset consisting of the independent variables measured in the preliminary study²⁵⁷ and *not* the dependent variables measured in the main study²⁵⁸. This is because some dependent variables either did not require these procedures²⁵⁹ or cleaning would have prohibited the calculation of other dependent variables^{260 261}.

Data cleaning began immediately after the preliminary study had ended. A detailed protocol of all measures of data cleaning taken may be found in Annex XXXI of this study. At first, various procedures of data cleaning were applied to the preliminary sample frame of 37,351 datasets. In particular, “only” 19,381 datasets of page visitors contained entries regarding e-mail addresses, mobile phone numbers, as well as age and gender. After conducting diverse plausibility checks and error validations with the collected mobile phone numbers and e-mail addresses – e.g. removing datasets containing implausible call numbers in accordance to national numbering plans of Germany (*Bundesnetzagentur 2012a*, *Bundesnetzagentur 2012b*), Austria (*RTR 2012*), and Switzerland (*BAKOM 2012*) – it was found that a total of 18,908 panelists entered datasets containing plausible contact data. Furthermore, after the panelists completed the preliminary questionnaire, even more datasets that showed invalid data, or unsolicited SRB were eliminated from the first preliminary sample frame along with panelists who were not the target group of this study.

Within the data collected in the course of the preliminary study, 15,578 registered panelists claimed to use the internet both on PCs and mobile phones. Hence, as users of the internet on both media forms, they were suitable as potential subjects for the experiment conducted in the course of the main study, which aimed to compare different survey and invitation modes on the stationary and mobile internet. 3,330 panelists, that did not use the internet on both of these media forms, have been removed from the first preliminary sample frame. Another 2,079 panelists had to be removed because they did not finish the entire preliminary questionnaire without breaking off, used the back button to view pages multiple times, or repeatedly participated in the survey.

²⁵⁷ Q.v. Section 4.3.1.

²⁵⁸ Q.v. Section 4.5.1, Table 4-5 as well as Section 4.5.3.1.

²⁵⁹ E.g. the binary participation variable (PAR).

²⁶⁰ E.g. data quality.

²⁶¹ Q.v. Section 4.5.4.4 for a detailed explanation.

Further 3,012 panelists were removed because they showed unsolicited SRB throughout the preliminary survey. For instance, their datasets were eliminated in case they were inconsistent and did not pass one of four control questions included in the survey²⁶², needed less than five minutes or more than 60 minutes of response time to complete pages 2 to 10 of the survey, processed the last page of the questionnaire in less than 20 seconds, or answered more than 10% of all questions with a “don’t know”. At this, Otter, Allenby and van Zandt (2008) claim that outliers in response time indicate poor data quality. They suggest that short response times lack a minimum amount of respondents’ deliberation with the survey task, while long response times point at distractions of participants.

Finally, 174 datasets of panelists were cleaned out because they did not match the relevant target group of the study. In particular, they were removed from the first preliminary sample frame in case they were underage or above 70 years of age or the area code of their mobile phone indicated that they did not permanently live in Germany, Austria, or Switzerland.

In this way out of the 37,351 datasets previously recruited “only” a preliminary sample frame (before pre-notification) of 10,311 panelists qualified for the main study. Later, in the second study phase, other procedures of data cleaning will be applied to this sample frame before the main study survey starts²⁶³.

4.4 Pretests

In order to ensure smooth progress of the study several pretests were conducted beforehand. First, the effects of the printed invitation, incentive, as well as the recruitment website and questionnaire on actual registration were pretested in a first comprehensive study within the population of Aachen in the summer of 2011. Then, with 1,200 distributed printed invitations, a promising average recruitment rate of 7.1% had been reached.

Second, the questionnaire for the preliminary study was successfully pretested in the towns of Eschweiler and Cologne with a total of 800 printed invitations distributed, resulting in 43 participants in the pretest, which is equal to a recruitment rate of 5.4%.

²⁶² Q.v. variable pairs bc_{p1} and bc_{p17} , bc_{p2} and bc_{p18} , bm_{p1} and bm_{p17} , as well as bm_{p2} and bm_{p18} .

²⁶³ Q.v. Sections 4.5.4.1 and 4.5.4.3.

Third, the main study questionnaire was pretested using several online mobile phone emulators²⁶⁴ which enabled to test the mobile web survey with different sized smartphones on a PC screen. Further, the survey was tested in “real-life conditions” with different mobile, tablet and stationary devices with various screen sizes, operating systems and browsers provided by a computer sciences chair at the RWTH Aachen University. The pretests proceeded entirely satisfactory. However, it should be noted that, in both survey modes which were used the adaptive layout²⁶⁵ caused unsolicited, inevitable wordwraps in a few spots of the questionnaire.

Finally, and most importantly, the main study had been pretested with panelists randomly drawn from the preliminary sample frame (before pre-notification) of 10,311 before the main study survey was conducted with a larger sample size. At this, the pretest completely resembled the later main study. 600 randomly drawn panelists were pre-notified on September 21st, 2012. 544 panelists²⁶⁶ included in the preliminary pretest sample (after pre-notification), for whom delivery of the pre-notification did not fail and who did not retreat from the study after being pre-notified and, hence, their datasets were not cleaned out²⁶⁷, were randomly assigned to four groups of 136 panelists each and, thereafter, invited to the pretest of the main study on September 26th, 2012.

The field phase of the pretest ended on October 29th, 2012. Afterwards the dataset of one panelist who failed the open end suspicion probe have been cleaned out²⁶⁸ from the sample. After conducting a Multiple Binary Logistic Regression Analysis²⁶⁹, which estimated the same model as used in the main study later, five pretest cases showed conspicuously high standardized residuals and unacceptably high Cook’s distance values. Moreover, two of these cases showed unacceptably high DfBeta values. Hence, they were regarded as outliers and removed from the sample²⁷⁰. Finally, two cases from the preliminary pretest sample have been randomly removed within their groups to ensure equal sized experimental groups of 134 panelists. This summed up to 536 datasets²⁷¹ of panelists evaluated within the final pretest sample. In total 166 of these panelists participated in the study (completed pretest sample) which equals a total participation rate of 31.0%. In turn, the participations rates in the four experi-

²⁶⁴ E.g. <http://www.mobilephoneemulator.com>.

²⁶⁵ Q.v. Section 4.5.1.

²⁶⁶ Q.v. Annex XXXI.

²⁶⁷ Q.v. Section 4.5.4.1.

²⁶⁸ Q.v. Section 4.5.4.3.

²⁶⁹ Q.v. Section 6.1.2.

²⁷⁰ Following the same multivariate outlier detection procedures as presented in Section 4.5.4.4.

²⁷¹ Q.v. Annex XXXI.

mental groups²⁷² were $PARR_{\text{expgr1}}=26.1\%$, $PARR_{\text{expgr2}}=41.0\%$, $PARR_{\text{expgr3}}=31.3\%$, $PARR_{\text{expgr4}}=25.4\%$. In the following, this pretest was primarily used to estimate the sample size necessary for multivariate evaluations in the course of the main study, or in other words, the optimum size of the evaluation sample²⁷³.

4.5 Main Study

In the following two sections the setup and procedure of the main experimental study will be described. After 10,311 datasets²⁷⁴ of subjects were left for the preliminary sample frame (before pre-notification) 600 panelists were pre-notified for the pretest and 9,711 for the main study. Because pre-notification failed for 1,115 subjects designated for the main study as well as 56 for the pretest, these datasets were cleaned out²⁷⁵ and, hence, not invited to the main study. Consequently, the main study – which will be described in the following sections – has been conducted with the preliminary sample frame (after pre-notification) of 8,596 panelists²⁷⁶ previously recruited solely for this purpose. The field phase lasted from October 30th, 2012 to January 2nd, 2013. Prior, the same procedures as described here were also applied on the pretest sample (after pre-notification) of 544 subjects in the course of the pretest²⁷⁷.

4.5.1 Setup of Main Study

For the purpose of hypothesis testing in the course of the main study a 2x2 between subjects (split sample) completely randomized full factorial design (*Kirk 2003, pp. 11-2; Myers and Hansen 2006, pp. 290-314; Nock and Guterbock 2010, pp. 845-6*) was established as experimental design. Here, the first factor, survey mode, was manipulated at two levels. After pre-notifying 9,711 panelists and cleaning out non-active contacts²⁷⁸, 8,596 panelists were invited to take part in a web survey on either the stationary internet on their PC or laptop, or the mobile internet on their mobile phone or smartphone. In parallel, the second factor, invitation mode, was manipulated at two levels as well. At this, all panelists received a short survey in-

²⁷² Q.v. Section 4.5.1, Table 4-3 as well as Section 4.5.3.2.1.

²⁷³ Q.v. Section 4.7.

²⁷⁴ Q.v. Annex XXXI.

²⁷⁵ Q.v. Section 4.5.4.1.

²⁷⁶ Q.v. Annex XXXI.

²⁷⁷ Q.v. Section 4.4.

²⁷⁸ Q.v. Section 4.5.4.1.

vation with a link to a web survey either by SMS or e-mail. Table 4-3 gives a detailed overview of the experimental set-up which has been used.

At this point it has to be mentioned that for both factors it has been forgone to establish experimental control groups and to conduct manipulation checks. This approach is acceptable as control groups in which no invitation is sent or no survey mode at all is offered to the panelists would trivially lead to unit non-response of all panelists in these groups (“no invitation, no survey, no response”). Besides, the inclusion of further experimental groups would disproportionately inflate sample sizes necessary to reveal significances²⁷⁹. Finally, due to the objective and unambiguous character of levels of both factors a manipulation check was not necessary in this study²⁸⁰.

Table 4-3: Experimental Set-Up

		<i>factor 2: invitation mode</i>	
		<i>invitation via e-mail</i>	<i>invitation via SMS</i>
<i>factor 1: survey mode</i>	<i>mobile web survey</i>	1st experimental group expgr ₁ (partially mixed mode)	3rd experimental group expgr ₃ (unimode)
	<i>stationary web survey</i>	2nd experimental group expgr ₂ (partially mixed mode)	4th experimental group expgr ₄ (mixed mode)

All recruited panelists were randomly assigned to one of the four experimental groups. Subsequently, they were invited to a stationary or a mobile web survey, either by e-mail or SMS, conditioned on the experimental group which they were assigned to. All SMS contained the

²⁷⁹ Q.v. Section 4.7.

²⁸⁰ In case panelists did not notice the manipulation of survey mode in the invitation and accessed the survey in an undesired mode they were forwarded to a dead end page and asked to access again in the desired mode; q.v. Section 2.6.2.

header text “MOBIstudie” as their sender instead of a call number. A similar text has been chosen as the sender’s name for the invitations by e-mail. All the same, the e-mail address, from which invitations were sent, started with the study’s own brand name “MOBIstudie”. This name was also included in the subject line of every e-mail sent. In order to anticipate bias by a lack of parallelization of – that is e.g. different invitation lengths and design effects in each mode – text and layout of e-mail and SMS invitations were almost identical. The content of invitations in both modes as well as the links sent to panelists were only customized to the factor level of survey mode corresponding to the panelists’ experimental group. Furthermore, they contained a personalized eight digits password consisting of numbers and case sensitive letters. The wording of the invitations to the survey conducted on the stationary internet read as follows²⁸¹:

*“The MOBIstudie has been designed for the stationary internet.
Participation is only possible on a PC/laptop:
<http://www.mobistudie.de/> ##### password: #####”*

And for the mobile internet²⁸²:

*“The MOBIstudie has been designed for the mobile internet.
Participation is only possible on a mobile phone/smartphone:
<http://www.mobistudie.de/> ##### password: #####”*

As both contact and survey modes have been manipulated, this experimental design includes groups which either were using or not using a mix of different contact and survey modes in order to access the survey and reply to it. This means that depending on the experimental group they belong to, participants were either invited to a unimode, mixed mode, or partially mixed mode survey. In particular, panelists invited by an SMS which was sent to their mobile phone in order to participate in a survey on their mobile phones (expgr₃) were in an unimode group, as short message services are solely a feature of the mobile mode. In contrast, panelists invited by an SMS which was sent to their mobile phone in order to participate in a survey on

²⁸¹ Q.v. Annex XXXIII.

²⁸² Id.

their stationary devices (expgr_4), will have to switch modes from mobile to stationary in order to participate in the study. Consequently, these panelists were in a mixed mode group.

Finally, all experimental groups receiving e-mails as contact mode are partially mixed mode²⁸³ (expgr_1 and expgr_2). In contrast to SMS, an e-mail may be received on both stationary and mobile devices. For instance, panelists may receive an e-mail with an invitation to a mobile web survey on stationary or mobile devices (expgr_1). All the same, panelists in another experimental group may receive an e-mail with an invitation to a stationary web survey on stationary or mobile devices (expgr_2). Dependent on the type of device panelists received the e-mail on as well as the mode of survey they were invited to, they either had to or did not have to switch modes in order to access the survey. Therefore, both of these experimental groups are referred to as partially mixed mode.

Panelists clicking on the link included in the invitational message or manually entering it into their web browser window were carried on to a website, on which a previously installed php-mobile-detect-script (*Google 2012*) invisible to the user was started in the background²⁸⁴. The script recognized the type of device, e.g. a PC or smartphone which participants used to access the website by inspection of its user agent²⁸⁵. In case participants accessed the website with a device corresponding to the survey mode experimental factor they had been assigned to, they were forwarded to the login page of the main study²⁸⁶, which was the same website for all participants. If not, the participant has been redirected to a so called “dead end” website²⁸⁷. Here they were asked to access the same link again – yet, this time only with the device dedicated for that purpose. All access to the “dead end” website was counted. For the rare case the script identified a user agent wrongly and denied access to the login page, the participants were asked to contact the researcher. The researcher then granted direct access to login website and checked manually within the survey software whether the site had been contacted with the desired device. In case the survey was accessed with an undesired device the corresponding datasets have been sorted out before evaluation. The reliability of the script has been pretested with several different mobile, stationary, and tablet devices with different operating systems provided by a computer sciences chair at the RWTH Aachen University. It is again highlighted at this point that automatically controlling for user agent strings ex ante is

²⁸³ This term was chosen by the author of this study.

²⁸⁴ Script blockers had to be disabled.

²⁸⁵ Q.v Section 4.3.1.

²⁸⁶ Q.v. Annex XXXIV and Annex LXI.

²⁸⁷ Q.v. Annex XXXV and Annex LXII.

superior to ex post user agent string testing procedures, which were e.g. applied by De Bruijne and Wijnant (2013) or Mavletova (2013)²⁸⁸.

Moreover, it is noteworthy that the present script treated tablet PCs neither as PCs or laptops nor as mobile phones or smartphones. Consequently, participants were not able to gain access to the survey with a tablet PC. Tablets have been intentionally excluded from the study, as they show distinct characteristics of both mobile and stationary devices, e.g. they may be used on-the-go, just as smartphones. At the same time some of them, e.g. the bestselling Apple iPad, cannot receive SMS just as a PC. Moreover, they are usually larger than popular smartphones. Additionally, as the results of an unpublished pilot study conducted by the researcher in the summer of 2011 within the population of Aachen indicated, the internet has not been frequently used on these devices. In particular only 12.12% of 132 participants surveyed, used the internet on a tablet PC, while 55.3% used it on mobile or smartphones, and all of them used it on a PC or laptop.

Participants that accessed the link with the desired type of device were transferred to a login page²⁸⁹. Here they were asked to enter an eight digit password, which had been sent to them with the survey invitation. By this unique code, or primary key (*Stafford 2010, pp. 786-8*), respondents' datasets recorded in the course of the main study were distinctly bundled with their corresponding dataset recorded in the preliminary study. Furthermore, the researcher was able to identify which experimental group they belonged to. Participants that entered the correct password were forwarded to the questionnaire.

The main study questionnaire consisted of 25 pages²⁹⁰. All participants were confronted with the same questionnaire, no matter what experimental group they belonged to. After a brief introduction to the survey on the first page²⁹¹ of the questionnaire – which contained an impersonal salutation, a clue on the survey topic and its length – an image of a young, traveling woman who is wearing headphones has been shown to the subjects as an initial stimulus²⁹². Subsequently, they were asked in three open questions to describe what comes into their minds first, when they see the situation, the woman, and the headphones on the previously presented initial stimulus²⁹³.

²⁸⁸ Q.v. Section 2.6.2.

²⁸⁹ Q.v. Annex XXXIV and Annex LXI.

²⁹⁰ Q.v. Annex XXXVI to Annex LX, as well as Annex LXIII.

²⁹¹ Q.v. Annex XXXVI, as well as Annex XLIII, page 1.

²⁹² Q.v. Table 4-2, Annex XXXVII, as well as Annex LXIII, page 2.

²⁹³ Variable Categories I1 to I3; q.v. Annex XXXVIII, as well as Annex LXIII, page 3.

Thereafter, they were shown a second stimulus²⁹⁴. It was the same picture as the one shown before, but it has been modified into a self-provided advertisement for a fictional headphone brand called “[you]”. Making use of a scale by Puto and Wells (1984, p. 641) the participants were subsequently asked to rate their level of agreement towards statements about the Informational (Cronbach’s $\alpha=.73$) and Transformational Ad Content (Cronbach’s $\alpha=.88$) regarding the ad stimulus²⁹⁵. Both stimuli are shown in Table 4-4.

Table 4-4: Stimuli

initial stimulus	advertisement stimulus
	

Images alienated due to copyright restrictions. Source of original image: gettyimages B2Mproductions / Photodisc (2012).

Next, they were confronted with a recognition test of 25 brand names of headphones of which 10 were bogus and 15 real brand names²⁹⁶. In particular they were asked to rate their level of brand familiarity with all names. At this, the real brand names were desk researched and randomly selected for the study, while the fictional names have been selected as the result of a pilot study with a convenience sample of 15 persons from the university’s environment. Here, participants of the pilot study have been asked to rate 43 fictional brand names created by the

²⁹⁴ Q.v. Table 4-2, Annex XXXIX and Annex LXIII, page 4.

²⁹⁵ Variable Category J; q.v. Annex XL to Annex XLIV, as well as Annex LXIII, pages 5 to 9.

²⁹⁶ Variable Category K; q.v. Annex XLV to Annex XLIX, as well as Annex LXIII, pages 10 to 14.

researcher in accordance to their suitability for use as headphone brand names. The ten brand names with the highest suitability have been selected for the main study and again carefully desk researched to ensure there are no real or similar named headphone brands amongst them.

Table 4-5: Variables Measured in Main Study Questionnaire

<i>variable category</i>	<i>category description</i>	<i>variable label</i>
I	open question	
I1	▪ on situation	oq ₁
I2	▪ on women	oq ₂
I3	▪ on headphones	oq ₃
J	Informational and Transformational Ad Content	
J1	▪ Informational Ad Content	iac ₁ - iac ₈
J2	▪ Transformational Ad Content	tac ₁ - tac ₁₅
K	recognition test of brand names of headphones	
K1	▪ real headphone brand names	real ₁ - real ₁₅
K2	▪ bogus headphone brand names	fake ₁ - fake ₁₀
L	Public Opinion toward Advertising Scale	
L1	▪ global attitudes	pota _{ga1} - pota _{ga2}
L2	▪ information	pota _{in1} - pota _{in3}
L3	▪ falsity/no sense	pota _{fns1} - pota _{fns3}
L4	▪ hedonic/pleasure	pota _{hp1} - pota _{hp3}
L5	▪ social role and image	pota _{sri1} - pota _{sri3}
L6	▪ materialism	pota _{ma1} - pota _{ma4}
L7	▪ value corruption	pota _{vc1} - pota _{vc2}
L8	▪ antecedent value corruption	pota _{avc1} - pota _{avc2}
L9	▪ good for the economy	pota _{gfe1} - pota _{gfe3}
L10	▪ antecedent good for the economy	pota _{agfe1} - pota _{agfe3}
M	open ended suspicion probe	oesp
N	willingness to participate in another study	wpas
O	recommendation	reco ₁ - reco ₅

Subsequently, participants were asked to rate their level of agreement with statements about advertising on the Public Opinion toward Advertising Scale (Cronbach's α ranged from $\alpha=.47$ to $\alpha=.78$) borrowed from Pollay and Mittal (1993, pp. 108-13)²⁹⁷. Thereafter, an open ended suspicion probe has been conducted²⁹⁸. Moreover, participants were asked to participate in another researcher's online study by entering their e-mail address into a text field²⁹⁹. For this future study it was not further specified if it was going to be conducted on stationary or mo-

²⁹⁷ Variable Category L; q.v. Annex L to Annex LV, as well as Annex LXIII, pages 15 to 20.

²⁹⁸ Variable Category M; q.v. Annex LVI as well as Annex LXIII, page 21.

²⁹⁹ Variable Category N; q.v. Annex LVII as well as Annex LXIII, page 22.

bile devices. Finally, respondents were asked to recommend the current study to five other persons by entering their e-mail addresses as well as their own name and e-mail address³⁰⁰. All relevant variables measured in the course of the main study are displayed in Table 4-5 above.

Throughout the entire main study questionnaire all polar questions were measured on 7-point-rating-scales with an additional “don’t know” answer option. For all questions referring to the level of agreement to a statement the extreme values of the scales were labeled “completely agree” (1) and “completely disagree” (7) (*Haley and Case 1979, p. 22*). Furthermore, for all questions referring to the level of brand familiarity the extreme values of the scales were labeled “very familiar to me” (1) and “very unfamiliar to me” (7) (*Kent and Allen 1994, p. 97*). At this, all items as well as the pages containing the Informational and Transformational Ad Content Scale (*Puto and Wells 1984*), the Public Opinion toward Advertising Scale (*Pollay and Mittal 1993*), and the brand name recognition test were randomized within each category³⁰¹.

The entire web questionnaire was built with EFS Survey, professional software for web surveys, offered by QuestBack. This software, however, is only customized for web surveys on the stationary internet, e.g. on PCs or laptops. Therefore, EFS Mobile Extension, a functional extension to EFS Survey offered by the same provider, has been adapted additionally. This add-on dynamically switches the output format of the survey, e.g. to HTML, XHTML-MP, WML, dependent on the browser used by the participant (*QuestBack 2012, p. 76*). Furthermore, the adaptive layout function of EFS Survey for HTML-enabled mobile devices has been used. This function of the survey software automatically optimizes pages, questions, and scales of a web survey to the size of a mobile phone with a HTML-browser (*QuestBack 2012, pp. 382-4*). By this procedure it was taken care of that the questionnaire was displayed on a vast number of mobile devices the best possible way. Sticking with the terminology used by Li and Townsend (2009, pp. 164-5) a so called “active” mobile web survey has been conducted in this experiment in order to offer subjects a maximum of user experience.

³⁰⁰ Variable Category O; q.v. Annex LVIII as well as Annex LXIII, page 23.

³⁰¹ Variable Categories J, K, and L.

4.5.2 Procedure of Main Study

The second phase of the study, the main study phase, was rung in on October 30th, 2012. Here, all of the remaining³⁰² 9,711 registered panelists included in the preliminary sample frame (before pre-notification) received both an e-mail as well as SMS pre-notification which stated that the main study will be conducted during the next week³⁰³. All pre-notifications were sent out by a professional online SMS bulk messaging service³⁰⁴ as well as a mass e-mailing program³⁰⁵ in 22 waves of 500 simultaneous e-mails and SMS in 25 minute intervals. The first wave has been sent out at 9:00 am, the last one lasted until 6:10 pm. Both modes of pre-notification contained the same short information message indicating that panelists will receive the link and a password to the main study during the next week³⁰⁶. It has been decided to send two messages with the same information in two different modes, instead of a single message in order to forestall possible effects of the chosen mode of pre-notification on participation in a certain survey mode. The chosen SMS bulk messaging service offered a detailed delivery report function. This was similar to e-mail notifications in case of the recipient's absence or delivery failures. Consequently, the researcher was able to control for delivery of both e-mails and SMS. This procedure allowed for validation of panelists' call numbers and e-mail addresses. Panelists who failed to receive pre-notifications by either SMS or e-mail were cleaned out of the dataset³⁰⁷ so that 8,596 panelist remained in the preliminary sample frame (after pre-notification).

All 8,596 panelists who received pre-notifications were sent an e-mail or SMS invitation with a link to a stationary or mobile web survey on November 6th, 2012. All messages were sent out in 10 waves of simultaneous 500 e-mails and 500 SMS invitations in 24 minute intervals making use of the same SMS bulk service and e-mail software that have been used for the delivery of pre-notifications. The first wave has been sent out at 12:00 am, the last one lasted until 4:00 pm. At this, a random half of a bundle of 500 messages contained links to the stationary web survey, while the other half was linked to the mobile web survey. Here, no delivery failures for both e-mails and SMS were noted as all panelists received their messages because they were retrieved from the servers. This information is particularly important because

³⁰² Preliminary sample frame (before pre-notification) - pretest sample (before pre-notification) = 10,311 - 600 = 9,711.

³⁰³ Q.v. Annex XXXII.

³⁰⁴ Massenversand.de.

³⁰⁵ SuperMailer.

³⁰⁶ Q.v. Annex XXXII.

³⁰⁷ Q.v. Section 4.5.4.1.

SMS – in vast contrast to e-mails – may be deleted from mobile network operators’ servers after just a few days in case they were not retrieved until their so called “validity period” expires. The latter is typically preconfigured by network operators. However, it may be manually adjusted by customers on their mobile phones. Consequently, it may be assumed that all invitations reached their recipients, without being previously deleted. The main study phase lasted until January 2nd, 2013. On this date the questionnaire has not been accessed by a single participant for more than a week.

4.5.3 Operationalization of Variables

In the following sections of this chapter both the dependent and independent variables which will be included in the Multiple Binary Logistic Regression Analysis will be operationalized.

4.5.3.1 Dependent Variables

At first, focus is put on the dependent variables. Here the outcome rates of web surveys – in particular participation rates – will be operationalized as the main dependent variable. Additionally, several dependent variables of secondary interest – among others, data quality, response time, and response speed – will be operationalized.

4.5.3.1.1 Outcome Rates as Primary Focus of Research

In this study outcome rates measured in the course of the main study are the primary dependent variables in the Multiple Binary Logistic Regression Analysis. At this, the most popular outcome rate analyzed in survey research is unequivocally the so called response rate. The American Association for Public Opinion Research (AAPOR) defines it as “*the number of complete interviews with reporting units divided by the number of eligible reporting units in the sample*” (AAPOR 2011, p. 5).

There are manifold ways to calculate a response rate. AAPOR (2011, pp. 44-5) suggests at least six different computations with regard to the mode a survey is conducted in. In particular, Response Rate 5 (RR5) and Response Rate 6 (RR6) were proposed for web surveys (*Id.*, p. 37). However, only RR5 refers to complete interview units, as demanded in the definition given above. It is computed as follows (*Id.*, p. 45):

Formula I: Response Rate 5

$$RR5 = \frac{I}{(I + PI) + (R + NC + O)}$$

Here, the number of complete interviews with reporting units (I) makes up the numerator of the fraction. The denominator represents the number of eligible reporting units in the sample. It is calculated as the sum of complete interviews, partial interviews (PI), refusals and break-offs (R), non-contacts (NC) and others (O). Opposed to this, both complete and partial interviews (PI) are included in the numerator of RR6 while, in comparison to RR5, the denominator of the fraction remains unchanged. Consequently, RR6 is always higher than RR5 (*Id.*, p. 45):

Formula II: Response Rate 6

$$RR6 = \frac{I + PI}{(I + PI) + (R + NC + O)}$$

Both formulas presume that there are no cases of unknown eligibility and no uneligible cases present in the sample (*Id.*, p. 45). This holds true for the sample at hand, as it is known whether or not the invitation reached the panelist and that no screening mechanism or quotas have been used in the course of the main study.

For Probability-Based Internet Panels, AAPOR (2011, pp. 36-7) suggests calculating a cumulative response rate (CUMRR) as the product of recruitment (RECR), profile (PROR), and participation rates (PARR) (*Id.*, p. 37). This product is expressed in the following equation:

Formula III: Cumulative Response Rate

$$CUMRR = RECR \cdot PROR \cdot PARR$$

At this, the recruitment rate refers to the response rate at which panelists – from a population of a size known to the researcher – gave an initial consent to be a part of the panel. Moreover, the profile rate is the response rate at which those recruited panelists completed initial profile

surveys. Finally, the completion rate mirrors the response rate at which panelist completed a particular panel survey. Because all of them are response rates they may be calculated using e.g. either one of the upper Formula I and Formula II used for the computation of RR5 and RR6.

In the case of Non-Probability Internet Panels (*Id.*, pp. 36-7), as the one in this study, a cumulative response rate cannot be calculated. This is reasonable, because it is impossible to calculate a recruitment rate in case the size of the population, and thus, the probability of panelists joining the panel cannot be quantified (*Id.*, p. 38). Nevertheless, both the number of panelists invited to a particular panel survey and the number of participants in the survey are known to the researcher. Therefore, a “response rate” for the particular panel survey may be calculated. However, this rate may not be referred to as a “response rate”, as this term is solely reserved for probability samples and the rate calculated is only a partial rate. Therefore, for reasons of unambiguity AAPOR (2011, p. 38) suggests referring to it as the “participation rate” of the study³⁰⁸.

The participation rate is defined as “*the number of respondents who have provided a usable response divided by the total number of initial personal invitations requesting participation*” (AAPOR 2011, p. 38). At this, the expression “usable response” leaves room for interpretation. On one hand, in accordance to RR5, solely complete interviews may be defined as “usable”. On the other hand, referring to RR6, besides complete interviews also partial interviews may be included in the numerator of a participation rate.

Therefore, researchers calculating these rates have to define what is regarded as complete (I) and partial interview (PI), as well as refusal or break-off (R). In this context AAPOR (2011, p. 26) suggests four standards that researchers may adopt for this purpose. They are shown in Table 4-6. Researchers choosing a particular standard should take into account whether their questionnaire contains questions which are essential or crucial to them. Moreover, they should specify how refusals and no answers should be treated.

³⁰⁸ At the same time, Callegaro and DiSogra (2008) opt for the term “completion rate”. Because this term wrongly suggests that only complete interviews were used in the numerator of its calculation, the term “participation rate” had been preferred in this study instead. The latter leaves more “verbal scope” for including complete and partial interviews in the calculated rate.

Table 4-6: AAPOR Definition of Break-Off, Partial, and Complete Cases

<i>standard</i>	<i>break-off</i>	<i>partial</i>	<i>complete</i>
A	< 50% of all applicable questions answered (with other than refusal or no answer)	50-80% of all applicable questions answered (with other than refusal or no answer)	> 80% of all applicable questions answered (with other than refusal or no answer)
B	< 50% of all asked questions answered	50-80% of all asked questions answered	> 80% of all asked questions answered
C	< 50% of all essential or crucial questions answered (with other than refusal or no answer)	50-99% of all essential or crucial questions answered (with other than refusal or no answer)	100% of all essential or crucial questions answered (with other than refusal or no answer)
D	A, B, C could be used in combination, (e.g. 100% of crucial questions and 80% of other questions answered is required for a case to be counted as complete)		

In the main study of this study large parts³⁰⁹ of the questionnaire were seen as essential for evaluation of data quality measures. For instance, the three open questions asked at the beginning of the questionnaire as well as all questions borrowed from the Informational and Transformational Ad Content (*Puto and Wells 1984, p. 641*) and the Public Opinion toward Advertising Scales (*Pollay and Mittal 1993, pp. 108-13*) were regarded as crucial. Therefore, standard “C” was selected in order to classify break-offs, partial, and complete interviews. It is the strictest of the four given standards, as only questionnaires for which all important questions were answered are regarded as complete. At this, “don’t know” answers to items were considered as valid answers. Moreover, in order for a questionnaire to be counted as partially answered, the participant had to respond to 50-99% of all important questions. Furthermore, questionnaires of participants who answered less than half of the questionnaire were treated as break-offs. Finally, participants who refused to answer or did not answer to any of the questions were regarded as non-response. Break-offs and non-response were then pooled into one category.

³⁰⁹ Variable Categories I to L; q.v. Section 4.5.1.

In comparison to the other standards, the one described above is very strict in its definition of complete interviews. In case participation rates will be calculated in accordance to the RR5 formula, fewer cases will be included in the calculation of the numerator. Therefore, it was decided to use the RR6 formula for this purpose instead. In contrast to RR5 it includes both complete as well as partial interviews in its numerator. Consequently in this study, participation rates were defined as follows (*Id.*, p. 45):

Formula IV: Participation Rate

$$\text{PARR} = \text{RR6} = \frac{I + \text{PI}}{(I + \text{PI}) + (R + \text{NC} + O)}$$

In case no non-contacts (NC) and no other cases (O) are present in a study, above Formula IV may be simplified to (*Id.*, p. 45):

Formula V: Simplified Participation Rate Formula

$$\text{PARR} = \frac{I + \text{PI}}{I + \text{PI} + R}$$

In the course of this study participation was coded as a dummy variable (PAR). At this, complete and partial responses were coded as “1” (“participation”). In contrast, break-offs and refusals were coded as “0” (“non-participation”). It has been suggested that a Multiple Binary Logistic Regression Analysis can be applied to this kind of binary dependent variables for the purpose of evaluation (*Backhaus et al. 2011*, p. 250).

4.5.3.1.2 Secondary Focus of Research

Besides prioritizing outcome rates – in particular participation rates – also further variables of SRB have been investigated in the course of this study. At this, secondary focus of research was not only put on data quality, speed, and time. But also panelists’ recommendations to others, as well as their willingness to participate in similar future surveys has been investigated. However, no hypotheses have been formulated for these variables. This would have been

beyond the scope of this study, as for every variable a separate theoretical underpinning – based on other theories than SX – would have been necessary.

Data quality – or synonymously response quality – is defined as the “*degree of effort and thought devoted to the questionnaire by the respondent who completes it*” (Houston and Ford 1976, p. 398). For the purpose of measuring this construct a distinction between the quality of data contained in closed and open questions is necessary. McDaniel and Rao (1980, p. 265) suggested to examine data quality in closed questions, among others, by studying item omission and response error. For open questions Schaefer and Dillman (1998) measured data quality by the length of given answers. In addition, Smyth et al. (2009) counted the number of different themes and elaborations brought forth by the participants in open questions.

In this study item omission (McDaniel and Rao 1980; Wotruba 1966) is operationalized as the sum of items left blank – which is the definition of item nonresponse (Groves et al. 2009, pp. 192-210) – including “don’t know” answers. Omission has been assessed regarding Variable Categories J to L measured in the course of the main study³¹⁰. Especially when no specific or complex prior knowledge is required to answer questions, omission and “don’t know” answers mirror a small level of effort and thought devoted to answering and, hence, low quality responses. In this case it is justified to equate “don’t know” answers with omissions, as all items used throughout the questionnaire aimed to measure the participants’ opinion toward a stimulus previously presented (Puto and Wells 1984), advertising in general (Pollay and Mittal 1993), and brand familiarity with headphone brands. For answering these questions no specific or complex prior knowledge was necessary. Consequently, “don’t know” answers were assumed to be due to little effort and thought devoted by participants to answer these questions. In total, item omission was controlled for 78 items. Therefore, the corresponding metric variable will range from “0” to a maximum value of “78”.

In turn, response error is defined as “*the difference between a survey estimate and the value which is estimated*” (Hansen et. al 1951, p. 147). At this, constant differences between true and estimated values in a survey indicate a low quality of responses. It has been suggested to measure response error by comparing “*information given by the respondent [...] with actual or known information to validate the reported information*” (McDaniel and Rao 1980, p. 265). One type of response error, the uninformed response error (URE), is an estimate on a fictitious issue, for which – as a matter of fact – no value can be estimated. This estimate is

³¹⁰ Q.v. Section 4.5.1.

given by an uninformed participant who does not know about the issue's fictive character (*Hawkins and Coney 1981*). Goldsmith (1985) proposed to assess URE by means of a recognition test of brand familiarity with bogus brands. He gauged the frequency with which these brands were rated as if they were real. In this context, Hawkins and Coney (1981, p. 374) advised to camouflage fictitious issue, e.g. bogus brand names, among real brand names. Sudman (1980, p. 241) claims that it is a specific problem of recognition tests that participants tend to state that they at least know a few of the brand names they were asked to recognize. Consequently, adding real brand names will lower URE. In addition, some researchers advocate including a "don't know" answer category when assessing URE (*Hawkins and Coney 1981, p. 374*). Especially participants who are well informed about brand names in certain product categories may otherwise doubt the seriousness of bogus items and, hence, the seriousness of the entire survey. Consequently, both of these measures will prevent participants from breaking off the survey. Furthermore, the suitability of the fictitious brand names as potential headphone brands had been controlled in a separate pretest and desk research before this study was conducted³¹¹.

Here in this study, URE is operationalized as the absolute frequency of falsely recognizing ten bogus brand names as real brand names among a list of 25 names of headphone brands³¹². All responses to bogus items on a brand familiarity scale labeled "know it very well" (1) and "don't know it at all" (7) with a score other than "don't know it at all" (7) or the "don't know" answer were counted as URE. In this operationalization, an individual's URE score may take in values ranging from "0", when none of the bogus brands is known to the participant, to "10", when all bogus brands were – at least to a little extent – "known" by mistake.

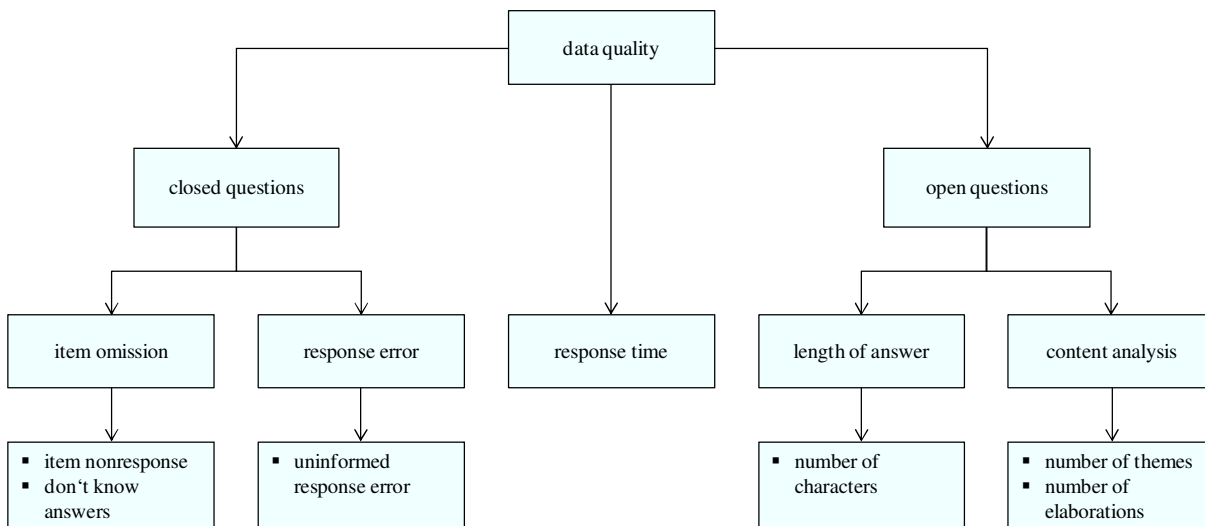
Finally, Schaefer and Dillman (1998) measured data quality of open questions by the length of answers given. They assume that the more effort and thought a participant devotes to answer a question, the longer his answer will be (*Kwak and Radler 2002*). In addition, Smyth et al. (2009) suggest assessing data quality of open ended questions by counting the number of themes and elaborations on themes reported. At this, a theme is a distinct train of thought which provides one possible answer to an open question. In case a participant is providing "additional descriptive information or explanation about a theme without introducing a new theme" (*Id.*, p. 327) an elaboration took place.

³¹¹ Q.v. Section 4.4.

³¹² Q.v. Section 4.5.1.

Within this study the length of the answers given has been assessed for three open questions at the beginning of the questionnaire³¹³. The questions gauged at the “spontaneous thoughts” that came into the participants’ minds, when they were confronted with the initial stimulus. Here, the length of the answers was operationalized as the sum of characters – both letters and numbers – used by a panelist to answer the three open questions. The number of characters for each individual question has been counted and summed up to a total length of answer score. The corresponding metric variables ranged from “0” to “937”.

Figure 4-2: Measurements of Data Quality Applied in this Study



Similar, themes and elaborations were assessed as two separate variables. Both of these were operationalized by two independent judges rating the number of themes and elaborations included in the answers given to the three open questions. One judge held a university degree in business administration the other in dentistry. Thereafter, the number of themes and elaborations counted by the judges were summed up across the three open questions for every judge. Based on this sum the interjudge reliability was calculated by means of Pearson’s product-moment correlations coefficient (*Sheskin 2004, p. 1104*). Thereafter the mean of the sum of themes and elaborations was calculated across both judges. The corresponding metric variables ranged from “0” to “14.5” for themes and “0” to “10” for elaboration. Figure 4-2 gives an overview of the diverse measurements of data quality applied in this study.

³¹³ Variable Category I; q.v. Section 4.5.1.

Besides, measuring data quality by item omission, response error, the length of answers and the number of different themes and elaborations some authors suggest an assessment by means of response time (*Bush and Parasuraman 1984*). It is defined as the time necessary for a participant to complete an item, a part, or an entire questionnaire (*Tourangeau, Couper and Conrad 2007*). A higher response time increases response accuracy and is therefore associated with higher data quality (*Burton and Blair 1991*). In contrast to this, Otter, Allenby and van Zandt (2008) claim that long response times may also be due to distractions or preoccupation of participants with other tasks.

In line with this, using response time as a proxy for quality may be devastating in this study, as variation in response time may rather be due to differences in the survey mode than more thoughts or effort devoted to the completion of the questions. For instance, it is not odd to assume that it may take participants more time to read onscreen instructions and then input their answers, because the screens and keyboards of mobile phones are smaller than those of PCs or laptops. Using the terminology of SX, differences in response time may therefore indicate that the use of one survey method may be less cost intensive and, hence, offers a better net-benefit to participants than another mode. At this, participants' effort will rather be attributed to their ability to deal with the mode rather than to completion of the questionnaire or questions.

As a consequence, in this study it is refrained from measuring data quality by means of response time across different modes. This method is rather suitable for experimental studies conducted in a single survey mode. However, comparing data quality in the same survey mode across different invitation modes may be appropriate, also in this study. Nevertheless, it is legitimate to use response time as a proxy of the net-benefit of different modes in case other methods of measurement would indicate that there are no differences in data quality across different survey modes. Therefore, in this study response time is operationalized as the time in seconds spent by participants to complete the first four crucial parts of the main study questionnaire³¹⁴, including the Public Opinion toward Advertising Scales (*Pollay and Mittal 1993, pp. 108-13*). The corresponding metric variable ranged from "152" to "3593".

In contrast to response time, response speed is defined as "*time lag between the receipt of a questionnaire and its return*" (*Houston and Ford 1976, p. 397*). Houston and Ford (1976, p. 397) illustrate the importance of high response speed. They claim that a low response speed of

³¹⁴ Variable Categories I to L; q.v. Section 4.5.1.

a survey will extend the length of survey projects for which results are urgently needed, increases the danger of external events affecting the results and the costs of a survey as follow-up procedures have to be applied in order to speed up urgently needed responses.

In this study response speed is operationalized as the time lag between invitations sent out and response received measured in days. Here, all invitations to the main study have been sent out in 10 waves on November 6th, 2012 between 12:00 am and 4:00 pm. So, the average sending time of an invitation was estimated to be 2:00 pm. Thus, the first day of response started on November 6th, 2:00 pm and lasted until November 7th, 2:00 pm, the second day started on November 7th, 2:00 pm and lasted until November 8th, 2:00 pm, and so forth. As an exception to this rule responses registered before November 6th, 2:00 pm were counted as first day responses. The corresponding metric variable ranged from “1” to “45”. Thus, the last survey has been completed in the time span between December 20th, 2:00 pm and December 21st, 2:00 pm.

Finally, also recommendation and the panelists’ willingness to participate in another online study conducted by a different researcher have been operationalized. At this, recommendation was measured as the frequency of participants entering the e-mail address of other persons into five recommendation text boxes at the end of the study³¹⁵. The metric variable ranged from zero to five. Moreover, participants of the main study could state their willingness to participate in another study by entering their e-mail address into a text field³¹⁶. Thereafter, the willingness to participate was coded as a dummy variable with the value “0”, for participants unwilling, and “1”, for participants willing to participate in another study.

4.5.3.2 Independent Variables

In the following sections different types of independent variables will be operationalized. These variables represent the experimental groups, sources of recruitment, age, and gender, as well as the panelists’ self-stated frequencies of internet and e-mail usage, anticipated ease of accessing web surveys, immediacy of perception of invitations, probability of participation in the survey, and their involvement in the incentive and study topic³¹⁷. All of them will be in-

³¹⁵ Variable Category O; q.v. Section 4.5.1.

³¹⁶ Variable Category N; q.v. Section 4.5.1.

³¹⁷ The importance of these variables has been highlighted throughout the Sections 3.2 and 3.3 of this study.

incorporated into Multiple Binary Logistic Regression models that have been estimated for evaluation purposes.

4.5.3.2.1 Experimental Groups

The mode of invitation as well as the survey mode have both been manipulated at two levels in the course of this study. More precisely, invitations with a link to a mobile or stationary web survey were sent either by SMS or e-mail. In this 2x2 full factorial design panelists have been randomly assigned to one of four experimental groups³¹⁸. Therefore, four dummy variables, indicating the groups that participants belong to, have been established as independent variables. Table 4-7 gives an overview of the chosen variable labeling and coding.

Table 4-7: Dummy Variable Labeling and Coding of Experimental Groups

<i>variable label</i>	<i>group description</i>		<i>dummy coding</i>		
	<i>factor 1: survey mode; web survey on the...</i>	<i>factor 2: invitation mode; invitation via ...</i>	<i>expgr₁</i>	<i>expgr₂</i>	<i>expgr₄</i>
expgr ₁	mobile internet	e-mail	1	0	0
expgr ₂	stationary internet	e-mail	0	1	0
expgr ₃	mobile internet	SMS	0	0	0
expgr ₄	stationary internet	SMS	0	0	1

If a case belongs to a certain experimental group the value of the corresponding dummy variable was set to “1”. Otherwise its value was set equal to “0”. As every case was assigned to exactly one group the sum of all four dummies is always equal to “1”. The above-mentioned circumstance is expressed in the following Formula VI. Here, “gr” represents a running index.

³¹⁸ Q.v. Section 4.5.1.

Formula VI: Equation Regarding Experimental Groups

$$\sum_{gr=1}^4 \text{expgr}_{gr} = 1$$

There are only three dummy variables necessary in order to code four experimental groups unambiguously. This is due to the fact that membership in the reference group may be expressed by setting all other dummies equal to “0” (*Bryman and Cramer 2009, p. 25; Jaccard 2001, pp. 5-6*). In this study the third experimental group – the group in which all panelists have been invited to a mobile web survey via SMS – was chosen as reference group. The reason for this was that this group can be regarded as consistently unimode³¹⁹. This is the case because it was the only one included in this experiment which does not require subjects to switch to another mode and, hence, does not make use of mixing modes. As Mobile Market Research (MMR) was the topic of research at hand, therefore, this “all-mobile group” was chosen as reference group. Group membership in the third group is expressed by setting the dummy variables $\text{expgr}_1 = \text{expgr}_2 = \text{expgr}_4 = 0$.

Furthermore, survey mode (mode_s) and invitation mode (mode_i) were coded as two separate nominal variables for the purpose of additional analyses. At this, the value “0” indicated a mobile web survey while a “1” indicated a stationary web survey. Moreover, the value “0” indicated an e-mail invitation while a “1” indicated an invitation sent by SMS for the invitation mode variable.

4.5.3.2.2 Frequencies of Internet and E-Mail Usage

It has been shown in previous sections³²⁰ that behavioral characteristics, as e.g. internet usage behavior, may influence the outcome rates of surveys (*Olson, Smyth and Wood 2012*) and should therefore be incorporated into a Multiple Binary Logistic Regression model of SRB. In this study the frequency of internet usage on a PC or laptop (iu_p) and mobile phone or smartphone (iu_m) as well as the frequency of e-mail usage on a PC or laptop (eu_p) as well as mobile phone or smartphone (eu_m) have been operationalized as four metric independent var-

³¹⁹ Q.v. Section 4.5.1.

³²⁰ Q.v. Section 3.3.2.3.

iables³²¹. All of these have been measured on single item 7-point-rating-scales with an additional “don’t know” answer option in the course of the preliminary study. At this, the extreme values of the scales were labeled “all-day” (1) and “never” (7). Within the data cleaning procedures 3,330 datasets of panelists, that did not use the internet on both stationary as well as mobile devices, were screened out from the first preliminary sample frame³²². Consequently, the latter variables – eu_p and eu_m – ranged from “1” to “7” while the prior – iu_p and iu_m – ranged from “1” to “6” only. In order to facilitate interpretation all four variables have been reversed before they were entered into the Multiple Binary Logistic Regression model.

4.5.3.2.3 Anticipated Ease of Accessing Web Surveys

As mentioned earlier Bosnjak et al. (2008) found evidence that mode switches in mixed mode surveys may have a negative impact on outcome rates. A mode switch occurs whenever a subject has to switch from one mode to another mode in order to access a survey. For instance, a mode switch from stationary to the mobile mode is necessary whenever an invitation to a stationary web survey – which can only be accessed on a PC or laptop – has been sent to a mobile device by SMS or e-mail. In accordance to SX a mode switch is associated with switching costs which reduce participants’ anticipated net benefit of participation. Hence, likewise actual participation and with it the outcome rates of a web survey are reduced as well. At this, the anticipated ease of accessing a web survey will likely differ regarding the mode of invitation, the type of device it has been received on, and the mode in which the survey is conducted in. Similar Dillman, Smyth and Christian claim: *“Perhaps one of the most effective ways of decreasing [participation] costs is making it as easy as possible to respond. This may involve offering a desired mode of responding that fits the population or, for web surveys, e-mailing people and including a link that, when clicked, will open their browser and take them directly to the survey to make it more convenient for them.”*

Invitations containing links to mobile and stationary web surveys have been sent by SMS and e-mail and received by panelists on mobile and stationary devices in the course of the main study. While SMS can only be received on mobile devices, e-mails may be retrieved on both mobile as well as stationary devices³²³. In case an invitation to a mobile web survey has been

³²¹ Variable Categories A and B; q.v. Section 4.3.1.

³²² All subjects that entered the values $iu_p = 7$ or $iu_m = 7$ into the questionnaire were screened out.

³²³ For reasons of complexity reduction the option of receiving e-mails on other less common devices is neglected.

received on a stationary device – or vice versa – a mode switch will be required to access the survey. A switch of modes is inevitable in this study because panelists were only able to access the survey in a dedicated mode. Table 4-8 offers an overview of the six possibilities of accessing a web survey available to participants in this study.

Table 4-8: Different Possibilities of Accessing Web Surveys

		<i>invitation sent via</i>	
		<i>e-mail</i>	<i>SMS</i>
<i>invitation received on</i>	<i>mobile device (mobile phone or smartphone)</i>	contains link to mobile web survey ▪ variable label: ea_{emm} ▪ associated with: $expgr_1$	contains link to mobile web survey ▪ variable label: ea_{smm} ▪ associated with: $expgr_3$
		contains link to stationary web survey ▪ variable label: ea_{emp} ▪ associated with: $expgr_2$	contains link to stationary web survey ▪ variable label: ea_{smp} ▪ associated with: $expgr_4$
	<i>stationary device (PC or laptop)</i>	contains link to mobile web survey ▪ variable label: ea_{epm} ▪ associated with: $expgr_1$	
		contains link to stationary web survey ▪ variable label: ea_{epp} ▪ associated with: $expgr_2$	

For every possibility to access a web survey the anticipated ease of its accessing has been measured on one of six single item 7-point-rating-scales with an additional “don’t know” answer option³²⁴. At this, panelists had to agree or disagree on statements about the anticipated ease of accessing web surveys conducted in different survey modes, received via different invitation modes, and accessed on different devices. The extreme values of the scales used for this purpose were labeled “completely agree” (1) and “completely disagree” (7) (*Haley and*

³²⁴ Variable Category G; q.v. Section 4.3.1.

Case 1979, p. 22). By applying this way of measurement six metric variables (ea) were obtained. For example, the anticipated ease of accessing a mobile web survey, for which an invitation with a link was sent by SMS and received on a mobile device, is expressed in the variable ea_{smm} . The translation of the corresponding item in the survey read as follows: “*It is simple to access a link, which I received via SMS on my mobile phone/smartphone, in the browser of my mobile phone/smartphone*”³²⁵.

Although, panelists from all four experimental groups were asked about the anticipated ease of accessing a web survey in all six possible ways, each possibility is directly associated with only one experimental group contacted in the course of this study. For instance, only panelists from the third experimental group were able to receive a survey invitation with a link to a mobile web survey on a mobile device sent by SMS. Therefore, the anticipated ease of accessing in this group is equal to the anticipated ease of accessing a mobile web survey on a mobile device for which an invitation was sent by SMS ($ea_3 = ea_{smm}$). A similar logic is applicable to the fourth experimental group ($ea_4 = ea_{smp}$).

At this point, it is important to keep in mind that invitations sent by e-mail may be received on both mobile as well as stationary devices. Consequently, panelists that received a link to a mobile web survey by e-mail will be confronted with a different amount of anticipated ease of accessing it regarding what type of device they received the invitation on. For example, receiving an e-mail with a link to a mobile web survey on a mobile device does not require mode switching in order to respond. In contrast, a mode switch is required in case the same link had been received on a stationary device.

Unfortunately, it is not possible to observe whether a panelist received an e-mail invitation with a link to a web survey on a mobile or a stationary device. Thus, it is impossible to identify whether or not a mode switch was necessary in order to access the web survey. Considering this circumstance, therefore, in order to index the anticipated level of ease with which surveys may be accessed by panelists that received an e-mail invitation a weighted anticipated ease of accessing variable had to be calculated. At this, variables indicating the anticipated ease of accessing web surveys on mobile and stationary devices were weighted with the frequency of e-mail services usage on a PC or laptop (eu_p) and mobile phone or smartphone (eu_m). This procedure is in keeping with the “*arbitrary numerical reduction*” of variables introduced by Lazarsfeld (1937, p. 128). The operationalization mirrors the device-independent expected

³²⁵ Q.v. Annex XXV.

value of the anticipated ease of accessing a survey for which a link was sent in an e-mail invitation.

Table 4-9 displays the operationalization of all variables indicating the anticipated ease of accessing web surveys regarding the different experimental groups involved in this study. Variables ea_1 , ea_2 , ea_3 , and ea_4 lie in the range of “1” to “7”, because all variables necessary for their computation lie in the same range. In order to facilitate interpretation all four had been reversed before they were entered into the Multiple Binary Logistic Regression model estimated.

Table 4-9: Anticipated Ease of Accessing Web Surveys

<i>invitation sent via</i>	<i>link to</i>	<i>invitation received on</i>	<i>anticipated ease of accessing web surveys</i>	<i>associated with experimental group</i>
e-mail	mobile web survey	stationary or mobile device	$ea_1 = \frac{eu_m \cdot ea_{emm} + eu_p \cdot ea_{epm}}{eu_m + eu_p}$	expgr ₁
e-mail	stationary web survey	stationary or mobile device	$ea_2 = \frac{eu_m \cdot ea_{emp} + eu_p \cdot ea_{epp}}{eu_m + eu_p}$	expgr ₂
SMS	mobile web survey	mobile device	$ea_3 = ea_{smm}$	expgr ₃
SMS	stationary web survey	mobile device	$ea_4 = ea_{smp}$	expgr ₄

4.5.3.2.4 Attention Paid to Notification Functions

As a pre-behavioral stage of the AICR model paying attention to a survey stimulus, e.g. to notice a survey invitation sent by SMS or e-mail, is a necessary condition for creating an in-

tention to participate in a survey (*Helgeson, Voss and Terpening 2002*)³²⁶. Consequently, gaining attention is a crucial factor for high outcome rates (*Bosnjak et al. 2008*).

SMS and e-mail invitations were sent to previously recruited panelists in the course of this study³²⁷. In order to measure the immediacy of perception of a certain invitation mode – which is a proxy for the attention gained by this mode – at first, panelists were primed with statements about different attention drawing notification functions of mobile and stationary devices. Thereafter they were asked to rate the frequency they used these functions with on 7-point-rating-scales with an additional “don’t know” answer option³²⁸. The extreme values of these scales were labeled “always” (1) and “never” (7).

Subsequently, they were asked to self-state their level of agreement to three statements on the immediacy of the perception of messages in different modes on different devices on 7-point-rating-scales with an additional “don’t know” answer option³²⁹. Here, the extreme values of the scales were labeled “completely agree” (1) and “completely disagree” (7) (*Haley and Case 1979, p. 22*). In this way panelists indicated if they usually take notice of newly incoming SMS on a mobile device (ip_{sm}), as well as e-mails on a mobile (ip_{em}) and stationary devices (ip_{ep}) immediately. In case they take notice of notification more immediate it is assumed that more attention has been paid to this function. Likewise when the notification is not noticed immediately, it does not cause lots of attention. The function may even be completely switched off.

In contrast to SMS, e-mails may be received on both mobile and stationary devices. Therefore, in parallel to the measurement of the anticipated ease of accessing web surveys³³⁰, a weighted immediacy of perception variable had to be calculated for e-mail invitations. In order to compute this variable the immediacy of perception on mobile and stationary devices were weighted with the frequency of e-mail usage on a PC or laptop (eu_p) and mobile phone or smartphone (eu_m). This index mirrors the device-independent expected value of the immediacy of perception of an e-mail invitation by panelists. Subsequent Table 4-10 displays the operationalization of variables indicating the immediacy of perception regarding the different invitation modes. Variables ip_s and ip_e lie within the range from “1” to “7” because all variables, which are necessary for their computation, also lie in this range. In order to facilitate

³²⁶ Q.v. Section 3.2.1.

³²⁷ Q.v. Section 4.5.2.

³²⁸ Variable Category E; q.v. Section 4.3.1.

³²⁹ Variable Category F; q.v. Section 4.3.1.

³³⁰ Q.v. Section 4.5.3.2.3.

interpretation both variables had been reversed before they were entered into the Multiple Binary Logistic Regression models.

Table 4-10: Immediacy of Perception of SMS and E-Mails

<i>invitation sent via</i>	<i>invitation received on</i>	<i>immediacy of perception of invitations</i>
e-mail	stationary or mobile device	$ip_e = \frac{eu_m \cdot ip_{em} + eu_p \cdot ip_{es}}{eu_m + eu_p}$
SMS	mobile device	$ip_s = ip_{sm}$

4.5.3.2.5 Intention to Participate in Surveys

The Theory of Planned Behavior views behavioral intention as precursor, determinant, and best estimator of consequent actual behavior (*Fishbein and Ajzen 1975*)³³¹. Consequently, intention may explain survey participation in stationary and mobile web survey (*Bosnjak, Tuten and Wittmann 2005; Bosnjak, Metzger and Gräf 2010*). Therefore, in the course of the preliminary study, panelists were primed with the requirements and consequences of their participation in surveys conducted via mobile and stationary web survey modes. This has been accomplished by confronting them with statements about the benefits and costs of mobile and stationary internet usage which arise during the completion of web surveys, e.g. the monetary costs of using the mobile or stationary internet³³². At this, all statements have been derived from qualitative interviews with internet users, expert interviews with other researchers, and literature research (most importantly *Bosnjak, Metzger and Gräf 2010, Bosnjak, Tuten and Wittmann 2005*). Moreover, a fixed point in time in which the study will take place was communicated to the participants in order to reveal their true pressing intentions (*Steffenhagen 1996*)³³³. Subsequently, they were asked to self-state their level of agreement to two statements on 7-point-rating-scales with an additional “don’t know” answer option³³⁴.

³³¹ Q.v. Section 3.2.2.

³³² Variable Category C; q.v. Section 4.3.1.

³³³ Q.v. Section 3.2.2.

³³⁴ Variable Category D; q.v. Section 4.3.1.

These statements aimed to assess the panelists' probability to participate in a subsequent main study in case it is going to be conducted as a mobile (pp_m) or stationary (pp_p) web survey. Hence, these variables measured their intention to participate in a certain survey mode. Again, the extreme values of the scales were labeled "completely agree" (1) and "completely disagree" (7) (*Haley and Case 1979, p. 22*) and both variables had been reversed before they were entered into the Multiple Binary Logistic Regression models estimated.

4.5.3.2.6 Involvement

The involvement in the survey topic and the incentive offered are both important psychographic characteristics of panelists that have an impact on outcome rates of a survey (*Church 1993; Göritz 2006; Hubbard and Little 1988; Van Kenhove, Wijnen and De Wulf 2002*). Potential participants were promised to enter a lottery during the recruitment phase to this study in which they were able to win a tablet PC as a reward for their participation. However, no additional post paid incentive, contingent on their participation in the study, have been promised to the panelists during the main study. Nevertheless, it is not far-fetched to control whether the involvement in the product class of the incentive offered in the recruitment phase might have "carried over" (*Tull 1965*) from the preliminary to the main study and influenced its outcome rates. Furthermore, the first page of the main study questionnaire contained a clue on "headphones" as survey topic. Therefore, also panelists' involvement in this product class had to be controlled.

The two involvement variables measured – involvement in the survey topic (it) and incentive (ii) – were included into the Multiple Binary Logistic Regression model estimated in the course of this study. Both were measured by making use of a German translation (*Trommsdorff 2008, p. 57*) of Mittal's (1995) modification of Zaichkowsky's (1985) Personal Involvement Inventory³³⁵. Here, panelists were asked to self-state their level of agreement to five statements for each product class (it_1 to it_5 as well as ii_1 to ii_5)³³⁶ on 7-point-rating-scales with an additional "don't know" answer option. The extreme scores of the scale were labeled "completely agree" (1) and "completely disagree" (7) (*Haley and Case 1979, p. 22*). After inverting one reversed item for both product classes, involvement has been indexed as the mean value of all five items regarding one product class (it and ii). Thereafter, in order to fa-

³³⁵ Q.v. Section 4.5.2.

³³⁶ Variable Category H; q.v. Section 4.3.1.

cilitate interpretation both means had been reversed before they were entered into the Multiple Binary Logistic Regression model.

4.5.3.2.7 Age, Gender and Sources of Recruitment

The impact of age and gender on outcome rates was stressed in a literature review by Green (1996)³³⁷. As a part of the recruitment questionnaire panelists were asked for their age and gender. At this, age has been operationalized as a metric variable measured by participants entering their age in an open text field. In contrast, gender was operationalized as a binary nominal variable. In case a panelist was male the value of the corresponding variable has been set to “0”. For females it was equal to “1”.

Furthermore, it is on the cards that different recruitment methods may attract people with different characteristics. For instance, acquaintances recruited via the researcher’s social networks may be more committed to help the researcher than random strangers recruited in online forums. All the same, such passive recruitment methods will likely cause self-selection bias (*Starsetzki 2003, pp. 46-51*). Finally, different layouts for paper letters, e-mails, and forum entries may have attracted different types of panelists varyingly strong. One method to cope with these non-negligible differences is to eliminate the confounders by deleting datasets retained by certain recruitment methods. However, as the sources of recruitment are known to the researcher and, hence, may be controlled, they were entered as dummy variables into the Multiple Binary Logistic Regression model.

In order to code six sources of recruitment unambiguously, five dummy variables (sou_2 to sou_6) were established. A sixth group was not necessary as a reference group may be expressed by setting all other dummies equal to “0” (*Bryman and Cramer 2009, p. 25; Jaccard 2001, pp. 5-6*). In the given study the first source of recruitment – the group in which all panelists have been recruited from several e-mail distribution lists of universities – functions as reference group, because a vast majority of panelists (89.1%) have been recruited from this source³³⁸. Consequently, group membership in the first group is expressed by setting $sou_2=sou_3=sou_4=sou_5=sou_6=0$.

³³⁷ Q.v. Section 3.3.2.1.

³³⁸ Q.v. Section 4.6.

Table 4-11: Dummy Variable Labeling of Sources of Recruitment

<i>variable label</i>	<i>source description</i>	<i>dummy coding</i>				
		<i>sou₂</i>	<i>sou₃</i>	<i>sou₄</i>	<i>sou₅</i>	<i>sou₆</i>
<i>sou₁</i>	sending invitational e-mails to several distribution lists of a range of dean's and principal's offices of different universities in Germany, Austria, and Switzerland	0	0	0	0	0
<i>sou₂</i>	physical distribution of poster and flyer advertisements within universities in Germany	1	0	0	0	0
<i>sou₃</i>	physical distribution of 100,000 printed invitation letters within the population of Aachen, Germany	0	1	0	0	0
<i>sou₄</i>	posting of invitations on diverse German-language websites and online forums	0	0	1	0	0
<i>sou₅</i>	e-mail invitations sent to former participants in the chair's previous surveys	0	0	0	1	0
<i>sou₆</i>	electronic invitations sent to a circle of the researcher's acquaintances via the social networks Facebook and XING	0	0	0	0	1

In case a panelist was recruited from a certain source the value of the corresponding dummy variable has been set to “1”. Otherwise its value was equal to “0”. As every case had been assigned to exactly one group the sum of all four dummies was always equal to “1”, as expressed by the following Formula VII. Table 4-11 gives an overview of the variable coding which has been applied. At this, “sr” serves as running index.

Formula VII: Equation Regarding Sources of Recruitment

$$\sum_{sr=1}^6 sou_{sr} = 1$$

In the course of the examination of methodological requirements and recommendations for a Multiple Binary Logistic Regression a too small number of cases and incomplete information has been detected in the data³³⁹. This put the validity of this study in danger. It has been suggested to heal these detrimental violations by collapsing of causative variables categories (*Bailey 1994, pp. 387-9; Urban and Mayerl 2011, p. 350*). Consequently, the problematic variables “age” and “source of recruitment” which could be identified as the cause of large numbers of null cells were transliterated. At this, the variable “age” (*Zikmund et al. 2013, p. 493*) has been coded as a dummy variable `agems` with a value of “1” for all “older panelist” with an age higher than the median 24 years ($\bar{x}=24$) or a value of “0” for “younger panelists”. In addition, for the nominal variable “source of recruitment” the source “e-mail distribution lists of universities” was coded “1” while all other source categories were coded “0”.

4.5.4 Check of Survey Data

In the following further procedures of data cleaning – based on the pre-notifications sent out ahead of the main study survey – will be described. These procedures were performed prior to sending out invitations to the main study³⁴⁰. Thereafter, all missing values were replaced in the dataset collected in the preliminary study³⁴¹ and previously cleaned³⁴². In addition, data cleaning was applied for a third time after the main study survey has been conducted³⁴³. Finally, all outliers were removed from the dataset as an additional act of data cleaning^{344 345}.

³³⁹ Q.v. Section 6.1.3.1.

³⁴⁰ Q.v. Section 4.5.4.1.

³⁴¹ Q.v. Section 4.5.4.2.

³⁴² Missing value replacement has been conducted after applying two sets of data cleaning procedures in order to increase the validity of the Expectation Maximization Algorithm. It is not necessary to perform a second missing value replacement after the main study survey because the dependent variable measured in the main study does not show missing values. Moreover, missing values in independent variables measured in the main study are relevant in order to assess the data quality of surveys.

³⁴³ Q.v. Section 4.5.4.3.

³⁴⁴ Q.v. Section 4.5.4.4.

³⁴⁵ Due to reasons of elaborateness, removal of outliers was highlighted as a separate, equitable part of the outline. In order to foster understanding for the procedure of the study and the associated reduction of sample frames, a chronological display of events was preferred by the author rather than treatment in a separate section. Moreover, removal of outliers is performed on the merged preliminary and main study dataset including the dependent variable measured in the main study survey.

4.5.4.1 Second Data Cleaning before the Main Study Survey

After the first study phase ended on September 21st, 2012 first procedures of data cleaning³⁴⁶ have been applied. Thereafter, the remaining 10,311 panelists from the preliminary sample frame (before pre-notification) received pre-notifications³⁴⁷ to the main study³⁴⁸: 600 panelists were pre-notified for a pretest, and 9,711 for main study. Further procedures of data cleaning were applied after SMS and e-mail pre-notifications had been sent out³⁴⁹. Here, panelists who failed to receive a pre-notification in either mode, or did not want to participate in the study anymore, have been removed. In particular these were a total of 1,115 datasets in the preliminary sample designated for the main study sample frame as well as 56 within the preliminary pretest sample. Thus, “only” 8,596 datasets were left for the preliminary sample frame (after pre-notification), with which the main study³⁵⁰ has been conducted. In addition 544 datasets remained for the pretest sample (after pre-notification) which has been used for a pretest³⁵¹. This equals a total preliminary sample frame (after pre-notification) of 9,140 datasets. A detailed overview of all procedures applied is given in Annex XXXI. Further procedures of data cleaning will be applied in Section 4.5.4.3.

4.5.4.2 Missing Value Replacement before the Main Study Survey

Subsequently after conducting data cleaning for the second time, the occurrence of missing values has been analyzed within data gathered throughout the preliminary study. All of this has been done with the total preliminary sample frame (after pre-notification) of 9,140 containing datasets designated for the pretest as well as evaluation and holdout sample. Here, only 3.01% of data was missing throughout the entire datasheet, which is not an unusual value in empirical research (*Schnell, Hill and Esser 2005, p. 468*). Hereunder exactly 30.0% were planned missing values which resulted from skip patterns. Such patterns were used in order to avoid confronting panelists with questions for which they were not able to provide an answer because an answer value was simply non-existent. For instance, questions on the usage of e-mail services were not shown to nonusers of e-mail services.

³⁴⁶ Q.v. Section 4.3.2.

³⁴⁷ Pre-notifications were regarded as a precursor of the main study. Hence, the procedures of the second data cleaning were discussed in this section.

³⁴⁸ These procedures cannot be assigned to the preliminary study (q.v. Section 4.3) because all were performed after sending out of pre-notifications to the main study.

³⁴⁹ Q.v. Sections 4.5.1 and 4.5.2.

³⁵⁰ Q.v. Section 4.5.

³⁵¹ Q.v. Section 4.4.

In contrast, 70.0% of all missing values were “don’t know” answers. At this, the items bc_{p12} ³⁵² and bc_{m12} ³⁵³ showed an unusually high proportion of “don’t know” answers (19.1% and 21.8%). As for both of these items approximately one out of five panelists did not know an answer, they were removed from evaluation. Furthermore, for the variable ea_{smp} ³⁵⁴ 12.2% of all answers given by the panelists were “don’t knows”. However, as this variable was essential for subsequent evaluation it has not been removed in an act of bona fide³⁵⁵.

Thereafter, the Expectation Maximization Algorithm (EM Algorithm) (*Dempster, Laird and Rubin 1977*) has been applied in order to replace missing values within data gathered in the preliminary study. As data quality is measured, among others, by means of item nonresponse the replacement of missing values within main study data was undesirable. The EM Algorithm is based on maximum-likelihood estimation (MLE) and regarded as one of the most efficient procedures to replace missing values (*Graham, Hofer and MacKinnon 1996, p. 197*). It requires multivariate normality (*Allison 2010*) as well as all values to be missing at random (MAR) at the very least (*Enders 2006, p. 320*). Moreover, in order for the algorithm to produce least biased estimations, data is required to be missing completely at random (MCAR) (*Graham, Hofer and MacKinnon 1996, p. 197*). However, the algorithm proved to be robust in case the MAR and MCAR assumptions are violated for some variables. This is particularly the case if the causes of missing values are included in the model (*Graham, Hofer and MacKinnon 1996, p. 217*).

The MCAR assumption cannot be met for all planned missing values. Allison (2010, pp. 633-9) suggested applying Dummy Variable Adjustment (DVA)³⁵⁶ (*Cohen and Cohen 1983*) to variables containing such values. At this, missing values are replaced by a constant value chosen by the researcher (e.g. the variable’s mean or the constant zero). Moreover, an additional dummy variable indicates that the missing value had been replaced (*Göthlich 2009, p. 127*). By this procedure the cause of missing values – namely, that values are non-existent – is included in the model. Consequently, the EM algorithm will be robust even if MCAR and MAR assumptions are violated. Unfortunately, Jones (1996) proved that the application of DVA will cause biased estimators. On the contrary, Allison (2010, p. 639) showed that this proof is

³⁵² “I am very similar to other people who use the internet on a PC/laptop”.

³⁵³ “I am very similar to other people who use the internet on a mobile phone/smartphone”.

³⁵⁴ $ea_{smp} = ea_4$; “It is simple to access a link, which I received via SMS on my mobile phone/smartphone in the browser of my PC/laptop”.

³⁵⁵ For all other five “ease of accessing web surveys” variables (Variable Category G) an average percentage of “don’t know”-answers of 4.4% had been reported.

³⁵⁶ Dummy Variable Adjustment is also called Missing Indicator Method.

only applicable to values for which true values are existent and proved, in turn, that if missing values are non-existent DVA leads to unbiased estimates. Therefore, this procedure was applied to the thirteen variables containing planned missing values³⁵⁷ in this dataset replacing planned missing values by the mean of the dataset. Because missing values were caused by only two skip patterns, two dummy variables³⁵⁸ were included into the dataset for the purpose of adjustment.

In order to examine if the remaining variables have met the MCAR condition Little's Missing Completely at Random Test (Little's MCAR Test) (*Little 1988*) had been conducted. For this test the null hypothesis states that data is MCAR. For larger sample sizes tests based on the chi-squared distribution, as e.g. Little's MCAR Test, easily yield highly significant results for negligibly small effects (*Healey 2012*). Little (*1988*), however, has shown in a simulation study that for his test a sample size of 80 cases will yield reliable results. In the present case the test was insignificant (ITE=25; $\chi^2=573.996$; df=556; p=.290) for a random sample of N=80 drawn from the dataset³⁵⁹. Consequently, it cannot be ruled out that missing values included in the dataset at hand are MCAR.

In addition, the assumption of normality has been examined for all variables measured in the preliminary study. At this, univariate normality has been analyzed by means of the Shapiro-Wilk test as well as analysis of kurtosis and skewness. In order to test the distribution of items a Shapiro-Wilk (S-W test) (*Shapiro and Wilk 1965*), which is superior³⁶⁰ to Kolmogorov-Smirnov test (K-S test) (*Kolmogorov 1956*), has been conducted. The null hypothesis for both of these tests states that data are normally distributed. The S-W test is most powerful in detecting non-normality when it is applied to a sample size of 50 in combination with an analysis of kurtosis and skewness (*Stevens 2002, p. 264; Shapiro, Wilk and Chen 1968*). In a Monte Carlo simulation Curran, West and Finch (*1970*) found univariate normality to be doubtful when the absolute values of skewness and kurtosis approach 2.0 for the prior and 7.0 for the latter.

³⁵⁷ $ip_{em}, un_{em1}, un_{em2}, un_{em3}, un_{em4}, ea_{emm}, ea_{emp}$ for DVA₁ and $ip_{es}, un_{ep1}, un_{ep2}, un_{ep5}, ea_{epp}, ea_{epm}$. Note that ea_{emm} and ea_{emp} are necessary in order to compute ea_1 . In turn, ea_{epp} and ea_{epm} are required for computation of ea_2 .

³⁵⁸ DVA₁=1 if $eu_m=1$ and DVA₂=1 if $eu_p=1$, else DVA₁=DVA₂=0.

³⁵⁹ Test conducted for Variable Categories A, B, D to H, age and gender variables as well as two DVA dummy variables. For Variable Category C: N=80; ITE=25; $\chi^2=726.299$; DF=710; p=.327.

³⁶⁰ A detailed explanation for its superiority is given by Stephens (*1974*).

For the S-W test, the null hypothesis of univariate normality cannot be rejected at an error probability of $\alpha=.05$ for only one item in the dataset at hand³⁶¹. At the same time only two items failed to remain beneath the thresholds for skewness and kurtosis values³⁶². Recently, Kline (2011) suggested less conservative threshold values of 3.0 for skewness and values of 8.0 up to 20.0 for kurtosis. Only one item violated the softer threshold regarding skewness. Finally, the central limit theorem states that any distribution will approach normal distribution for sample sizes larger than 30 (Gravetter and Wallnau 2009, p. 204). Consequently, at the end of the day univariate normal distribution may be assumed for the entire dataset.

Moreover, following the instructions of DeCarlo (1997), multivariate normality has been tested with the same sample as previously used for univariate testing. At this, the null hypothesis stated multivariate normality for the data. The results showed mixed support for multivariate normality: on one hand for Srivastava's tests of multivariate skewness ($b_{1p}^2=32.424$; $p=.683$) and kurtosis ($b_{2p}=2.7892$; $p=.166$) (Srivastava 1984) even at an error level of $\alpha=.10$ the null hypothesis cannot be rejected. On the other hand it has to be rejected at $\alpha=.01$ level for Small's tests of multivariate skewness ($Q_1=137.475$; $p=.000***$), kurtosis ($Q_2=175.834$; $p=.000***$), and normality ($Q_3=313.309$; $p=.000***$) (Looney 1995; Small 1980) as well as Mardia's test of multivariate skewness ($b_{2,p}=1225.000$; $p=.000***$) (Mardia 1970)³⁶³. Concluding from the prior, there is mixed evidence for multivariate normality. Its existence within the given dataset can at least not be ruled out completely (Datallo 2013). Additionally, it cannot be ruled out that missing values are MCAR. Therefore, it is not inappropriate to apply the EM Algorithm in order to replace missing values³⁶⁴. Moreover, the EM Algorithm is robust even if missing values are not MCAR (Graham, Hofer and MacKinnon 1996, p. 217).

³⁶¹ Tests conducted for Variable Categories A, B, D to H and the age variable. For Variable Category C: the null hypothesis of univariate normality cannot be rejected for eight items at a probability of error of $\alpha=.05$.

³⁶² Evaluation conducted for Variable Categories A, B, D to H and the age variable. For Variable Category C: three items showed skewness values and one item showed kurtosis values higher than the thresholds suggested by Curran, West and Finch (1970). Only one item violated the softer threshold regarding skewness suggested by Kline (2011).

³⁶³ Tests conducted for Variable Categories A, B, D to H and age variable. For Variable Category C: Srivastava's tests of multivariate skewness ($b_{1p}^2=32.572$; $p=.632$) and kurtosis ($b_{2p}=2.9622$; $p=.781$) (Srivastava 1984), Small's tests of multivariate skewness ($Q_1=137.116$; $p=.000***$), kurtosis ($Q_2=98.280$; $p=.000***$), and normality ($Q_3=235.395$; $p=.000***$) (Looney 1995; Small 1980), Mardia's test of multivariate skewness ($b_{2,p}=1225.000$; $p=.000***$) (Mardia 1970).

³⁶⁴ The EM algorithm had been applied twice: Once for Variable Categories A, B, D to H and once for Variable Category C as the latter had not been included into the Binary Logistic Regression estimated in the course of this study.

4.5.4.3 Third Data Cleaning after the Main Study Survey

The main study has been conducted with the preliminary sample frame (after pre-notification) of 8,596 panelists, which was left after applying data cleaning procedures for a second time. Previously also a pretest has been conducted with 544 panelists from the preliminary pretest sample (after pre-notification). This is equal a total preliminary sample frame (after pre-notification) of 9,140 datasets. Additionally, both datasets have been cleaned for a third time right after the main study survey ended.

In an open end suspicion probe included in the study two subjects designated for either the evaluation of the main study or holdout sample claimed that they recognized the aim of the study or the applied manipulation and, hence, had to be removed from the preliminary sample frame (after pre-notification). Another subject designated for the pretest has also been removed for the same reason.

Furthermore, the user agent strings of the devices, with which participants have accessed the survey website, have been recorded during the pretest and the main study. In total 3,930 different user agent strings have been analyzed. For recapitulation: Amongst other, these strings contain information about browser, platform, and operating system installed on participants' devices. Consequently, an analysis of user agent strings enables the researcher to identify with what type of device – mobile, tablet, or stationary – individual participants have accessed the survey (*Frederick and Lal 2009*). This procedure has been applied for the purpose of identifying participants who have – accidentally or intentionally – answered the survey in a survey mode which was undesirable for their experimental group. In particular, participants were sorted out which were invited to a mobile web survey but, nevertheless, tried to answer on a stationary device or vice versa. In order to identify these datasets, first, the frequencies in which individual user agent strings occurred in different experimental groups have been calculated. Frequent user agents which appeared in both mobile and stationary groups were analyzed with an appropriate online tool³⁶⁵. Furthermore, also less frequent strings were analyzed case-by-case wise. In this way in total five unsolicited datasets designated for the main study or holdout sample were removed from the preliminary sample frame (after pre-notification). The low number of datasets deleted indicates that the php-mobile-detect-script used as “gate-keeper” has done proper work in rejecting access of a large number of participants who were using unwanted devices.

³⁶⁵ <http://www.useragentstring.com>.

After datasets of panelists that failed to pass the open end suspicion probe or which showed conspicuous user agent strings have been removed, 8,589 datasets designated for the evaluation of the main study and holdout sample were left as preliminary sample frame (before outlier removal), as well as 543 datasets designated as pretest sample (before outlier removal). This equals a total preliminary sample frame (before outlier removal)³⁶⁶ of 9,132 datasets. A detailed overview of all data cleaning procedures applied here is given in Annex XXXI. In the next section in this study data on the independent variables were linked with corresponding dependent variables measured in the main study and examined for multivariate outliers³⁶⁷.

At this point it has to be mentioned that – with exception of the procedures presented in this section – further application of data cleaning procedures on data collected in the main study have been forgone. In addition no procedures of missing value replacement have been applied on data collected in the main study. It is out of the question for the following two reasons:

The first reason is regarding the outcome rates as the primary dependent variable and main focus of research³⁶⁸. Here, out of the variables measured within the main study only participation (PAR) was relevant for the evaluation of hypotheses conducted at a later point in time³⁶⁹. All other data – the independent variables – stem from the preliminary study and have already been cleaned with aforementioned procedures³⁷⁰. Furthermore, as the participation variable (PAR) was coded as binary dummy – with “1” for “participation” and “0” for “non-participation” – thus, there were no missing values present and no data cleaning was necessary.

The second reason is regarding diverse other variables of secondary focus of research³⁷¹. At this, the application of aforementioned procedures will render the calculation of some additional dependent variables impossible, e.g. computation of data quality by means of item omission would have been affected by the elimination of missing values by the Expectation Maximization Algorithm (EM Algorithm). For other important dependent variables as response speed or response time, it turn, data is complete. For all of these reasons only procedures regarding the detection and removal of multivariate outliers have been applied to the main study dataset and, consequently, data cleaning and missing value replacement procedures have been foregone.

³⁶⁶ Q.v. Section 4.5.4.4.

³⁶⁷ Q.v. Section 4.5.4.4.

³⁶⁸ Q.v. Section 4.5.3.1.1.

³⁶⁹ Q.v. Chapter 6.

³⁷⁰ Q.v. Section 4.3.2.

³⁷¹ Q.v. Section 4.5.3.1.2.

4.5.4.4 Multivariate Outlier Removal after the Main Study Survey

For the purpose of preparing an adequate dataset for proper evaluation of hypotheses, datasets containing data on the independent variables measured in the preliminary study³⁷² were linked with the corresponding dependent variables measured in the main study³⁷³. Thereafter, the preliminary sample frame (before outlier removal)³⁷⁴ – now containing participation as its main dependent variable as well as all independent variables³⁷⁵ – has been examined for multivariate outliers. It consisted out of 8,589 panelists designated for the evaluation or holdout sample who all took part in the main study (but not necessarily completed the survey).

Outliers were detected by means of a function included in IBM SPSS 21.0 Binary Logistic Regression procedure (*IBM 2012b*). At this, the same model has been estimated with 8,589 panelists as it was used for the later evaluation of the main study with an optimum sample size. Here, values were identified as outliers in case the absolute value of their studentized residuals was larger than 2 (*Fox 1997, p. 280*). Subsequently, both Cook's Distance (Cook's D) (*Cook 1977*) and DfBeta (*Belsley, Kuh and Welsch 1980*) statistics were used to identify which of these cases had strong influence on the binary logistic regression conducted. At this, Cook's D (*Cook 1977*) mirrors the impact of removing single cases on the residuals of all other cases included in a regression (*Asthana and Buhshan 2007, p. 185*). The measure has been chosen because it comprises the leverage measure, studentized residuals, as well as independent and dependent variables in its computation. Therefore, it is superior to pure distance measures, as e.g. the Mahalanobis Distance or the leverage measure on their own (*Miles and Shevlin 2007, p. 96*). For large sample sizes Fox (*1997, p. 34*) suggest to cut off every case with an absolute Cook's D value greater than the size-adjusted quotient $4/(n-k-1)$.

In addition to Cook's D, DfBeta (*Belsley, Kuh and Welsch 1980*) has been chosen as an influence measure. Contrary to Cook's D, the latter specifies the impact of removing individual values on the regression coefficients (*Asthana and Buhshan 2007, p. 185*). For large sample sizes Belsley, Kuh and Welsch (*1980*) suggest to cut off every case with an absolute DfBeta value greater than the size-adjusted quotient $2/\sqrt{n}$.

Following above procedures, in total 123 cases with an absolute value of the studentized residuals greater than 2 (*Fox 1997, p. 280*) designated for the evaluation or holdout sample have

³⁷² Q.v. Section 4.3.

³⁷³ Q.v. Section 4.5.1.

³⁷⁴ Q.v. Section 4.5.4.3.

³⁷⁵ Q.v. Section 4.5.3.

been identified. 121 of these outliers showed absolute Cook's D values above $4/(n-k-1)=4/(8596-26-1)=.000467$ while at the same time none showed absolute DfBeta values greater than $2/\sqrt{n}=2/\sqrt{8596}=.021572$. Consequently, all 121 cases had an impact on the residuals of all other cases included in the regression. Therefore, these cases were carefully examined case-by-case and marked as outliers. Subsequently, they were removed from the preliminary sample frame (before outlier removal). The removed cases equaled a share of only 1.41%³⁷⁶ of all cases in this preliminary sample frame. This figure indicates a rather conservative elimination of outliers because under ideal conditions usually about 5% of cases will be identified as outliers by means of studentized residuals (*Id.* 1991, p. 33). In this way 8,468 panelists were left for the final sample frame designated for the evaluation and holdout sample (after outlier removal). Thereafter, an optimum-sized evaluation sample of 5,124 – stratified by the four experimental groups of a size of 1,281 panelists each – was randomly drawn from the final sample frame. Moreover, the 3,344 remaining datasets were marked as holdout sample³⁷⁷.

In a similar way five outliers have been previously removed from the sample (before outlier removal) of 543 subjects designated for the pretest³⁷⁸ (.92%³⁷⁹). Finally, two cases designated for the pretest sample were randomly removed in order to provide for equal sizes of experimental groups³⁸⁰. Hence, overall 9,004 datasets may be regarded as the studies total final sample frame³⁸¹.

4.6 Description of the Sample Frame

In the following section the properties of the sample frame – after data cleaning, missing value replacement, and outlier removal procedures have been performed – will be described. At this, special focus will be put on the source of recruitment, as well as demographic, socioeconomic, psychographic, and behavioral characteristic of the recruited panelists³⁸² measured in the preliminary study³⁸³. In this study the union of final sample frame of 8,468 panelists and final pretest sample frame of 536 panelists will be jointly described as one total sample frame

³⁷⁶ $121/8,589=.014088\approx 1.41\%$.

³⁷⁷ Q.v. Section 6.2.3.2.

³⁷⁸ Q.v. Section 4.4.

³⁷⁹ $5/543=.009201\approx .92\%$.

³⁸⁰ Q.v. Section 4.4.

³⁸¹ Final sample frame + final pretest sample = 8,468 + 536 = 9,004; q.v. Annex XXXI.

³⁸² Q.v. Section 3.3.2.

³⁸³ Q.v. Section 4.3.

of 9,004 panelists. This is an appropriate thing to do because both have been recruited from the same sources³⁸⁴, both have passed similar aforementioned procedures³⁸⁵, and both completed the same main study questionnaire³⁸⁶. As a matter of fact it is only by chance whether panelists were assigned to the pretest sample or the sample frame designated for the main study.

Table 4-12: Description of the Sample Frame Regarding Sources of Recruitment, Study Phases, Demographics and Internet Usage Behavior

<i>source of recruitment and study phase</i>	<i>N</i>	<i>gender</i>	<i>age</i>	<i>iu_p</i>	<i>iu_m</i>	<i>eu_p</i>	<i>eu_m</i>
e-mail distribution lists of universities	8,026 (89.1%)	m=52.4% f=47.6%	$\mu=24.45$ $\sigma=4.533$	$\mu=5.24$ $\sigma=1.330$	$\mu=5.00$ $\sigma=1.676$	$\mu=4.83$ $\sigma=1.612$	$\mu=4.75$ $\sigma=2.029$
e-mail recommendations	424 (4.7%)	m=62.0% f=38.0%	$\mu=28.16$ $\sigma=9.206$	$\mu=5.39$ $\sigma=1.254$	$\mu=4.99$ $\sigma=1.659$	$\mu=5.07$ $\sigma=1.617$	$\mu=4.79$ $\sigma=2.027$
printed invitation letters	206 (2.3%)	m=62.1% f=37.9%	$\mu=30.50$ $\sigma=10.272$	$\mu=5.53$ $\sigma=1.271$	$\mu=4.62$ $\sigma=1.740$	$\mu=5.433$ $\sigma=1.454$	$\mu=4.57$ $\sigma=2.061$
social networks Xing and Facebook	224 (2.5%)	m=54.5% f=45.5%	$\mu=28.73$ $\sigma=5.435$	$\mu=5.56$ $\sigma=1.328$	$\mu=5.03$ $\sigma=1.577$	$\mu=5.40$ $\sigma=1.457$	$\mu=5.12$ $\sigma=1.929$
postings on websites and in online forums	84 (.9%)	m=59.5% f=40.5%	$\mu=25.80$ $\sigma=5.868$	$\mu=5.51$ $\sigma=1.247$	$\mu=4.96$ $\sigma=1.579$	$\mu=5.17$ $\sigma=1.447$	$\mu=4.63$ $\sigma=1.962$
other (e.g. flyers and posters, twitter, former participants)	40 (.4%)	m=57.5% f=42.5%	$\mu=27.88$ $\sigma=9.785$	$\mu=5.58$ $\sigma=1.174$	$\mu=5.20$ $\sigma=1.667$	$\mu=5.38$ $\sigma=1.275$	$\mu=5.25$ $\sigma=1.971$
pretest	536 (6.0%)	m=52.8% f=47.2%	$\mu=24.86$ $\sigma=5.257$	$\mu=5.41$ $\sigma=1.245$	$\mu=5.08$ $\sigma=1.665$	$\mu=5.03$ $\sigma=1.530$	$\mu=4.73$ $\sigma=2.053$
(main study) sample	5,124 (56.9%)	m=53.5% f=46.5%	$\mu=24.91$ $\sigma=5.345$	$\mu=5.28$ $\sigma=1.326$	$\mu=5.00$ $\sigma=1.674$	$\mu=4.88$ $\sigma=1.620$	$\mu=4.77$ $\sigma=2.013$
holdout sample	3,344 (37.1%)	m=53.0% f=47.0%	$\mu=24.90$ $\sigma=5.208$	$\mu=5.23$ $\sigma=1.337$	$\mu=4.98$ $\sigma=1.675$	$\mu=4.83$ $\sigma=1.600$	$\mu=4.73$ $\sigma=2.045$
total	9,004 (100.00%)	m=53.3% f=46.7%	$\mu=24.90$ $\sigma=5.298$	$\mu=5.27$ $\sigma=1.326$	$\mu=5.00$ $\sigma=1.674$	$\mu=4.87$ $\sigma=1.608$	$\mu=4.76$ $\sigma=2.027$

iu_p : frequency of internet usage on a PC/laptop; iu_m : frequency of internet usage on a mobile phone/smart-phone; eu_p : frequency of e-mail services usage on a PC/laptop; eu_m : frequency of e-mail services usage on a mobile phone /smartphone. Scale: (1=never; 7=always).

³⁸⁴ Q.v. Section 4.2.

³⁸⁵ Q.v. Sections 4.3.2, 4.5.4.1, 4.5.4.2, and 4.5.4.3.

³⁸⁶ Q.v. Section 4.5.1.

The largest share of panelists ($N=8,026$; 89.1%) have been recruited³⁸⁷ by the forwarding of e-mails through the distribution lists of dean's and principal's offices of private and public university colleges, as well as universities of applied sciences. Hence, for the most part this sample consists of students³⁸⁸. E-mail recommendations ($N=424$; 4.7%), printed invitation letters ($N=206$; 2.3%), the recruitment of researcher's acquaintances over his social networks ($N=224$; 2.5%), as well as the posting of links on diverse websites and in online forums ($N=84$; .9%) in sum accounted only for a relatively small share of the sample frame ($N=938$; 10.4%). Other methods of recruitment, as e.g. the distribution of flyers and posters, twitter recommendations, and the repeated recruitment of former participants of the chair's previous studies, were not pursued intensively and therefore only marginally contributed ($N=40$; .4%) to the recruited sample.

At this point it is noteworthy, that due to an insufficient delivery of printed invitations among the general population carelessly executed by a "professional" direct mailing organization, especially engaged for this purpose, only a poor registration rate of .206% has been obtained from this source³⁸⁹. In vast contrast, in similar self-delivered pretest mailings registration rates of up to 7.1% have been reached³⁹⁰. Therefore, the sample at hand consisted mostly out of students recruited from e-mail distribution lists of their universities. As a consequence, panelists recruited for this study were relatively young ($\mu=24.90$) and the distribution of age showed low variation ($\sigma=5.298$). Elder age groups were vastly underrepresented in this sample. In contrast to this, men were slightly overrepresented ($m=53.3\%$, $f=46.7\%$). However, this is not surprising as approximately 52.5% of all students in Germany are men (*Statistisches Bundesamt 2012*)³⁹¹.

Although the sample is rather homogeneous in terms of age, it is striking that there are non-negligible differences between panelists recruited from different sources. For instance, as displayed in Table 4-13 there is a highly significant standardized mean age difference of a medium effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) between panelists contacted via the distribution lists of universities and those recruited by e-mail recommendation ($d=-.749$; $p=.000***$). All the same, the variances of these variables are not equal ($F=350.096$; $p=.000***$). On average recruited students were obviously younger than the segment of panelists recruited by means of recommendations. As this variable – and perhaps

³⁸⁷ Q.v. Section 4.2.

³⁸⁸ Q.v. Section 7.2 for a brief discussion of the limitations of student samples.

³⁸⁹ At total of 100,000 printed invitation letters were sent out.

³⁹⁰ Q.v. Section 4.4.

³⁹¹ Q.v. Section 7.2 for a brief discussion of the limitations of student samples.

also other behavioral variables which were not explicitly tested here – have an impact on different facets of SRB³⁹², it cannot be ruled out that the recruitment method might systematically bias the participation rates of this study. Therefore, the source of recruitment had to be entered into the Multiple Binary Logistic Regression model as a control variable during the evaluation phase in order to counteract a source of possible bias.

Table 4-13: Comparison of Means Regarding Demographics and Usage Behavior for Two Different Sources of Recruitment

var. label	<i>e-mail distribution lists of universities</i>		<i>e-mail recom- mendations</i>		<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
	<i>N=8,026</i>		<i>N=424</i>				<i>N=8,450</i>				
	μ	σ	μ	σ	F	p	T	df	d	p	$1-\beta$
age	24.45	4.533	28.16	9.206	350.096	.000***	-8.229	434.903	-.749	.000***	1.000
iu _p	5.24	1.330	5.39	1.254	1.057	.304	-2.208	8,448	-.110	.027**	.578
iu _m	5.00	1.676	4.99	1.659	.357	.550	.219	8,448	.011	.827	.056
eu _p	4.83	1.612	5.07	1.617	.009	.926	-3.034	8,448	-.151	.002***	.858
eu _m	4.75	2.029	4.79	2.027	.271	.603	-.424	8,448	-.021	.671	.071

N=8,450, largest available sample size.

Furthermore, as Table 4-14 shows, there is a highly significant standardized mean difference of a small effect size ($d=.231$; $p=.000***$) (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) between the average frequency with which panelists use the stationary ($\mu=5.27$; $\sigma=1.326$) and mobile internet ($\mu=5.00$; $\sigma=1.674$). Moreover, a statistically significant difference ($d=.135$; $p=.016**$) between the frequency of usage of e-mail services on the stationary ($\mu=4.87$; $\sigma=1.608$) and mobile internet ($\mu=4.76$; $\sigma=2.027$) exists. Unfortunately, the latter difference is only of trivial size and the power of the test was insufficient ($1-\beta=.682$) to fully trust the result just as well. Consequently, it may be assumed that panelists use the stationary internet on a PC/laptop slightly more frequently than the mobile internet on a mobile phone or smartphone. However, there is no evidence that they use e-mail services more frequently on their mobile phones than on their PCs and laptops.

³⁹² Q.v. Section 3.3.2.3.

Table 4-14: Sample Frame Description and Comparison of Means Regarding Usage Behavior on Different Internet Devices

(1=never; 7=always)	variable label	PC/laptop (x=p)		mobile phone/ smartphone (x=m)		paired samples t-test (two tailed)			
		N=9,004				N=327			
		μ	σ	μ	σ	T	d	p	$1-\beta$
frequency of internet usage on a	iu _x	5.27	1.326	5.00	1.674	4.184	.231	.000***	.986
frequency of e-mail services usage on a	eu _x	4.87	1.608	4.76	2.027	2.433	.135	.016**	.682

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$.

As it is displayed in Table 4-15, panelists perceive the benefits and costs of internet usage differently depending on whether they accessed the stationary or mobile web. In particular the characteristics “*speed*” ($d=1.318$; $p=.000***$) “*absence of connection failures*” ($d=1.201$; $p=.000***$), as well as the “*ease of page navigation*” ($d=1.621$; $p=.000***$), “*ease of text input*” ($d=1.100$; $p=.000***$), and “*ease of viewing of images and texts*” ($d=1.503$; $p=.000***$), showed highly significant standardized mean differences of a large effect size (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) to the advantage of the stationary web over its mobile counterpart. In addition, highly significant, medium and small effects (*Id.*) have been found for the variables “*monetary costs of usage*” ($d=.671$; $p=.000***$), “*usefulness in work-related situations*” ($d=.709$; $p=.000***$), “*fun*” ($d=.630$; $p=.000***$) and “*usage of people whose opinion panelists value*” ($d=.578$; $p=.000***$). Moreover, a small effect (*Id.*) has been found for the variables “*anonymity*” of internet usage ($d=.298$; $p=.000***$) and “*safety*” ($d=.489$; $p=.000***$). All of these results indicate an advantage of the stationary internet compared to the mobile internet in terms of benefits and costs of usage regarding the previous eleven variables. Besides, two items – “*usefulness in private situations*” ($d=.062$; $p=.260$) and “*privacy*” ($d=.067$; $p=.228$) – showed only insignificant, trivial effect sizes (*Id.*). Regarding these two variables the benefits and costs of usage of stationary and mobile internet seem to be about equal.

Finally, for the items “*spontaneous access*” ($d=-.954$; $p=.000***$) and “*easy access on the move*” ($d=-1.635$; $p=.000***$) the standardized mean difference showed large (*Id.*), highly significant effects in favor of the mobile internet. This means, that spontaneous access to the web as well as access on the move are much more practicable on a mobile than a stationary

device. Nevertheless, these remain the only two items tested here regarding which the benefits of mobile internet usage are higher in comparison to the benefits of stationary internet usage.

Table 4-15 : Sample Frame Description and Comparison of Means Regarding the Perceived Benefits and Costs of Internet Usage on Different Internet Devices

Statement Regarding the Perceived Benefits and Costs of Internet Usage (1= completely disagree; 7= completely agree)	var. label	PC/laptop ($x=p$)		mobile phone/ smartphone ($x=m$)		paired samples t-test (two tailed)			
		N=9,004				N=327			
		μ	σ	μ	σ	T	d	p	1- β
It is cheap to use the internet on a ...	bc _{x1}	5.86	1.182	4.43	1.614	12.129	.671	.000***	1.000
The internet on a... is fast.	bc _{x2}	6.31	.917	3.93	1.445	23.827	1.318	.000***	1.000
It is save to use the internet on a ...	bc _{x3}	4.47	1.520	3.46	1.490	8.837	.489	.000***	1.000
Using the internet on a ... one remains anonymous.	bc _{x4}	3.01	1.603	2.59	1.393	5.381	.298	.000***	.999
It is simple to input short texts by way of a keyboard/touchscreen of a ...	bc _{x5}	6.80	.582	5.06	1.589	19.892	1.100	.000***	1.000
One can easily navigate on internet pages with a ...	bc _{x6}	6.67	.637	4.19	1.421	29.313	1.621	.000***	1.000
It is simple to view images and texts on the internet with a ...	bc _{x7}	6.75	.583	4.12	1.537	27.173	1.503	.000***	1.000
It is fun to use the internet on a...	bc _{x8}	6.42	.859	5.33	1.462	11.400	.630	.000***	1.000
One can use the ... without connection failures.	bc _{x9}	5.71	1.255	3.46	1.540	21.710	1.201	.000***	1.000
The internet on a ... is useful in many private situations.	bc _{x10}	6.36	.982	6.24	1.075	1.128	.062	.260	.201
Most people, whose opinion I value, would use the internet on a ...	bc _{x11}	5.89	1.250	4.98	1.444	10.451	.578	.000***	1.000
One can spontaneously access the internet on a ...	bc _{x13}	4.39	1.730	6.46	.839	-17.251	-.954	.000***	1.000
One can easily access the internet on the move with a ...	bc _{x14}	3.07	1.517	6.25	.967	-29.571	-1.635	.000***	1.000
Using the internet on a ... is something very personal.	bc _{x15}	4.48	1.542	4.38	1.592	1.209	.067	.228	.227
The internet on a ... is useful in many work-related situations.	bc _{x16}	6.55	.804	5.37	1.563	12.816	.709	.000***	1.000

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is N=327; df=326.

Thus, as it is displayed in Table 4-16, it is not surprising that panelists see highly significant mean differences with a small (*Id.*), positive effect for the amount of advantages ($d=.397$;

$p=.000^{***}$) as well as a small (*Id.*), negative effect for the amount of disadvantages ($d=-.201$; $p=.000^{***}$) both in favor of the stationary internet over the mobile internet. Consequently, also the difference of advantages and disadvantages – known as the net benefit of usage – measured either by subtracting the value for disadvantages from the value for advantages ($d=.377$; $p=.000^{***}$) or as a separate questionnaire item ($d=.267$; $p=.000^{***}$) show highly significant mean differences of small effect sizes (*Id.*). In summary it is therefore concluded that panelists attribute greater advantages as well as smaller disadvantages when comparing stationary with mobile internet usage. In line with this, panelists see a higher net benefit of using the stationary in comparison to the mobile web.

Table 4-16: Sample Frame Description Regarding the Perceived Net Benefits of Internet Usage and Intention to Participation on Different Internet Devices

Statement Regarding the Perceived Benefits and Costs of Internet Usage (1= completely disagree; 7= completely agree)	variable label	PC/laptop (x=p)		mobile phone/ smartphone (x=m)		paired samples t-test (two tailed)			
		N=9,004				N=327			
		μ	σ	μ	σ	T	d	P	1- β
Using the internet on a ... offers great advantages (compared to not using it).	bc _{x19}	6.42	.889	5.76	1.292	7.182	.397	.000***	.999
One has to accept great disadvantages using the internet on a ... (compared to not using it).	bc _{x20}	2.14	1.484	2.46	1.419	-3.633	-.201	.000***	.952
bc _{x19} – bc _{x20}	nb _x	4.28	1.904	3.31	2.102	6.809	.377	.000***	.999
Taken as a whole, using the internet on ... has greater advantages than disadvantages.	bc _{x21}	6.48	.864	6.01	1.165	4.832	.267	.000***	.998
I will certainly participate in the MOBISTudie in summer 2012 in case I am surveyed on the internet	pp _x	6.25	1.071	4.87	1.982	10.017	.554	.000***	1.000

Optimal sample size a priori estimated for two tailed paired samples t-test with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$; $bc_{x19} - bc_{x20}$, the difference between statement bc_{x19} ("Using the internet...") and bc_{x20} ("One has to accept...") is scaled from -6 ("great negative net benefit") to 6 ("great positive net benefit").

Moreover, as it is shown in the same Table 4-16, there is a highly significant mean difference with a medium size effect (*Id.*) between the panelists' intention to participate in stationary and mobile web surveys ($d=.554$; $p=.000^{***}$). Panelists previously confronted with different facets regarding the benefits and costs of stationary and mobile internet usage implicitly stated

that they were rather willing to participate in a survey conducted on a PC or laptop rather than on a mobile phone or smartphone in the summer of 2012.

Furthermore, as it is displayed in Table 4-17, the behavior of panelists showed differences regarding the frequency of using different notification functions for newly incoming e-mails and SMS – as e.g. notifications symbols and sounds, on stationary and mobile phones. For instance, for both SMS ($\mu=6.55$; $\sigma=1.117$) and e-mails ($\mu=5.24$; $\sigma=2.291$) on mobile phones as well as e-mails ($\mu=3.84$; $\sigma=2.667$) on stationary devices panelists most frequently made use of symbols for notification purposes. Besides, the usage of notification sounds and vibrating alerts were quite common on mobile and stationary devices. In contrast, lighting effects were the least frequently used notification function for SMS ($\mu=3.59$; $\sigma=2.608$) and e-mails ($\mu=2.73$; $\sigma=2.298$) on mobile devices. All the same, pop-up windows ($\mu=2.78$; $\sigma=2.391$) and notification sounds ($\mu=2.78$; $\sigma=2.361$) were the least frequently used functions on stationary devices.

Table 4-17: Sample Frame Description Regarding the Frequency of Usage of Different Notification Functions

frequency of usage of different notification functions (1= never; 7= always)	var. label	for SMS on mobile phone /smartphone (x=sm)		for e-mail on mobile phone /smartphone (x=em)		for e-mail on PC/laptop (x=ep)		paired samples t-test (two tailed)			
		N=9,004						N=327			
		μ	σ	μ	σ	μ	σ	T	d	p	1- β
notification symbol	un _{x1}	6.55	1.117	5.24	2.291	/	/	10.061	.556	.000***	1.000
		6.55	1.117	/	/	3.84	2.667	14.849	.821	.000***	1.000
		/	/	5.24	2.291	3.84	2.667	6.053	.335	.000***	.999
notification sound	un _{x2}	4.79	1.959	3.50	2.231	/	/	9.949	.550	.000***	1.000
		4.79	1.959	/	/	2.78	2.361	11.946	.661	.000***	1.000
		/	/	3.50	2.231	2.78	2.361	4.562	.252	.000***	.995
vibrating alert	un _{x3}	5.68	1.868	3.78	2.468	/	/	15.401	.852	.000***	1.000
lighting effect	un _{x4}	3.59	2.608	2.73	2.298	/	/	7.949	.440	.000***	1.000
pop-up window	un _{x5}	/	/	/	/	2.78	2.391	/	/	/	/

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$.

Table 4-18: Sample Frame Description Regarding the Immediate Perception of Messages in Different Modes

level of agreement to statements on the immediate perception of messages in different modes (1= completely disagree; 7= completely agree)									
for SMS on mobile phone /smartphone		for e-mail on mobile phone /smartphone		for e-mail on PC/laptop		paired samples t-test (two tailed)			
ip _{sm}		ip _{em}		ip _{ep}					
N=9,004						N=327			
μ	σ	μ	σ	μ	σ	T	d	p	1-β
5.90	1.076	4.33	1.825	/	/	14.841	.821	.000***	1.000
5.90	1.076	/	/	4.16	1.917	12.775	.706	.000***	1.000
/	/	4.33	1.825	4.16	1.917	-.035	-.002	.972	.050

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$.

Table 4-19: Sample Frame Description Regarding the Immediate Perception of Messages in Different Modes

<i>level of agreement to statements on the immediate perception of messages in different modes</i> <i>(1= completely disagree; 7= completely agree)</i>							
<i>for SMS on mobile devices</i>		<i>for e-mail on stationary or mobile devices</i>		<i>paired samples t-test (two tailed)</i>			
ip _s		ip _e					
<i>N=9,004</i>				<i>N=327</i>			
<i>μ</i>	<i>σ</i>	<i>μ</i>	<i>σ</i>	<i>T</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
5.90	1.076	4.39	1.444	15.315	.847	.000***	1.000

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$.

In addition, the same Table 4-17 shows that all notification functions for SMS were more frequently used as their counterparts for e-mail on both stationary and mobile devices. Here, all standard mean differences showed highly significant large, medium, and small size effects (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). Moreover, all notification functions for e-mails on mobile phones are more frequently used as their counterparts on stationary devices. Again, standard mean differences show highly significant small size effects (*Id.*).

The aforementioned mean differences in the frequency of usage of notification functions are accompanied by differences in the panelists' immediacy of perception of SMS and e-mail on different types of internet enabled devices, as Table 4-18 and Table 4-20 show. At this, there are highly significant standardized mean differences of large and medium effect sizes (*Id.*) between the immediacy with which SMS are received on mobile devices and e-mails received on mobile ($d=.821$; $p=.000***$) as well as stationary devices ($d=.706$; $p=.000***$). In contrast, there is no significant standardized mean difference between the immediacy of perception of e-mails on stationary and mobile devices ($d=-.002$; $p=.972$). Obviously, SMS are always perceived more immediately than e-mails which were received on either stationary or mobile devices. At this, there seems to be no significant difference between the immediacy of perception of e-mails on mobile and stationary devices.

Variables indicating the immediacy of perception of e-mails on mobile and stationary devices were weighted with the frequency of e-mail usage on mobile and stationary devices and computed to an index (ip_e) in the course of operationalization³⁹³. Here, a highly significant standardized mean difference of a large effect size (*Id.*) was found between the immediacy of SMS perception on mobile devices and the combined weighted immediacy of e-mail perception on stationary and mobile devices ($d=.847$; $p=.000***$). Again, this means that, in general, newly incoming SMS are perceived more immediate by the panelists than newly incoming e-mails.

³⁹³ Q.v. Section 4.5.3.2.2.

Table 4-20: Sample Frame Description Regarding the Anticipated Ease Accessing Web Surveys

			<i>N</i> =9,004				
			<i>ea_{smp}</i>	<i>ea_{emm}</i>	<i>ea_{emp}</i>	<i>ea_{epp}</i>	<i>ea_{epm}</i>
			$\mu=3.51$ $\sigma=1.954$	$\mu=5.40$ $\sigma=1.507$	$\mu=4.73$ $\sigma=1.926$	$\mu=6.69$ $\sigma=.807$	$\mu=4.26$ $\sigma=1.944$
<i>variable</i> (1= completely disagree; 7= completely agree)			<i>paired samples t-test</i> (two tailed)				
<i>N</i> =9,004			<i>N</i> =327				
invitation sent by SMS, received on mobile phone /smartphone, link accessed on mobile phone /smartphone	<i>ea_{smm}</i>	$\mu=5.13$ $\sigma=1.707$	T=13.508 d=.747 p=.000*** 1- β =1.000	T=-4.763 d=-.263 p=.000*** 1- β =.997	T=2.506 d=.139 p=.013** 1- β =.708	T=-15.981 d=-.884 p=.000*** 1- β =1.000	T=6.467 d=.358 p=.000*** 1- β =.999
invitation sent by SMS, received on mobile phone /smartphone, link accessed on PC/laptop	<i>ea_{smp}</i>	$\mu=3.51$ $\sigma=1.954$	/	T=-15.873 d=-.878 p=.000*** 1- β =1.000	T=-12.253 d=-.678 p=.000*** 1- β =1.000	T=-27.145 d=-1.501 p=.000*** 1- β =1.000	T=-8.198 d=-.453 p=.000*** 1- β =1.000
invitation sent by e-mail, received on mobile phone /smartphone, link accessed on mobile phone /smartphone	<i>ea_{emm}</i>	$\mu=5.40$ $\sigma=1.507$	/	/	T=5.138 d=.284 p=.000*** 1- β =.999	T=-14.117 d=-.781 p=.000*** 1- β =1.000	T=9.104 d=.503 p=.000*** 1- β =1.000
invitation sent by e-mail, received on mobile phone /smartphone, link accessed on PC/laptop	<i>ea_{emp}</i>	$\mu=4.73$ $\sigma=1.926$	/	/	/	T=-16.825 d=-.930 p=.000*** 1- β =1.000	T=8.081 d=.447 p=.000*** 1- β =1.000
invitation sent by e-mail, received on PC/laptop, link accessed on PC/laptop	<i>ea_{epp}</i>	$\mu=6.69$ $\sigma=.807$	/	/	/	/	T=20.738 d=1.147 p=.000*** 1- β =1.000
invitation sent by e-mail, received on PC/laptop, link accessed on mobile phone /smartphone	<i>ea_{epm}</i>	$\mu=4.26$ $\sigma=1.944$	/	/	/	/	/

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$.

Table 4-21: Sample Frame Description Regarding the Anticipated Ease of Accessing Web Surveys

<i>variable</i> <i>(1= completely disagree;</i> <i>7= completely agree)</i>			<i>N=9,004</i>		
			<i>ea₂</i>	<i>ea₃</i>	<i>ea₄</i>
			$\mu=5.78$ $\sigma=1.162$	$\mu=5.13$ $\sigma=1.707$	$\mu=3.51$ $\sigma=1.954$
			<i>paired samples t-test</i> <i>(two tailed)</i>		
<i>N=9,004</i>			<i>N=327</i>		
invitation sent by e-mail, received on stationary or mobile device, link accessed on mobile phone/smartphone	<i>ea₁</i>	$\mu=4.80$ $\sigma=1.484$	T=-13.021 d=-.720 p=.000*** 1- β =1.000	T=-3.481 d=-.192 p=.001*** 1- β =.933	T=13.723 d=.759 p=.000*** 1- β =1.000
invitation sent by e-mail, received on stationary or mobile device, link accessed on PC/laptop	<i>ea₂</i>	$\mu=5.78$ $\sigma=1.162$	/	T=6.282 d=.347 p=.000*** 1- β =.999	T=22.708 d=1.256 p=.000*** 1- β =1.000
invitation sent by SMS, received on mobile device, link accessed on mobile phone/smartphone	<i>ea₃</i>	$\mu=5.13$ $\sigma=1.707$	/	/	T=13.508 d=.747 p=.000*** 1- β =1.000
invitation sent by SMS, received on mobile device, link accessed on PC/laptop	<i>ea₄</i>	$\mu=3.51$ $\sigma=1.954$	/	/	/

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$.

Moreover, as displayed in Table 4-20, panelists evaluated the anticipated ease of accessing web surveys differently depending on whether the link was sent by SMS or e-mail, or whether it was received and accessed on mobile or stationary devices. At this, almost all variables which were not associated with mode switches (in particular ea_{smm} , ea_{emm} , ea_{ep}) showed highly significant or significant³⁹⁴ standardized mean differences of small, medium, and large

³⁹⁴ The comparison between ea_{smm} and ea_{emp} yielded only a trivial effect (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) of the paired samples t-test with a rather low test power indicating a β/α -ratio of below 4 (Cohen 1988, p. 56).

effect sizes (*Id.*) in comparison to those that were associated with switches (ea_{smp} , ea_{emp} , ea_{epm}). At this, prior variables showed a higher ease of accessing web surveys than the latter.

In order to index the level of anticipated ease with which surveys may be accessed by panelists – regardless of the survey mode in which the link had been received in – a weighted anticipated ease of access variable was calculated (ea_1 , ea_2)³⁹⁵. This procedure is necessary because it is neither possible to observe if a panelist received an e-mail with a link on a mobile or a stationary device nor to identify whether or not a mode switch was actually necessary to access the survey. Again panelists evaluated the anticipated ease of accessing web surveys differently. At this, their evaluation depended on the fact whether the link was sent by SMS or e-mail and whether it had to be accessed on a mobile or stationary device. At this, panelists rated surveys for which links were sent by invitational e-mails, received either on stationary or mobile devices and accessed on PCs/laptops (ea_2) easier to access than all other combinations including links sent by SMS, received on mobile devices and accessed on mobile phones/smartphones (ea_3). This comparison showed a highly significant standardized mean difference of a small effect size ($d=.347$; $p=.000***$).

Furthermore, the latter (ea_3) was rated easier to access than web surveys for which links were sent by SMS, received on a mobile device, and accessed on a PC/laptop (ea_4) ($d=.747$; $p=.000***$) as well as surveys for which links sent by e-mail, received on stationary or mobile device, and accessed on a mobile phone/smartphone (ea_1) ($d=.192$ ³⁹⁶; $p=.001***$). These comparisons showed highly significant standard mean differences of a large effect size for the prior, but only a trivial effect size for the latter comparison (*Id.*).

Finally, the involvement in the main incentive (ii) (tablet PC), offered in the course of recruitment in the first study phase, as well as the involvement in the topic (it) of the main study (headphones) also have been examined. At this, both types of involvement were measured by means of a German translation (*Trommsdorff 2008, p. 57*) of Zaichkowsky's (1985) five item Personal Involvement Inventory modified by Mittal (1995).

It has been suggested that Cronbach's α values should be greater than .70 in order to assume reliability of a scale (*Hammond 2006, p. 198*). In accordance to this proposition the multi-item scales measuring involvement in the incentive ($\alpha=.912$) and topic ($\alpha=.872$) are most likely reliable, as it is displayed in Table 4-22. Moreover, there is a highly significant standard-

³⁹⁵ Q.v. Section 4.5.3.2.3.

³⁹⁶ Reversed algebraic sign.

ized mean difference of a trivial effect size between the involvement in the incentive and the topic ($d=-.129$; $p=.020^{**}$) (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192)³⁹⁷. Consequently, the panelists' product class involvement in headphones, which were the topic of the main study, is higher than their involvement in tablet PCs, which were offered as main incentive in the course of this study. However, this was the case only to a neglectable, trivial extent. Moreover, the test showed too low statistical power ($1-\beta=.643$).

Table 4-22: Sample Frame Description Regarding Product Class Involvement

level of agreement to statements on product class involvement (1= completely disagree; 7= completely agree)	x	tablet PCs (incentive, ii _x)		headphones (topic, it _x)	
		N=9,004			
		μ	σ	μ	σ
... are important to me.	1	3.74	1.950	5.11	1.879
... mean a lot to me.	2	3.49	1.909	4.66	1.952
I am very interested in	3	4.54	2.031	4.13	1.908
It bores me, when others talk about ³⁹⁸	4	4.86	1.791	4.27	1.984
... are very relevant to me.	5	3.97	1.965	4.37	1.963
product class involvement in ...		4.12	1.660	4.51	1.575
Cronbach's α (for 5 items)		.912		.871	
paired samples t-test (two tailed)		N=327			
		T	d	p	1-β
		-2.334	-.129	.020**	.643

Optimal sample size a priori estimated for two tailed paired samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4 is $N=327$; $df=326$.

4.7 Size Calculations and Drawing of the Evaluation Sample

In empirical studies it is necessary to determine appropriate sample sizes in advance for two reasons. Firstly, a sufficient sample size is important in order to unveil meaningful effects. At this, small samples foster the danger of overlooking important effects, e.g. revealing them as statistically insignificant. On the contrary, too large sample sizes increase the risk of assessing effects as substantial being, however, negligible in size (Rasch et al. 2009, pp. 77-86). Sec-

³⁹⁷ For the comparison between ii and it the β/α -ratio is below 4 indicating a rather low power of the paired samples t-test (Cohen 1988, p. 56).

³⁹⁸ Reversed item.

only, sample size is crucial for testing hypotheses. In the context of statistical testing it is not only important to keep the α error probability at a low level. This is the probability of wrongly rejecting a true null hypothesis (type I error). Moreover, it is essential to minimize the β error – the probability of wrongly accepting a false null hypothesis (type II error) – so that the power $1-\beta$ of the statistical test is reasonably high. All of this can be assured by an appropriate sample size (*Rasch et al. 2009, pp. 77-87; Land and Zheng 2010, pp. 199-203*).

This study aims to detect differences between groups of panelists by means of Multiple Binary Logistic Regression Analyses. As it is its main purpose to research differences in participation in stationary and mobile web surveys, both dataset of participants and non-participants will be included in the evaluation sample, for which an optimum size will be determined in this section. There are several statistics – e.g. Cohen's d or ω -algebra (*Cohen 1988, pp. 20-26; Id., pp. 216-26*) – which are suitable as effect sizes in pairwise comparisons. However, in the context of Logistic Regression Analyses only the odds ratio (OR) is frequently referred to as the effect size by a vast majority of authors (e.g. *Backhaus et al. 2011, p. 266; Id., p. 292; Bühner and Ziegler 2009, pp. 299-300; Ellis 2010, p. 16; Konstantopoulos 2008, p. 180; Kraemer 2011, pp. 90-2*). Nevertheless, there are also a few sources which do not coincide with this opinion and do not regard ORs as effect sizes. In their option ORs do not contain different information than unstandardized logistic regression coefficients or probabilities, as they are only a different way of presenting information (*Menard 2010, pp. 94-6*). Nevertheless, in accordance with the widespread view in literature, ORs are regarded as the effect size of Logistic Regression Analyses conducted in this study.

Formula VIII: Odds Ratio

$$OR = \frac{ODD_1}{ODD_2} = \frac{\frac{P_1}{1-P_1}}{\frac{P_2}{1-P_2}} = \frac{\frac{PARR_1}{1-PARR_1}}{\frac{PARR_2}{1-PARR_2}}$$

At this, an odds ratio (OR) is defined as the odds of event $Y=1$ of one group in comparison to the odds of the same event for another group. In turn an odd is defined as the ratio of the probability (P) of an event and its complementary probability ($1-P$) (*Hosmer and Lemeshow 2000, p. 49*). Hence, an OR contrasts the proportion of probability and complementary probability of one event between two groups. Participation of subjects in studies can be displayed

as a probability (of participation) and converted to an odd (*Jaccard 2001, pp. 2-3*). In case $PARR_1$ is the participation rate of one group and $PARR_2$ that of another, then the OR is defined as shown in Formula VIII.

Comparing participation rates (PARR) between two groups of respondents, the OR has to surpass certain thresholds in order to unveil more than just trivial effect sizes. Unfortunately, to the best knowledge of this author, there are no established thresholds for small, medium, and large ORs. However, in the course of meta analyses, ORs are frequently converted into more popular effect size measures, such as the standardized mean difference (Cohen's d), for which, in turn, such thresholds exist. Hasselblad and Hedges (*1995*), for instance, suggested to do so by means of Formula IX (*Id.*, *p. 170*).

Formula IX: Conversion of Standardized Mean Difference Cohen's d into Odds Ratio

$$d = \frac{\ln(OR) \cdot \sqrt{3}}{\pi} \Leftrightarrow OR = e^{\frac{d \cdot \pi}{\sqrt{3}}}$$

Cohen (*1988, pp. 24-7*) as well as Gray and Kinnear (*2012, p. 192*) suggest similar threshold values as reference points for large, medium, small, and trivial effect sizes of Cohen's d in scientific literature. Based on Formula IX the thresholds for ORs may be calculated from these thresholds. At this, d ranges from $+\infty$ to $-\infty$ while OR ranges from 0 to ∞ . In case an OR corresponds to a d , at the same time its reciprocal function $1/OR$ represents the negative value of d . All of this is displayed in Table 4-23.

Comparing the sizes of effects derived from the pretest with threshold values presented in literature by Cohen (*1988, pp. 24-7*) as well as Gray and Kinnear (*2012, p. 192*), the effects researched in this study are continuously expected to be possibly of small size. In general even minor differences in participation rates may have a strong impact on the costs of a study. Assuming, for example, that according to a sample size calculation a researcher needs to analyze the datasets of 100 respondents. With a participation rate of $PARR = 11\%$ a sample of approximately 909 panelists would be necessary in order to receive this number of responses³⁹⁹, but a $PARR$ of 10% would require 1,000 panelists for the same number of responses⁴⁰⁰. Assuming that it costs c monetary units to recruit one panelist, the costs of recruiting 1,000

³⁹⁹ $11\% \cdot 909 = 99.99 \approx 100$.

⁴⁰⁰ $10\% \cdot 1,000 = 100$.

panelists would amount to $1,000 \cdot c$, and 909 panelists to $909 \cdot c$, respectively. Consequently, the costs of the study would increase by weighty 10% in case PARR would drop by only one percentage point from 11% to 10%⁴⁰¹.

Table 4-23: Thresholds for Odds Ratio and Cohen's d Effect Sizes

Effect Size Description	Corresponding Threshold Values					
	Cohen (1988, pp. 24-7)			Gray and Kinnear (2012, p. 192)		
	d	OR	1/OR	d	OR	1/OR
large	.80	4.268	.234	>.80	>4.268	<.234
medium	.50	2.477	.404	.79 to .50	4.267 to 2.477	.235 to .404
small	.20	1.437	.696	.49 to .20	2.476 to 1.437	.405 to .696
trivial	/	/	/	<.20 and >-.20	<1.437 and >.696	>.697 and <1.437
small	-.20	.696	1.437	-.20 to -.49	.696 to .405	1.437 to 2.476
medium	-.50	.404	2.477	-.50 to -.79	.404 to .235	2.477 to 4.267
large	-.80	.234	4.268	<-.80	<.234	>4.268

The calculation presented in Formula X shows, that inserting the upper assumptions into Formula VIII yields only an $OR=1.112$. This is a trivial effect size, because – according to the thresholds presented in Table 4-23 – a small effect size would require an OR of at least 1.437 (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192).

⁴⁰¹ $\frac{1.000 \cdot c}{909 \cdot c} - 1 = .1001100 \approx 10\%$.

Formula X: Example Calculation of Odds Ratio

$$OR = \frac{\frac{PARR_1}{1 - PARR_1}}{\frac{PARR_2}{1 - PARR_2}} = \frac{\frac{.11}{1 - .11}}{\frac{.10}{1 - .10}} = \frac{.124}{.111} = 1.112$$

The abovementioned problem of trivial response rate differences having serious impact on the costs of a survey aggravates for higher participation rate levels for which a small OR corresponds to a larger absolute difference of $PARR_1$ and $PARR_2$. This fact is expressed in Table 4-24. Therefore, because even small effect sizes are worthwhile investigating in survey research, also trivial differences in participation rates will have to be taken into account in the course of this piece of research.

Table 4-24: Odds Ratio vs. Response Rate Differences

$PARR_1$	ODD_1	$PARR_2$	ODD_2	OR	$ PARR_1 - PARR_2 $
10.0%	.11	7.9%	.09	1.3	2.1%
20.0%	.25	16.1%	.19	1.3	3.9%
30.0%	.43	24.8%	.33	1.3	5.2%
40.0%	.67	33.9%	.51	1.3	6.1%

Reasoning a convenient sample size in order to show small, medium, and large effect sizes for the purpose of Multiple Binary Logistic Regression Analysis is possible by means of procedures proposed by Lyles, Lin and Williamson (2007), Demidenko (2007), as well as Hsieh, Bloch and Larsen (1998), for example. All three procedures are part of the G*Power 3.1.4 statistical software package (Faul et al. 2007; Faul et al. 2009). At this, the enumeration procedure of Lyles, Lin and Williamson (2007) is based on Wald and likelihood ratio tests. Demidenko's (2007) procedure offers a large sample approximation of the Wald test which – as Monte-Carlo simulations have shown – is more accurate than and, therefore, preferable to the similar procedure proposed by Hsieh, Bloch and Larsen (1998). Faul et al. (2009, p. 1157) recommend to calculate the sample size by means of Demidenko's (2007) estimation and thereafter validate the results with the enumeration approach based on the likelihood ratio test proposed by Lyles, Lin and Williamson (2007). The authors claim that their simulations have

shown that the simulated power and accuracy of the likelihood ratio test procedure is higher in comparison to the Wald test procedure.

Besides an estimation of the expected order of magnitude of the relevant effect size, here the odds ratio (OR), determining the appropriate sample size for Multiple Binary Logistic Regression Analysis by means of both afore-noted procedures with G*Power 3.1.4 requires indicating the number of tails of the test (“one” vs. “two”-tailed⁴⁰²), the proportion of variance explained by additional predictors in the model (“R² other X”⁴⁰³) as well as the distribution of the investigated predictor (“X distribution”⁴⁰⁴) to be known to the researcher. Moreover, the probability of the researched event (Y=1) – here participation in the survey – for all cases for which the researched predictor is not X=1 (“P(Y=1|X=1)H₀”⁴⁰⁵) is needed. In case of a binary distribution of a predictor the software additionally requires the proportion of the predictor in the sample (“X parm π ”⁴⁰⁶). In case of a normal distribution the mean (μ) and standard deviation (σ) of the variable are required. In this study each of the four experimental groups (expgr₁ to expgr₄) – except the reference group expgr₃ – functioned as the most important predictor once. All of this data has been derived from the final pretest (N=536) previously conducted⁴⁰⁷.

Furthermore, the desired error probability (α) and power of the test (1- β) have to be specified by the researcher (Faul et al. 2009, p. 1157). For the latter purpose Cohen (1988, p. 56) proposed a convention to choose a β/α -ratio equal to 4. This ratio implies that type I errors are regarded as “four times as serious as type II errors” (Cohen 1988, p. 56). However, in case the aforementioned ratio would lead to “sample sizes so large to exceed an investigator’s resources” (Cohen 1988, p. 56) a smaller ratio may be chosen. Therefore, as in this study a relatively large panel has been at hand, the ratio of $\beta/\alpha=1$ has been chosen. This coefficient implies that type I errors are regarded as serious as type II errors.

⁴⁰² Terminology used by G*Power 3.1.4.

⁴⁰³ See above (prior footnote).

⁴⁰⁴ See above.

⁴⁰⁵ See above.

⁴⁰⁶ See above.

⁴⁰⁷ Q.v. Section 4.4.

Table 4-25: Sample Size Calculation for Main Effects

variable	$P(Y=1 X=1)$ H_0^{408}	OR	d	R^2 other X	sample size in accordance to	
					Demidenko (2007) with variance correction	Lyles, Lin and Williamson (2007) if $N < 10,000$
expgr ₁	32.6%	.731	-.173	.265	3,900	3,915
expgr ₂	27.6%	1.309	.148	.266	5,124	5,092
expgr ₄	32.8%	.738	-.168	.266	4,128	4,144

Further input parameters: tails:=one; $\alpha=\beta=.05$; $1-\beta=.95$; X distribution:=binomial; X parm $\pi=.25$;
 R^2 other X:= Nagelkerke's R^2 .

Based on the data collected of the final pretest the sample size has been determined by means of G*Power 3.1.4. The results regarding the experimental groups, as the most important predictor researched in the course of this study, are displayed in Table 4-25.

Following the most conservative approach of Demidenko (2007), a size of 5,124 panelists appears to be optimal for the evaluation sample in order to unveil and interpret meaningful main effects. Consequently, in order to ensure equal representation of different invitation and survey modes, an evaluation sample of 5,124 – stratified by the four experimental groups of a size of 1,281 panelists each – was randomly drawn from the final sample frame of 8,468 and provided for analysis. Furthermore, all 3,344 datasets remaining in the final sample frame were marked as a holdout sample⁴⁰⁹.

⁴⁰⁸ $P(Y = 1|X = 1)H_{0\text{expgr1}} = \frac{\text{PARR}_{\text{expgr2}} + \text{PARR}_{\text{expgr3}} + \text{PARR}_{\text{expgr4}}}{3} = \frac{.41044776 + .31343284 + .25373134}{3} \approx 32.6\%;$
 $P(Y = 1|X = 1)H_{0\text{expgr2}} = \frac{\text{PARR}_{\text{expgr1}} + \text{PARR}_{\text{expgr3}} + \text{PARR}_{\text{expgr4}}}{3} = \frac{.26119403 + .31343284 + .25373134}{3} \approx 27.6\%;$
 $P(Y = 1|X = 1)H_{0\text{expgr4}} = \frac{\text{PARR}_{\text{expgr1}} + \text{PARR}_{\text{expgr2}} + \text{PARR}_{\text{expgr3}}}{3} = \frac{.26119403 + .41044776 + .31343284}{3} \approx 32.8\%.$

⁴⁰⁹ Q.v. Section 6.2.3.2.

5 Research Guiding Hypotheses

In the course of the following chapter several hypotheses will be derived from a combined application of SX (*Blau 1964; Dillman 1978; Homans 1961; Thibaut and Kelley 1959*) paired with practical deliberations on panelists' profile data which was collected in the course of the preliminary study and displayed in the previous Section 4.6. At this, at first survey and invitation modes were treated as separate variables for the purpose of deriving two hypotheses (H1 and H2). Subsequently, making use of the four experimental groups – which constitute distinct combinations of survey and invitation modes – the following six hypotheses (H3 to H8) will be derived. This sophisticated approach has been chosen in order to emphasize the danger of overlooking important combined effects of survey and invitation modes by only applying a standalone analysis of the two variables. All of these hypotheses will be guiding subsequent research and evaluated by means of a Multiple Binary Logistic Regression Analysis⁴¹⁰.

5.1 Standalone View on Survey and Invitation Mode

According to SX panelists will participate in a survey when they trust that their expected individual net benefit of participation is positive (*Hoonakker and Carayon 2009*). At this, net benefit of participation is defined as the difference between the sum of expected benefits associated with the survey and the sum of its expected costs. Two survey modes will likely yield different evaluations of benefits and costs – and with it of net benefit – in case panelists value comparable characteristics of these modes, e.g. speed, costs, safety or the ease of accessing web surveys⁴¹¹, at different levels. Consequently, the mode which offers them a higher net benefit will yield higher participation rates.

In case all other features of the survey and survey process are identical or indeed very similar, the differences in the evaluation of net benefit between two web survey modes will stem from the characteristics attributed to stationary and mobile web usage on different devices. This

⁴¹⁰ In addition, further four hypotheses (H9 to H12) introduced interaction effects of the anticipated ease of access variable with the four experimental groups to the model. However, as the effect of anticipated ease of access already may have been included in and, hence, has inextricably been linked with the interaction between survey and invitation mode – referred to as experimental groups here – multicollinearity might be present in the analyses of such interactions. Nevertheless, tests of multicollinearity conducted (q.v. Section 6.1.3.2) did not support this proposition. Therefore, the corresponding hypotheses and results were reported in Annex CXIII.

⁴¹¹ Factors all of which serve as independent variables in this study. Q.v. Section 4.5.3.2.

ceteris paribus condition also holds true for this study. As previously displayed in Table 4-15, panelists in this sample frame perceive the benefits and costs of stationary and mobile web usage differently, in vast favor for the stationary internet⁴¹². Furthermore, as Table 4-16 showed, they ascribe more advantages and fewer disadvantages and, thus, a highly significantly higher net benefit to stationary than to mobile web usage⁴¹³. Therefore, participation rates of stationary web surveys in this study should be higher than the participation rates of comparable mobile web surveys. Hence, without differentiating between invitation modes, it is hypothesized:

H1: The probability of participation of panelists invited to stationary web surveys ($mode_{sur}=1$) is higher in comparison to the probability of participation of panelists invited to mobile web surveys ($mode_{sur}=0$).

The preceding hypothesis is disregarding the fact that panelists may be invited to stationary and mobile web surveys by means of various invitation modes – e.g., here in this study, by SMS or e-mail invitations. In order to derive hypotheses from SX (Blau 1964; Dillman 1978; Homans 1961; Thibaut and Kelley 1959) that will help to predict the participation of panelists in a survey regarding the mode they have been invited in, it is necessary to comprise an anticipated ease of access (ea) variable. This variable establishes a theoretical link between the mode of invitation and the mode the survey is conducted in. In particular, speaking in terms of SX, the easier it is to access a particular link in an invitation to a survey the higher the expected participation rate of the corresponding survey will be.

At this, the ease of accessing web surveys will differ regarding the mode of invitation, the type of device the invitation has been received on, and the survey mode. Consequently, all four experimental groups in this study were associated with different levels of ease of accessing web surveys. The reason for these differences is founded in the nature of the experimental groups included, as it has been previously shown in Table 4-3. In particular, the groups differ regarding the access path of surveys, which were either unimode, partially mixed mode, or mixed mode.

At first sight, it would immediately suggest itself that the ease of accessing web surveys should be highest for unimode studies, followed by partially mixed mode and pure mixed mode studies. It intuitively stands to reason, that for experimental groups associated with

⁴¹² Q.v Section 4.6.

⁴¹³ For nb_x (d=.377; p=.000***) and for bc_{x21} (d=.267; p=.000***).

mixed mode or partial mixed mode surveys switching costs from the mode of invitation to survey mode (partly) lower the anticipated net benefit of participation. Conversely, the anticipated ease of accessing web surveys conducted in a certain mode should raise anticipated net benefit and, hence, the intention to participate in this mode. However, as the following data shows, this rather intuitive assumption is elusive.

Table 5-1 : Ranking of Variables Regarding the Anticipated Ease of Accessing Web Surveys

<i>rank</i>	<i>variable label</i>	μ	σ	<i>access path</i>	<i>type of survey access</i>	<i>associated with expgr</i>
1st	ea ₂	5.78	1.162	- invitation with link to a stationary web survey - sent by e-mail - received on stationary or mobile device - supposed to be accessed on PC/laptop	partially mixed mode	expgr ₂
2nd	ea ₃	5.13	1.707	- invitation with link to a mobile web survey - sent by SMS - received on mobile device - supposed to be accessed on mobile phone/smartphone	unimode	expgr ₃
3rd	ea ₁	4.80	1.484	- invitation with link to a mobile web survey - sent by e-mail - received on stationary or mobile device - supposed to be accessed on mobile phone/smartphone	partially mixed mode	expgr ₁
4th	ea ₄	3.51	1.954	- invitation with link to a stationary web survey - sent by SMS - received on mobile device - supposed to be accessed on PC/laptop	mixed mode	expgr ₄

N=9,004. Means and standard deviations measured with final sample frame.

Table 5-1 gives an overview of the ranking of different access paths in accordance to their mean of associated ease of accessing. Panelists in this study anticipate invitations with a link to a stationary web survey sent by e-mail, which are received on stationary or mobile devices and are supposed to be accessed on a PC/laptop, as the easiest way to access a link to a survey (ea₂; $\mu=5.78$; $\sigma=1.162$). However, this is an access path of a partial mixed mode survey rather than an unimode survey. In the opinion of panelists this mixed mode survey is easier to access than all three other possibilities of accessing examined in this study. This includes an ad-

vantage over the unimode access path used – namely accessing invitations with a link to a mobile web survey sent by SMS, which were received on mobile devices and supposed to be accessed on mobile phones/smartphones (ea_3 ; $\mu=5.13$; $\sigma=1.707$). Here, the standardized mean difference between ea_2 and ea_3 proved to be highly significant ($d=.347$; $p=.000***$). Similar holds true for this and all other differences between the ease of access variables researched, which have previously been compared in Table 4-21.

Comparing the ease of accessing web surveys which were supposed to be accessed on a PC/laptop it has to be noted that panelists rated the invitational links sent by e-mail (ea_2) easier to access than links sent by SMS (ea_4). This comparison showed a highly significant standardized mean difference of large size ($d=1.256$; $p=.000***$)⁴¹⁴. However, when comparing the ease of accessing invitations on a mobile phone/smartphone panelists rated links sent by e-mail (ea_1) harder to access than links sent by SMS (ea_3). Interestingly, this comparison showed a highly significant standardized mean difference – but only of trivial size ($d=-.192$; $p=.001***$).

In summary, e-mail invitations show an advantage of a large effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) over SMS invitations in terms of ease of accessing in case an e-mail invitation have been received on a PC/laptop. At the same time e-mail invitations show a disadvantage (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) over SMS invitations – but only of a trivial effect size – in case the e-mail invitations have been received on a mobile phone/smartphone. As large effects outweigh trivial effects, therefore in summary, without differentiating between different survey modes, it is hypothesized in general:

H2: The probability of participation of panelists invited by e-mail ($mode_{inv}=0$) is higher in comparison to the probability of participation of panelists invited by SMS ($mode_{inv}=1$).

In the following Section 5.2 the combinations – and, hence, interactions – of survey and invitation modes are analyzed jointly as four experimental groups.

5.2 Combined View on Survey and Invitation Modes as Experimental Groups

In order to derive the following hypotheses for the purpose of explanation it has been assumed that two hypothetical experimental groups, $expgr_A$ and $expgr_B$, exist. Here, $expgr_A$ is associat-

⁴¹⁴ Q.v. Table 4-21.

ed with a survey conducted in one survey mode sm_A to which panelists were invited in invitation mode im_A , and $expgr_B$ with a survey conducted in a different mode sm_B to which they were invited to in im_B .

Assuming that, in accordance to SX (*Blau 1964; Dillman 1978; Homans 1961; Thibaut and Kelley 1959*), both survey modes sm_A and sm_B will yield different panelists' evaluations of net benefit⁴¹⁵, consequently, participation rates of these modes will vary. At this, the mode associated with higher net benefit will show higher participation rates.

However, in case different corresponding ease of access variables ea_A and ea_B are included into this underlying additive (or partial) model of benefit (*Green, Carmone and Wind 1972, pp. 288-9*) three scenarios of the impact of these variables on participation are conceivable. The following scenarios have been deployed under the assumption that in the initial situation – the one in which it has been abstracted from ease of accessing – panelists ascribe a higher net benefit to sm_A than to sm_B :

- First, in case the ease of accessing a survey ea_A to which panelists were invited to in im_A is higher than the ease of accessing a survey ea_B to which panelists were invited to in im_B , and at the same time – per assumption – higher net benefit is ascribed to sm_A than to sm_B , survey participation $expgr_A$ will be higher than in $expgr_B$.
- Second, in case the ease of accessing a survey ea_A to which panelists were invited to in im_A is equal to the ease of accessing a survey ea_B to which panelists were invited to in im_B , and at the same time – per assumption – higher net benefit is ascribed to sm_A than to sm_B , survey participation in $expgr_A$ will be higher than in $expgr_B$.
- Third, in case the ease of accessing a survey ea_A to which panelists were invited to in im_A is lower than the ease of accessing a survey ea_B to which panelists were invited to in im_B , and at the same time – per assumption – higher net benefit is ascribed to sm_A than to sm_B , survey participation in $expgr_A$ and $expgr_B$ will have to be assessed on a case-by-case basis regarding the magnitude of effect size differences in net benefit and ease of access in both experimental groups.

Furthermore, a different situation is assumed in which in two different hypothetical experimental groups $expgr_A$ and $expgr_B$ surveys are conducted in the same mode ($sm_A=sm_B$). Following above logic, both groups will yield identical evaluations of net benefit. Hence, their participation rates will show no differences. However, in case participants have been invited

⁴¹⁵ E.g. in case panelists value comparable characteristics of these survey modes at different levels.

in different invitation modes – im_A and im_B – and corresponding ease of access variables ea_A and ea_B were included into the model, the following three additional scenarios of the impact of these variables on participation are conceivable:

- Fourth, in case the ease of accessing a survey ea_A to which panelists were invited to in im_A is higher than the ease of accessing a survey ea_B to which panelists were invited to in im_B , and at the same time – per assumption – an equal amount of net benefit is ascribed to sm_A and sm_B , then survey participation in $expgr_A$ will be higher than in $expgr_B$.
- Fifth, in case the ease of accessing a survey ea_A to which panelists were invited to in im_A is lower than the ease of accessing a survey ea_B to which panelists were invited to in im_B , and at the same time – per assumption – an equal amount of net benefit is ascribed to sm_A and sm_B , then survey participation in $expgr_A$ will be lower than in $expgr_B$.
- Sixth, in case the ease of accessing a survey ea_A to which panelists were invited to in im_A is equal to the ease of accessing a survey ea_B to which panelists were invited to in im_B , and at the same time – per assumption – an equal amount of net benefit is ascribed to sm_A and sm_B , then survey participation in $expgr_A$ will be equal to that in $expgr_B$.

In order to derive hypotheses regarding participation rates all four groups included in the experimental design were compared to each other. All relevant data for this purpose has been displayed in Table 5-2. First, following the logic of the first case explained above, the experimental groups $expgr_1$ and $expgr_2$ will be compared. For the former, invitations with a link to a mobile web survey were sent by e-mail, received on stationary or mobile devices, and were supposed to be accessed by panelists on their mobile phones/smartphones. This constitutes the first access path utilized in this study which is characterized by a specific amount of ease of access (ea_1). At the same time in $expgr_2$ invitations with a link to a stationary web survey were sent by e-mail, received on stationary or mobile devices, and were supposed to be accessed by panelists on PCs/laptops. In turn, this constitutes the second access path which is associated with its own individual amount of ease of access (ea_2).

Table 5-2: Experimental Set-Up

		factor 2: invitation mode																									
		invitation via e-mail	invitation via SMS																								
factor 1: survey mode	mobile web survey	expgr₁ - invitation with link to mobile web survey, - sent by e-mail. - received on stationary or mobile device. - link accessed on mobile phone/smartphone, - partially mixed mode <table><tr><td></td><td>μ</td><td>σ</td></tr><tr><td>ea₁</td><td>4.80</td><td>1.484</td></tr><tr><td>bc_{m21}</td><td>6.01</td><td>1.165</td></tr><tr><td>nb_m</td><td>3.31</td><td>2.102</td></tr></table>		μ	σ	ea ₁	4.80	1.484	bc _{m21}	6.01	1.165	nb _m	3.31	2.102	expgr₃ - invitation with link to mobile web survey, - sent by SMS, - received on mobile device, - link accessed on mobile phone/smartphone, - unimode <table><tr><td></td><td>μ</td><td>σ</td></tr><tr><td>ea₃</td><td>5.13</td><td>1.707</td></tr><tr><td>bc_{m21}</td><td>6.01</td><td>1.165</td></tr><tr><td>nb_m</td><td>3.31</td><td>2.102</td></tr></table>		μ	σ	ea ₃	5.13	1.707	bc _{m21}	6.01	1.165	nb _m	3.31	2.102
		μ	σ																								
ea ₁	4.80	1.484																									
bc _{m21}	6.01	1.165																									
nb _m	3.31	2.102																									
	μ	σ																									
ea ₃	5.13	1.707																									
bc _{m21}	6.01	1.165																									
nb _m	3.31	2.102																									
	stationary web survey	expgr₂ - invitation with link to stationary web survey, - sent by e-mail, - received on stationary or mobile device, - link accessed on PC/laptop, - partially mixed mode <table><tr><td></td><td>μ</td><td>σ</td></tr><tr><td>ea₂</td><td>5.78</td><td>1.162</td></tr><tr><td>bc_{p21}</td><td>6.48</td><td>.864</td></tr><tr><td>nb_p</td><td>4.28</td><td>1.904</td></tr></table>		μ	σ	ea ₂	5.78	1.162	bc _{p21}	6.48	.864	nb _p	4.28	1.904	expgr₄ - invitation with link to stationary web survey, - sent by SMS, - received on mobile device, - link accessed on PC/laptop, - mixed mode <table><tr><td></td><td>μ</td><td>σ</td></tr><tr><td>ea₄</td><td>3.51</td><td>1.954</td></tr><tr><td>bc_{p21}</td><td>6.48</td><td>.864</td></tr><tr><td>nb_p</td><td>4.28</td><td>1.904</td></tr></table>		μ	σ	ea ₄	3.51	1.954	bc _{p21}	6.48	.864	nb _p	4.28	1.904
	μ	σ																									
ea ₂	5.78	1.162																									
bc _{p21}	6.48	.864																									
nb _p	4.28	1.904																									
	μ	σ																									
ea ₄	3.51	1.954																									
bc _{p21}	6.48	.864																									
nb _p	4.28	1.904																									

In this study panelists ascribed higher net benefit to stationary than to mobile internet usage. In particular, it has been shown in Table 4-16, that the net benefit of stationary internet usage in expgr₂⁴¹⁶ is highly significantly higher than the net benefit of mobile internet usage in expgr₁⁴¹⁷. If all other features of the survey and survey process are identical or indeed very similar then panelists also ascribe a higher net benefit to stationary than to mobile web surveys. Consequently, in case it is abstracted from different invitation modes and ease of ac-

⁴¹⁶ For nb_p ($\mu=4.28$; $\sigma=1.904$) and for bc_{p21} ($\mu=6.48$; $\sigma=.864$).

⁴¹⁷ For nb_m ($\mu=3.31$; $\sigma=2.102$) and for bc_{m21} ($\mu=6.01$; $\sigma=1.165$); t-test for bc_{x21} ($d=.267$; $p=.000^{***}$) and for nb_x ($d=.377$; $p=.000^{***}$).

cessing, stationary web surveys should rather yield higher participation rates than mobile web surveys⁴¹⁸.

Moreover, as it is shown in Table 4-21 ($d=-.720$; $p=.000^{***}$) panelists in expgr_2 rated that it is highly significantly easier for them to access a survey in their experimental group ($\mu=5.78$; $\sigma=1.162$) in comparison to panelists in expgr_1 in their group ($\mu=4.80$; $\sigma=1.484$). Noteworthy, access in expgr_2 has been rated as the easiest possible access path in this study. As both the net benefit of the survey mode and the ease of access of expgr_2 are superior to their counterparts for expgr_1 it is therefore hypothesized:

H3: The probability of participation of panelists invited to stationary web surveys by e-mail (expgr_2) is higher in comparison to the probability of participation of panelists invited to mobile web surveys by e-mail (expgr_1).

Additionally, second, also expgr_2 and expgr_3 will be compared by means of the logic of the first case explained above. For the latter group invitations with a link to a mobile web survey were sent by SMS, received on mobile devices, and supposed to be accessed by panelists on mobile phones/smartphones. This, in turn, constitutes the third access path utilized in this study with its characteristic amount of ease of access (ea_3). Again, for theoretical reasons explained above, in the case of abstracting from ease of access the stationary web survey comprised in expgr_2 should rather yield higher participation rates than the mobile web survey in expgr_3 . In addition, panelists rated that for expgr_2 ($\mu=5.78$; $\sigma=1.162$) the survey is highly significantly easier to access than for expgr_3 ($\mu=5.13$; $\sigma=1.707$) ($d=.347$; $p=.000^{***}$). Noteworthy, access in expgr_4 has been rated as the least easiest – or, in other words, hardest – possible access path in this study. As both the net benefit of the survey mode and the ease of accessing in expgr_2 are superior to expgr_3 , it is therefore hypothesized:

H4: The probability of participation of panelists invited to stationary web surveys by e-mail (expgr_2) is higher in comparison to the probability of participation of panelists invited to mobile web surveys by SMS (expgr_3).

Moreover, in order to derive further hypothesis the logic of the third case shown above has also been utilized. For this purpose, third, expgr_1 and expgr_4 have been compared. For the latter group invitations with a link to a stationary web survey were sent by SMS, received on a mobile device, and supposed to be accessed by panelists on a PC/laptop. This makes up the

⁴¹⁸ Q.v. H1.

fourth access path with its characteristic ease of access (ea_4). At this, rather the stationary web survey comprised in $expgr_4$ should yield higher net benefit, and hence, also higher participation rates than the mobile web survey in $expgr_1$.

However, in contrast to the prior, panelists rated that in $expgr_1$ ($\mu=4.80$; $\sigma=1.484$) the survey is highly significantly easier to access than in $expgr_4$ ($\mu=3.51$; $\sigma=1.954$) ($d=.759$; $p=.000***$). As $expgr_4$ is superior in terms of net benefit, but $expgr_1$ offers easier access, the sizes of both effects have to be compared. Table 4-16 revealed highly significant standardized mean differences of small effect sizes (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*)⁴¹⁹ between the net benefit of stationary and mobile internet usage to the advantage of $expgr_4$. In contrast, there is a standardized mean difference of medium effect size (*Id.*) ($d=.759$; $p=.000***$) regarding the ease of accessing in favor for $expgr_1$. Therefore, it has been assumed here that the medium effect of ease of access is stronger than the small survey mode effect. Consequently, it has been hypothesized:

H5: The probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_1$) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$).

Following the same logic as before, $expgr_3$ and $expgr_4$ have also been compared. Again, the stationary web survey conducted with $expgr_4$ should rather yield higher net benefit and, hence, higher participation rates than the mobile web survey with $expgr_3$. However, the survey for $expgr_3$ ($\mu=5.13$; $\sigma=1.707$) is highly significantly easier to access than the one for $expgr_4$ ($\mu=3.51$; $\sigma=1.954$) ($d=.747$; $p=.000***$). Because $expgr_4$ is superior in terms of net benefit, but $expgr_3$ offers easier access, again the sizes of both effects have been compared. As it is known from the previous example, there are significant standardized mean differences of small effect sizes (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*), between the net benefit of stationary and mobile internet usage in favor of $expgr_4$. In contrast, there is a standardized mean difference of medium effect size ($d=.747$; $p=.000***$) (*Id.*) regarding the ease of accessing to the advantage of $expgr_3$. Therefore, also in this case, it is assumed that the medium effect of ease of access is stronger than the small survey mode effect in favor for $expgr_3$. Consequently, it is hypothesized:

⁴¹⁹ For bc_{x21} ($d=.267$; $p=.000***$) and for nb_x ($d=.377$; $p=.000***$).

H6: The probability of participation of panelists invited to mobile web surveys by SMS (expgr₃) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS (expgr₄).

Finally, following the logic from the fourth or fifth case expgr₁ and expgr₃ have been compared. In both groups panelists were asked to participate in mobile web surveys. Therefore, there is no difference between both groups regarding the net benefit of the survey mode used. However, panelists rated that in expgr₃ ($\mu=5.13$; $\sigma=1.707$) the survey is highly significantly easier to access than in expgr₁ ($\mu=4.80$; $\sigma=1.484$) ($d=-.192$; $p=.001^{***}$). However, this significant effect is only trivial in size (*Id.*), just on the edge to a small effect. Consequently, it is assumed that there is a rather neglectable difference between the response rates of expgr₁ and expgr₃. Therefore, it is hypothesized:

H7: The probability of participation of panelists invited to mobile web surveys by SMS (expgr₁) does not differ from the probability of participation of panelists invited to mobile web surveys by e-mail (expgr₃).

Following the same logic, expgr₂ and expgr₄ have been compared. Again, panelists are indifferent between both groups regarding the net benefit of the survey mode used, because in both groups they were asked to participate in stationary web surveys. Nevertheless, expgr₂ ($\mu=5.78$; $\sigma=1.162$) is superior to expgr₄ ($\mu=3.51$; $\sigma=1.954$) because panelists rated the survey in the prior group highly significantly easier to access ($d=1.256$; $p=.000^{***}$). Therefore, it is hypothesized:

H8: The probability of participation of panelists invited to stationary web surveys by e-mail (expgr₂) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS (expgr₄).

5.3 Summary of Hypotheses

As a synthesis of the preceding sections, Table 5-3 ranks the four experimental groups researched regarding participation rates expected in this study. Additionally, Table 5-4 gives an overview of all hypotheses derived in this chapter.

Table 5-3: Expected Ranking of Experimental Groups Regarding Participation Rates

<i>rank</i>	<i>expgr</i>	<i>invitation sent via</i>	<i>survey mode</i>	<i>type of survey access</i>
1st	expgr ₂	e-mail	stationary web survey	partially mixed mode
2nd	expgr ₃	SMS	mobile web survey	unimode
3rd	expgr ₁	e-mail	mobile web survey	partially mixed mode
4th	expgr ₄	SMS	stationary web survey	mixed mode

In the course of the following chapter the previously derived hypotheses will be tested by means of Multiple Binary Logistic Regression Analysis. In order to fulfill the requirements to conduct this method, several tests had to be conducted beforehand. Therefore, the method as well as its requirements will be introduced and tested in the next chapter.

Table 5-4: Research Guiding Hypotheses (Main Effects)

<i>hypothesis</i>	<i>wording</i>
<i>H1</i>	<i>The probability of participation of panelists invited to stationary web surveys ($mode_{sur}=1$) is higher in comparison to the probability of participation of panelists invited to mobile web surveys ($mode_{sur}=0$).</i>
<i>H2</i>	<i>The probability of participation of panelists invited by e-mail ($mode_{inv}=0$) is higher in comparison to the probability of participation of panelists invited by SMS ($mode_{inv}=1$).</i>
<i>H3</i>	<i>The probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) is higher in comparison to the probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_1$).</i>
<i>H4</i>	<i>The probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) is higher in comparison to the probability of participation of panelists invited to mobile web surveys by SMS ($expgr_3$).</i>
<i>H5</i>	<i>The probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_1$) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$).</i>
<i>H6</i>	<i>The probability of participation of panelists invited to mobile web surveys by SMS ($expgr_3$) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$).</i>
<i>H7</i>	<i>The probability of participation of panelists invited to mobile web surveys by SMS ($expgr_1$) does not differ from the probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_3$).</i>
<i>H8</i>	<i>The probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$).</i>

6 Evaluation of Experimental Data and Results

6.1 Preparation of the Evaluation

6.1.1 Choice of Evaluation Method

In order to ease the decision of choosing the proper method to evaluate data Riesenhuber (2009, pp. 13-4) introduced two decision trees which were based on Churchill's (1991, pp. 755-8) prior deliberations. Here in this section, these trees are summarized and extended in the following Figure 6-1.

According to the aforementioned authors, methods of multivariate analysis will have to be applied in case two or more variables of interest exist, which are relevant for evaluation. If only one of these variables may be specified as the dependent variable a Dependence Analyses will be the proper choice of class from which an evaluation method should be chosen. Methods from this class analyze how one or more independent variables influence a dependent variable. Hence, they are suitable for the purpose of investigating (difference and) correlation hypotheses (Riesenhuber, p. 14).

In this study several independent variables – e.g. the four experimental groups which refer to different invitation and survey modes – were hypothesized to have an impact on outcome rates or, more specifically, survey participation which functioned as dependent variable in this study. Hence, a method from the class of Dependence Analyses will have to be conducted at this point.

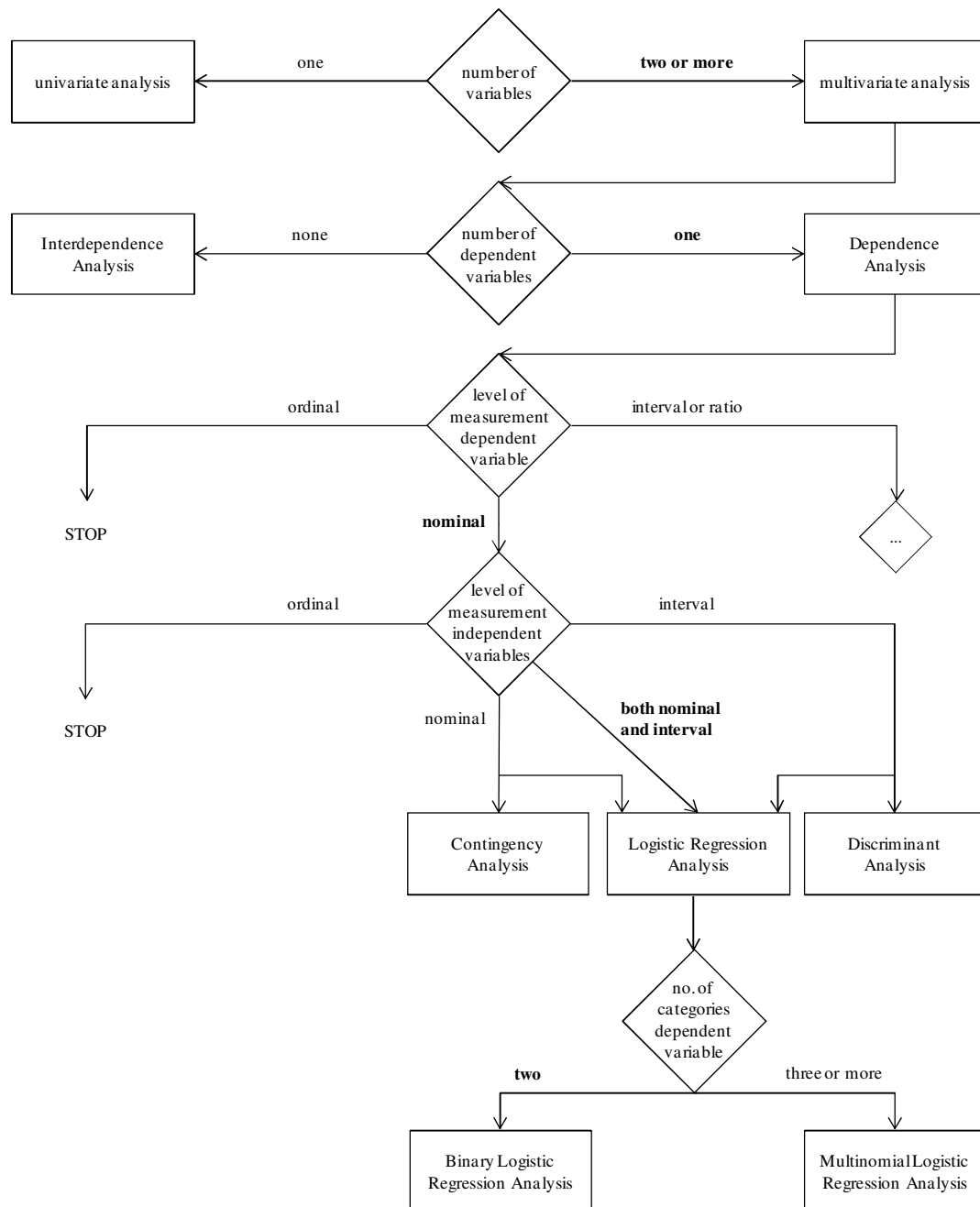
In case the underlying dependent variable shows nominal measurement of scale the aforementioned authors (Churchill's 1991, pp. 755-8; Riesenhuber 2009, pp. 13-4) suggest applying following types of Dependence Analyses:

- a Contingency Analysis, in case the level of measurement of the independent variables is nominal,
- a Discriminant Analysis, in case the level of measurement of the independent variables is interval (or metric).

Furthermore it has been suggested (Backhaus et al. 2011, pp. 250-1) to apply

- a Logistic Regression Analysis, in case both nominal- and interval-leveled (metric) independent variables will be researched.

Figure 6-1: Choice of Evaluation Method Decision Tree



Based on Churchill (1991, pp. 755-8) in Riesenhuber (2009, pp. 13-4).

It has been previously shown that survey participation is coded as a nominal dependent variable in the current study⁴²⁰. In addition, both nominal- and interval-leveled (metric) variables will enter the model as independent variables. At this, for instance, the four experimental groups included in this study are coded as nominal dummies⁴²¹. Moreover, the variable anticipated ease of accessing web surveys will be included as an interval-leveled variable⁴²² among several other independent variables.

The possibility to include multiple independent variables with both interval as well as nominal measurement of scale levels is a central advantage of a Logistic Regression Analysis in comparison to Contingency and Discriminant Analyses (*Backhaus et al. 2011, p. 251*). Discriminant Analyses are only capable of dealing with metric independent variables (*Id., pp. 188-9*). At the same time, independent variables have to be nominal (*Id., pp. 304-7*) in order to be analyzed by means of Contingency Analysis. According to *Backhaus et al. (2011, p. 250)* its less rigorous requirements are another advantage of the Logistic Regression in comparison to the Discriminant Analysis. For instance, the latter requires multivariate normality of independent variables as well as equality of variance-covariance-matrices across targeted groups. All of these are not a prerequisite for a Logistic Regressions. Consequently, Logistic Regression Analyses are more robust than Discriminant Analyses.

Moreover, several authors have cautioned (*Backhaus et al. 2011, pp. 250-1; Rohrlack 2009, p. 267*) that it is required to apply a Logistic Regression Analysis on datasets containing a nominal dependent variable. The authors explained that no meaningful estimation may be conducted for such variables by means of “classic” Ordinary Least Square (OLS) Regression⁴²³.

Finally, the type of Logistic Regression Analysis which ought to be conducted, depends on the number of categories of the nominal dependent variable at hand. For dependent variables with two categories, e.g. for a dichotomous dummy variable, a Binary Logistic Regression will have to be applied. In contrast, in case there are more than two categories of the nominal dependent variable an evaluation by means of Multinomial Logistic Regression will be necessary (*Rohrlack 2009, p. 267*). In a Logistic Regression model nominal independent variables with more than two categories have to be decomposed into (at least two) dummy variables (*Bryman and Cramer 2009, p. 25; Jaccard 2001, pp. 5-6*) for which separate regression coefficients will be estimated (*Backhaus et al. 2011, p. 251*).

⁴²⁰ Q.v. Section 4.5.3.1.1.

⁴²¹ Q.v. Section 4.5.3.2.1.

⁴²² Q.v. Section 4.5.3.2.3.

⁴²³ The reasons for this shortcoming will be elaborated in the following Section 6.1.2.

Out of 536 panelists participating in the pretest of the main study 27.8% completed the entire questionnaire and 64.7% did not answer the survey. Furthermore, 3.7% broke off before answering at least 50% of all essential or crucial questions. Finally, another 3.7% only responded partially by answering more than 50% but less than 100% of all essential or crucial questions. It will be shown in the following⁴²⁴ that efforts had to be made in order to meet the methodological requirements and recommendations necessary to conduct a Multiple Binary Logistic Regression Analysis in this study. For instance, the number of null cells in cross tabs of the dependent and independent variables had to be minimized in order to meet the requirement of no complete separation (*Urban and Mayerl 2011, p. 350*). Moreover, within the value distribution of the dependent variable every value had to be chosen by more than 10% of panelists (*Id., p. 349*)⁴²⁵.

With a relatively small percentage of break-offs (3.7%) and partial responses (likewise 3.7%) counted in the pretest, however, both of these demands were in danger to remain unfulfilled. Consequently, it has been decided to code study participation as a dummy variable with complete responses as well as partial responses (“participation”) coded as “1”. Further, break-offs as well as refusals (“non-participation”) were coded as “0”⁴²⁶. All of this has been performed in order to minimize null cells and prevent complete separation. For such a binary dependent variable a Binary Logistic Regression is considered the preferred evaluation method. However, if complete response, partial response, break-offs, and refusals were coded as separate dummy variables a Multinomial Logistic Regression would also be an acceptable approach. The latter approach, however, was not further followed as the two additional variable categories – which would have to be added to the dependent variable as additional categories – made up a total share of only 7.4% of the entire sample. Hence, for reasons stated above, this procedure would have strongly complicated subsequent evaluation.

6.1.2 Multiple Binary Logistic Regression Analysis

In the following sections, at first, Multiple Binary Logistic Regression Analysis will be introduced as the main evaluation method applied in this study. Thereafter, it will be shown to the reader how regression coefficients estimated with this method have to be correctly interpreted

⁴²⁴ Q.v. Section 6.1.3.

⁴²⁵ Q.v. Section 6.1.3.1.

⁴²⁶ Q.v. Section 4.5.3.1.1.

regarding all analyzed effects. Finally, important methodological requirements and recommendations will be introduced, discussed, and tested.

6.1.2.1 Method Description

In a nutshell a Multiple Binary Logistic Regression Analysis (*Backhaus et al. 2011, pp. 250-302; Hosmer and Lemeshow 1989; Hosmer, Lemeshow and Sturdivant 2000; Kleinbaum and Klein 2010; Jaccard 2001, pp. 1-17; Menard (2002; 2010); Rohrlack 2009, pp. 267-78; Urban and Mayerl 2011, pp. 323-54*) – which is sometimes also referred to as Binary Logit Model (*Rohrlack 2009, p. 267*) – follows a similar principle as a traditional Linear Regression. Nevertheless, it is accompanied by some important conceptual differences (*Jaccard 2001, p. 3*). Following a regression approach it aims to detect the non-linear impact of different independent variables – also called covariates or predictors (*Backhaus et al. 2011, p. 258*) – on the probability of the occurrence of a certain event relevant to the researcher. This probability represents the regression’s dependent variable. In contrast to a Linear Regression, a Logit Model does not aim to predict a certain value or score but only its probability (*Rohrlack 2009, pp. 267-8*).

For instance, the probability of panelists’ participation in a web survey, coded as a binary dependent variable⁴²⁷, may be influenced by panelists’ membership in different experimental groups, in turn, coded as an independent dummy variable. Alternatively, the anticipated ease of accessing web surveys – an independent variable with a metric level of measurement – may have an impact on the probability of participation just as well. At this, the magnitude of impact of both types of independent variables is indicated by the corresponding regression coefficients β (*Backhaus et al. 2011, p. 250*). Making use of the Newton-Raphson procedure (*Backhaus et al. 2011, pp. 258-61*) they are estimated by means of Maximum Likelihood Estimation (MLE) (*Hosmer and Lemeshow 1989, pp. 8-11*).

Most importantly, the dependent variable of a Multiple Binary Logistic Regression model is dichotomous and, hence, distributed binomially, whereas Linear Regressions (*Backhaus et al. 2011, pp. 55-118; Urban and Mayerl 2011, pp. 13-322*) demand continuous and normally distributed dependent variables (*Jaccard 2001, p. 3*). Therefore, for binary dependent variables a “classic” Linear Regression is an inappropriate and improper method of evaluation as it

⁴²⁷ It will be explained later in this section, that the mean of all cases of the binary dependent variable with a 0/1-coding for participation and non-participation represents the probability of survey participation.

generates biased estimators (*Backhaus et al. 2011, pp. 253-4; Rohrlack 2009, p. 267*). In contrast, the dichotomous dependent variable Y in a Multiple Binary Logistic Regression Analysis is modeled indirectly by means of a logit link “logit(μ)”. The latter is defined as the natural log of the odds of the event $Y=1$ equal to $\ln(\mu/(1-\mu))$ (*Jaccard 2001, p. 4*). It is also called linking function (*Rohrlack 2009, p. 268*), as it establishes a link between dependent and independent variables by means of a logistic function⁴²⁸ (*Backhaus et al. 2011, pp. 251-5*). At this, the model of a Multiple Binary Logistic Regression is specified as (*Jaccard 2001, p. 4*):

Formula XI: Multiple Binary Logistic Regression Equation

$$\text{logit}(\mu) = \ln\left(\frac{\mu}{1-\mu}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$$

In the preceding equation μ represents the mean of Y , which is the probability of the event $Y=1$. At the same time $\mu/(1-\mu)$ are the odds of this particular event (*Id., pp. 2-3*). At this, odds are an alternative concept which is similar to probabilities (*Jaccard 2001, pp. 2-3*). In general, odds are defined as the quotient of probability of an event $Y=1$ and the probability of the complementary event $Y=0$. Here, it has been chosen to model Y as natural log of odds because the values of this term range from $-\infty$ to $+\infty$. In contrast, probability μ and odds $\mu/(1-\mu)$ range from 0 to 1 and 0 to $+\infty$, respectively (*Id., p. 10*). This mathematical ploy makes statistical theory in this area “easier to handle” (*Id., p. 4*).

Regarding the dependent dummy variable in this study, participating panelists have been coded as “1”, non-participants as “0”. Therefore, here, μ as a mean of the dummy represents the percentual share of panelists participating in the study and, hence, the probability of an average individual panelist participating (*Backhaus et al. 2011, p. 253; Jaccard 2001, p. 2*). Moreover, $\mu/(1-\mu)$ stands for the odds and $\ln(\mu/(1-\mu))$ for the log of odds of an individual participating (*Jaccard 2001, p. 4*).

At this, probabilities $<.50$ are associated with odds <1 and log odds <0 (*Id., p. 10*). Moreover, an odd equal to $.50$, indicates that the probability of panelist’s participation is half the size of the probability of non-participation (*Id., pp. 2-3*). On the contrary, probabilities $>.50$ are associated with odds >1 and log odds >0 (*Id., p. 10*). For example, an odd equal to 2, means that

⁴²⁸ The Logistic Regression equation is defined as $\frac{1}{1+e^{-(\alpha+\beta_1 X_1+\beta_2 X_2+\dots+\beta_k X_k)}} = \mu \Leftrightarrow \ln\left(\frac{\mu}{1-\mu}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$.

the probability of participation is double the probability of non-participation (*Id.*, pp. 2-3). In turn, probabilities equal to .50 are associated with odds equal to 1 and log odds equal to 0 (*Id.*, p. 10). An odd equal to 1 indicates that the probabilities of participation and non-participation in a survey are equal (*Id.*, pp. 2-3).

In the model shown above, the natural log of the odds of participation ($Y=1$) varies as a function of the linear predictor $\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$ (*Id.*, p. 5), which in Logistic Regression Analysis is also called “logit”. Here, the coefficient α represents the intercept, β the regression coefficients – also called logistic coefficient or logit coefficients – and X the predictors (*Id.*, p. 5). In a Logistic Regression Analysis both α and β are estimated by means of MLE while all predictors X_k were e.g. surveyed⁴²⁹. At this, all predictors have to be either metric or nominal. In addition all nominal predictors have to be coded as dummy variables (*Backhaus et al. 2011*, p. 251; *Hosmer and Lemeshow 1989*, pp. 26-7; *Jaccard 2001*, p. 6; *Rohrlack 2009*, p. 269).

At this, the regression coefficients β – which all are logged odds – can simply be transformed into odds by calculating their exponential function $\exp(\beta)$. *Jaccard (2001, pp. 7-9)* has formally shown⁴³⁰ that these odds can be interpreted as odds ratios (OR)⁴³¹. Consequently, $\exp(\beta)$ is defined as the ratio of the odds of event $Y=1$ for one group (e.g. the group which scored $X_1 = 1$ on the first predictor) and the odds of event $Y=1$ for a second group (e.g. the group which scored $X_1 = 0$ on the first predictor), at the same time holding constant all other predictors. Therefore, as in this thesis, $\exp(\beta)$ is frequently referred to as OR.

6.1.2.2 Interpretation of Regression Coefficients

The following section focuses on the interpretation of effects in Multiple Binary Logistic Regression Analysis. At this, the elaboration will mainly draw on previous interpretational approaches of *Jaccard (2001, pp. 7-46)*.

For the interpretation (*Hosmer and Lemeshow 1989, pp. 38-81; Jaccard 2001, pp. 7-46; Rohrlack 2009, pp. 272-4*) of the coefficients of the logit, the intercept α of Formula IX equals the predicted log odds when all predictors $X_1=X_2=X_k$ are equal to zero (*Id.*, p. 7). For some predictors the value of “0” is nonexistent or outside of a range of possible values and, hence,

⁴²⁹ Or identified by means of secondary research.

⁴³⁰ For an extensive explanation which would go past the scope of this study see *Jaccard (2001, pp. 7-9)*.

⁴³¹ Q.v. Section 4.7.

α has limited interpretational value. Therefore, sometimes, in order to make the intercept interpretable it is necessary to give meaning to these predictors, e.g. by means of transformation by grand mean centering (*Hox 2010, pp. 61-3; Jaccard 2001, p. 12*). In this case the intercept equals the predicted log odds when all predictors take their mean value.

Furthermore, for a metric predictor variable “the exponent of the logistic coefficient [β] equals a multiplicative factor⁴³² by which the predicted odds [of the event $Y=1$] change given a 1-unit increase in the predictor variable, holding constant all other predicted variables in the equation” (*Id.*, p. 9). In other words, the value of the odds ratio (OR) indicates either how many times smaller ($OR < 1$) or larger ($OR > 1$) the predicted odds of event $Y=1$ become, or that there is no impact on predicted odds ($OR=1$) at all, in case the metric predictor is increased by one unit (*Id.*, p. 9).

In contrast, for a nominal predictor variable coded as dummy “the exponent of the logistic coefficient [β] will equal an odds ratio in which the predicted odds [of the event $Y=1$] for the group scored 1 on the dummy variable is divided by the predicted odds [of the event $Y=1$] for the reference group⁴³³, holding constant all other predictor variables in the equation” (*Jaccard 2001, p. 8*). Hence, an odds ratio (OR) contrasts two odds and is formally defined as the quotient of the odds of event $Y=1$ for the group scoring “1” on the dummy variable and the odds of the same event for the reference group coded “0” on the same dummy. The value of the odds ratio will then indicate the factor by which the odds to engage in event $Y=1$ are either larger ($OR > 1$) or smaller ($OR < 1$), or that they are equally large when comparing group “1” to the reference group “0” (*Id.*, p. 8).

6.1.3 Examination of Methodological Requirements and Recommendations

According to Urban and Mayerl (2011, p. 349) a Multiple Binary Logistic Regression is inference-prone as it is based on a Maximum Likelihood Estimation (MLE). The authors claim that in some cases MLE may not converge and reveal no final result. Conversely, in other cases it will converge and reveal merely doubtful results. Even if the estimation proceeds flawlessly results may show errors in case methodological requirements are violated. Therefore, the authors list several requirements and practical recommendations in order to avoid the

⁴³² Jaccard (2001, p. 9) remarks that this multiplying factor “is referred to [...] as an odds ratio because it is the result that one obtains when one divides the predicted odds at one value of the predictor by the predicted odds at the same value minus 1”.

⁴³³ Q.v. group scoring “0”.

most serious and common problems associated with Multiple Binary Logistic Regression Analysis (*Urban and Mayerl 2011, pp. 349-51*). Subsequently, the dataset which is intended to be analyzed in the course of this study will be controlled for all requirements and recommendations listed. In particular, these regard

- the number of cases,
- complete information,
- (no) complete separation,
- the value distribution of the dependent variable,
- (no) multicollinearity,
- linearity,
- independence of residuals,
- outliers,
- and unobservable heterogeneity and comparison of coefficients.

6.1.3.1 Number of Cases, Complete Information, Complete Separation, and Value Distribution of the Dependent Variable

Firstly, an extensive number of cases are required in order to conduct a Multiple Binary Logistic Regression. This is accounted for by the fact that the Maximum Likelihood estimator is asymptotically consistent and efficient. Thus, a limited number of cases increases the probability of empty cells as well as complete separation and, hence, reduces the power of the model (*Id., p. 349*). Here, a cell is defined as the one combination of categories of two independent variables in a cross tab. A popular heuristic to ensure that the number of cases are sufficiently high enough is to control whether the frequency of every cell exceeds “1” and at the same time less than 20% of all cells show a frequency smaller than “5” (*Id., p. 349*).

Secondly, in addition to the requirement of a sufficiently high number of cases the stricter requirement of complete information demands the absence of null cells, which are cells showing a frequency of “0”. A null cell included in the dataset may lead to an extremely large standard error which, in turn, indicates a problematic MLE that does not converge or will show erroneous results (*Id., pp. 349-50*).

Thirdly, no complete separation is required from data, which means that the analysis of the binary dependent and independent variables in a cross tab will also show no null cells for all

combinations of categories. In case this requirement is violated the independent variable is a so called perfect predictor for a particular event. Consequently, MLE would not be able to find values of maximum likelihood for the parameters to be estimated (*Id.*, p. 350).

Fourthly, the stricter rule of value distribution of the dependent variable also demands control. At this, a common heuristic suggests that every value of the binary dependent variable has to be chosen by more than 10% of panelists as otherwise the MLE will not converge and lead to biased, implausible valuations (*Id.*, p. 349).

In order to control for the number of cases, complete information, complete separation, and the value distribution of the dependent variable, all metric variables required for Multiple Binary Logistic Regression Analysis in the present study (N=5,140) were collapsed into seven categories⁴³⁴ and rounded to the nearest integer. This operation is necessary in order to analyze variable values with decimal places, which have previously been generated by means of the Expectation Maximization Algorithm, in cross tabs (*Bailey 1994*, pp. 387-9). For this purpose, the cross tabs function of IBM SPSS 21.0 (*IBM 2012a*, pp. 22-9) has been applied on all metric and nominal variables in the dataset. At this, for the test of the number of cases and complete information, 2,880 (27.02%) of all cells showed a frequency that did not exceed “1”, 3,998 cells (37.51%) showed a frequency which did not exceed “5”, and 1,895 (17.78%) of all cells were null cells. This indicates a vast violation of the requirements for the number of cases and completeness of information. All the same, the test of complete separation showed nine (2.80%) empty cells in a cross tab of the independent variable “age” and the dependent variable “participation”. Thus, also this requirement is violated. Finally, the value distribution of the dependent variable showed ten violations of the 10%-rule-of-thumb in a cross tab of the independent variables “age” and “source of recruitment” and the dependent variable.

Urban and Mayerl (2011, p. 350) suggest to heal shortcoming which stem from a too small number of cases and incomplete information by collapsing categories of variables which bring about these violations (*Bailey 1994*, pp. 387-9). At this, two especially problematic variables – “age” and “source of recruitment” – have been identified as the cause of large number of null cells. Consequently, for the variable “age” a median split (*Zikmund et al. 2013*, p. 493) has been performed. This operation created a new dummy variable *age_{ms}* coded with “1” for all panelists older than the median 24 years ($\bar{x}=24$) and labeled as “older panelists”. For all other panelists the variable was coded “0” to indicate “younger panelists”⁴³⁵. Furthermore, for

⁴³⁴ Variable Categories A to B as well as D to H; q.v. Section 4.5.3.2.1 to 4.5.3.2.7.

⁴³⁵ Q.v. Section 4.5.3.2.7.

the nominal variable “source of recruitment” the source “e-mail distribution lists of universities” was coded “1” while all other categories were coded “0”⁴³⁶.

This procedure completely eliminated all empty cells from the cross tab for the variables “age” and “participation” and, hence, healed the violation of the requirement of no complete separation. In addition, the value distribution of the dependent variable showed no violation of the 10%-rule-of-thumb anymore. Furthermore, it drastically lowered the number of null cells in the dataset to 77 (1.46%), the number of cells which showed a frequency lower than “1” to 219 (2.90%), and the number of cells which showed a frequency that did not exceed “5” to 407 cells (7.72%). This fulfilled the requirement for the number of cases regarding the percentage (<20%) of all cells showing a frequency smaller than “5” now. Nevertheless, the requirements for the number of cells and incomplete information still were not completely fulfilled. In particular some cells still showed a frequency that did not exceed “1” or they were identified as null cells.

Unfortunately, a collapse of further metric variables containing null cells into categories was impracticable and only tied to a severe loss of information as these variables were measured on 7-point-rating-scales (*Bailey 1994, pp. 387-9*). Therefore, the Multiple Binary Logistic Regression Analysis has been pursued without further collapsing. However, while conducting this analysis no unusually large standard errors of regression coefficients were observed during evaluation. Therefore, at this point – despite the partial violation of aforementioned requirements – a non-problematic, converging, error-free Maximum Likelihood Estimation will be assumed for the analysis conducted in the course of this study.

6.1.3.2 Multicollinearity

Fifthly, it is required to test the data for multicollinearity which indicates undesirable linear interdependence between two or more independent variables used within the Multiple Binary Logistic Regression model (*Schneider 2009, p. 221*). In case high multicollinearity exists the MLE will result in biased variances, standard errors and improper regression coefficients (*Urban and Mayerl 2011, p. 350*). It has been suggested to control for multicollinearity by means of conducting several OLS Regression with all independent variables used in the Multiple Binary Logistic Regression Analysis (*Schneider 2009, pp. 224-6*). At this, for every OLS Re-

⁴³⁶ Id.

gression another independent variable serves as dependent variable (*Urban and Mayerl 2011, p. 231*). IBM SPSS 21.0 (*IBM 2012a, p. 105*) automatizes this procedure and computes the tolerance (TOL) and variance-inflation-factor (VIF) as measures of linear dependence (*Meyers, Gamst and Guarino 2006, p. 211-3; Schneider 2009, p. 225*).

Urban and Mayerl (*2011, p. 232*) point out, that according to a heuristic which is frequently used in literature, multicollinearity occurs whenever tolerance is below the threshold value of .1. Because VIF is the reciprocal of tolerance, similar is assumed in case VIF values exceed a threshold of 10.0. However, the authors suggest applying much stricter thresholds for the tolerance which lie below the range of .2 and .25. This corresponds to a VIF above a value of 5.0. For the underlying dataset all tolerance values lie above the .25 threshold value in a range between .313 and .966. Hence, values for the VIF are below the threshold value of 5.0 in a range between 1.035 and 3.196. The aforementioned VIF and tolerance values correspond to multiple correlation coefficients in the range from .034 to .687 as these values are related in the following way (*Schneider 2009, p. 125*):

Formula XII: Variance-Inflation-Factor

$$\text{VIF} = \frac{1}{\text{TOL}} = \frac{1}{1 - R^2}$$

Consequently, as high multicollinearity does not exist in the given data, the aforesaid requirement is not violated.

6.1.3.3 Linearity

Sixth, linearity within the relationship between the values of the logit of the Multiple Binary Logistic Regression and its independent variables is also required for all metric variables (*Urban and Mayerl 2011, p. 350*). At this, it has been suggested to test linearity by means of interaction effects in an OLS Regression with the logit as a dependent variable (*Id., pp. 202-4*). For this purpose a median split has been conducted for all metric independent variables contained in the dataset. Then the resulting splits have been coded as dummy variables. Subsequently, the product of these dummy variables and the corresponding metric independent variables were computed as interaction terms. In case an interaction term containing the dummy

variable is significant there is a difference between the split groups regarding the independent variable. However, only a distinct difference is an indicator for non-linearity (*Id.*, pp. 202-3) and a non-linear relationship between this independent and the dependent variable may only be assumed in case the effect size of this difference is large. Consequently, with the help of G*Power 3.1.4 (*Faul et al. 2007; Faul et al. 2009*) statistical software package, a sample size ($N=41$) necessary to show only large significant effect sizes has been computed⁴³⁷. Thereafter, a random sample was drawn from the dataset and analyzed by means of OLS Regression. Here, no significant interactions effects were even found at $\alpha=.10$ level for all metric variables included in the model. Consequently, the relation between the value of the logit and the independent variable may, indeed, be assumed as linear. Hence, the requirement of linearity is also fulfilled for this sample.

6.1.3.4 Independence of Residuals

Seventhly, the requirement of independence of residuals demands that independent variables do not correlate across repeated measurements. Autocorrelation may lead to extremely small standard errors which, in turn, will lead to faulty significances (*Urban and Mayerl 2011*, pp. 350-1). As no repeated measures were included into this model a test of autocorrelation is not demanded in this study.

6.1.3.5 Outliers

Eighthly, a high share of outliers in the dataset will reduce the fit and bias the estimated values of the model. Consequently, they should be identified and carefully removed (*Id.*, pp. 351). In this study multivariate outliers have previously been identified in Section 4.5.4.4 by means of studentized residuals, Cook's D, as well as DfBeta and subsequently removed. Therefore repeated display of these procedures is forgone at this point.

⁴³⁷ Optimal sample size a priori estimated for two tailed linear multiple regression, with $\alpha=.05$, $1-\beta=.95$, and $f^2=.35$ (*Cohen 1988*, p. 414) and 14 predictors with G*Power 3.1.4 is $N=41$; $df=26$.

6.1.3.6 Unobservable Heterogeneity and Comparison of Coefficients

Ninthly, and finally, Urban and Mayerl (2011, pp. 351-2) warn readers against unobservable heterogeneity and with that the careless comparison of coefficients across different Multiple Binary Logistic Regression models. According to their definition, unobservable heterogeneity is the lack of important independent variables which help to predict the probability of the dependent variable. Even if they do not correlate with the independent variables included, unidentified variables may lead to bias by underestimation of odds and logged odds in a Multiple Binary Logistic Regression model. Consequently, the more non-correlated independent variables are included the higher are the odds and logged odds in a model. The extent of this influence on an independent variable is constant within one but may vary across different models. Therefore, the comparison of odds and logged odds of similar groups across different Multiple Binary Logistic Regression models is defective. The authors therefore recommend including as many relevant independent variables as possible into a model in order to minimize the influence of unobservable heterogeneity (*Id.*, pp. 351-2). In this study the experimental groups which are compared to each other are included as dummy variables into the models⁴³⁸, so that a comparison across different models is not necessary. In order to reduce the effect of unobservable heterogeneity a variety of different independent variables has been included into the model⁴³⁹.

In the end of this section, it has to be noted that – in contrast to “classic” OLS Regressions – for regressions based on MLE it is not necessary to test the prerequisites of homoscedasticity and normal distribution of residuals. Aforementioned requirements are unaccomplishable in the context of Multiple Binary Logistic Regressions as binary dependent variables cannot fulfill the so called BLUE criteria (Best Linear Unbiased Estimate) (Urban and Mayerl 2011, pp. 323-4).

6.2 Procedure for the Evaluation of Hypotheses and Results

In the following sections, at first, the evaluation procedure regarding the previously formulated hypotheses will be introduced to the reader. Thereafter, all variables entering the Multiple Binary Logistic Regression model will be briefly revisited. Finally, the evaluation results regarding survey participation will be presented.

⁴³⁸ Q.v. Section 4.5.3.2.1.

⁴³⁹ Q.v. Sections 4.5.3.2.2. to 4.5.3.2.7.

6.2.1 Evaluation Procedure

In order to evaluate the data collected in the course of this study several Multiple Binary Logistic Regression models have been estimated. For this purpose one binary dependent as well as several nominal and metric independent variables were entered into five different regression models. At this, model #1 contained individual study participation as dependent (PAR) and dummy variables for survey (mode_{sur}) and invitation mode (mode_{inv}), amongst others, as independent variables. Within models #2 to #5 the latter two variables were substituted by four dummy variables (expgr_1 ; expgr_2 ; expgr_3 ; expgr_4) which represented the experimental groups surveyed as distinct combinations – and, hence, interactions – of invitation and survey modes.

6.2.2 Variables Entering the Binary Logistic Regression Models

Most importantly, individual study participation (PAR) was coded as a dummy variable. At this, complete responses as well as partial responses were labeled as “1” (“participation”) and break-offs as well as refusals as “0” (“non-participation”). The variable entered the Multiple Binary Logistic Regression model as dependent variable⁴⁴⁰.

In addition, several independent variables⁴⁴¹ were entered into the model either as metric or nominal dummies. As one of the latter, the variables expgr_1 , expgr_2 , expgr_3 , and expgr_4 indicated the affiliation of panelists to the four experimental groups in which they had received an invitation to either an stationary or mobile web survey by e-mail or SMS⁴⁴². At this, only three group variables were entered into each regression model at a time. The group which did not enter the model served as reference group. Following the recommendation of Jaccard (2001, p. 23) a given model has been re-specified three times so that every group once served as reference group.

Additionally, for the analyses of the first two hypotheses, survey mode (mode_{sur}) has been coded as a nominal dummy, with “0” indicating a mobile and “1” a stationary web survey. Moreover, for invitation mode (mode_{inv}) a value of “0” indicated an e-mail invitation while, in turn, a “1” indicated an invitation by SMS.

⁴⁴⁰ Q.v. Section 4.5.3.1.1.

⁴⁴¹ Q.v. Sections 4.5.3.2.1 to 4.5.3.2.7.

⁴⁴² Q.v. Section 4.5.3.2.1.

Gender (*gen*) entered the model as dummy variable with women coded as “1” and men as “0”. Also for methodological reasons⁴⁴³ the source of recruitment (*sou*) and age (*age_{ms}*) has been collapsed into two dummy variables. For the latter variable a median split has been performed. Here, all panelists older than 24 years have been labeled as “1” and all other panelists as “0”. Similarly, for the source of recruitment variable all panelists recruited via e-mail distribution lists of universities were coded with the value of “1” while all other sources were coded with “0”. Finally, two further dummies, *DVA₁* as well as *DVA₂*, entered the regression model due to the Dummy Variable Adjustment (DVA) conducted in the course of missing value replacement procedures⁴⁴⁴.

In case the scale of measurement of an independent variable was metric, the variable was priorly grand mean centered in order to ease interpretation of its regression coefficient and intercept (*Hox 2010, pp. 61-3; Jaccard 2001, p. 12*). This, most importantly, holds true for the metric variable *ea* representing the anticipated ease of accessing web surveys. In particular the variables *ea₁*, *ea₂*, *ea₃*, and *ea₄* stand for the ease of accessing web surveys associated with the four experimental groups⁴⁴⁵.

Furthermore, the metric variable *ip* models the immediacy of perception of SMS on mobile devices (*ip_s*) and e-mails on stationary or mobile devices (*ip_e*) and, hence, the attention paid to different notification functions⁴⁴⁶. Two further metric variables entered, quantified the frequency of internet usage (*iu*) and frequency of e-mail usage (*eu*) on different devices. At this, it was differentiated between internet usage on a PC or laptop (*iu_s*) and a mobile phone or smartphone (*iu_m*) as well as e-mail services usage on a PC or laptop (*eu_s*) and a mobile phone or smartphone (*eu_m*)⁴⁴⁷.

Moreover, two additional metric variables portray the intention to participate in future surveys conducted on the stationary (*pp_s*) as well as mobile web (*pp_m*)⁴⁴⁸. In addition, two types of metric involvement variables, the panelists’ involvement in a tablet PC as the incentive offered as prize of a lottery among all participants (*ii*) and headphones as the topic of the survey (*it*), were entered into the model⁴⁴⁹.

⁴⁴³ Q.v. Section 6.1.3.1.

⁴⁴⁴ Q.v. Section 4.3.2. *DVA₁*=1 if *eu_m*=1 and *DVA₂*=1 if *eu_p*=1, else *DVA₁*=*DVA₂*=0.

⁴⁴⁵ Q.v. Section 4.5.3.2.3.

⁴⁴⁶ Q.v. Section 4.5.3.2.4.

⁴⁴⁷ Q.v. Section 4.5.3.2.2.

⁴⁴⁸ Q.v. Section 4.5.3.2.5.

⁴⁴⁹ Q.v. Section 4.5.3.2.6.

Table 6-1 gives an overview of all variables which were entered into the regression models utilized in this study.

Table 6-1: Overview of Variables Entering the Binary Logistic Regression Models

<i>variable label</i>	<i>variable description</i>	<i>variable type</i>	<i>level of measurement</i>
PAR	individual study participation	dependent	nominal (dummy)
mode _s	survey mode	independent	nominal (dummy)
mode _i	invitation mode	independent	nominal (dummy)
expgr ₁	experimental group 1: invitation to mobile web survey sent via e-mail	independent	nominal (dummy)
expgr ₂	experimental group 2: invitation to stationary web survey sent via e-mail	independent	nominal (dummy)
expgr ₃	experimental group 3: invitation to mobile web survey sent via SMS	independent	nominal (dummy)
expgr ₄	experimental group 4: invitation to stationary web survey sent via SMS	independent	nominal (dummy)
pp _s	intention to participate in stationary web surveys	independent	metric
pp _m	intention to participate in mobile web surveys	independent	metric
ip _e	immediacy of perception of e-mail received on stationary or mobile device	independent	metric
ip _s	immediacy of perception of SMS received on mobile device	independent	metric
iu _s	frequency of internet usage on PC or laptop	independent	metric
iu _m	frequency of internet usage on a smartphone or mobile phone	independent	metric
eu _s	frequency of e-mail usage on PC or laptop	independent	metric
eu _m	frequency of e-mail usage on a smartphone or mobile phone	independent	metric
ii	involvement in incentive	independent	metric
it	involvement in topic	independent	metric
age _{ms}	age (median split)	independent	nominal (dummy)
gen	gender	independent	nominal (dummy)
sou	source of recruitment (e-mail distribution lists of universities)	independent	nominal (dummy)
DVA ₁	Dummy Variable Adjustment for eu _m = 1	independent	nominal (dummy)
DVA ₂	Dummy Variable Adjustment for eu _p = 1	independent	nominal (dummy)

All metric variables have been grand mean centered.

It has been suggested to trim independent variables and interaction terms in case they are statistically insignificant with logistic coefficients close to zero. However, this procedure has to be performed carefully as removing variables with logistic coefficient different from zero can introduce bias to the Multiple Binary Logistic Regression model. This problem may intensify in case several variables are not removed stepwise but in one step only. Therefore, it is not advised to trim variables which may be of theoretical importance. An exception to this rule

may be granted for inconsequential variables for which logistic coefficients are very close to zero and, hence, removal will not bring along misspecification errors (*Jaccard 2001.*, pp. 66-7).

6.2.3 Results of the Evaluation of Research Guiding Hypotheses

Next, the results of the univariate as well as multivariate evaluation of hypothesis regarding survey participation as main dependent variable will be presented to the reader. At this, for the purpose of univariate testing several χ^2 -tests have been conducted. Moreover, a number of Multiple Binary Logistic Regression models have been estimated in the course of multivariate testing.

6.2.3.1 Univariate Evaluation

Across all experimental groups a total of 1,487 of 5,124 randomly selected and invited panelists participated in the main study. This equals a total participation rate of $PARR_t=29.0\%$. The participation rates in this study differed by the invitation mode panelists have been invited in as well as the mode of the survey they have been invited to. In order to test whether these differences were significant several χ^2 -tests for homogeneity (*Backhaus et al. 2011*, pp. 304-15) have been conducted. According to G*Power 3.1.4 (*Faul et al. 2007*; *Faul et al. 2009*), a statistical software package for sample size planning, this category of test requires an optimal sample size of 1,300 panelists ($\alpha=.05$; $1-\beta=.95$; $df=1$) in order to account for even for small⁴⁵⁰ differences in variance (*Cohen 1988*, pp. 224-7). Consequently, all of the following χ^2 -tests have been conducted with this sample size randomly drawn from the completed sample of 1,487 panelists⁴⁵¹.

In detail, $PARR_{st}=31.3\%$ of panelists who were invited to a stationary web survey participated in it, while only $PARR_{mo}=26.7\%$ of those invited to a mobile web survey complied with the survey request. The corresponding difference in variance was highly significant ($\omega=.099$; $p=.000***$)⁴⁵². Hence, there is a significant difference between the participation rates of stationary and mobile web surveys, however, just shortly below the threshold to a small effect size.

⁴⁵⁰ $\omega=.1$ (small effect), $\omega=.3$ (medium effect), $\omega=.5$ (large effect) (*Cohen 1988*, pp. 224-7).

⁴⁵¹ In the following all sample reductions of the completed sample will be performed by random drawing.

⁴⁵² Two tailed χ^2 -test; $\omega=.099$; $\chi^2=12.332$; $df=1$; $p=.000***$; $1-\beta=.947$.

Table 6-2: Participation Rates of Main Study

		<i>factor 2: invitation mode</i>	
		<i>invitation via e-mail</i> $PARR_e=32.4\%$	<i>invitation via SMS</i> $PARR_s=25.7\%$
<i>factor 1: survey mode</i>	<i>web survey on mobile internet</i> $PARR_{mo}=26.7\%$	$expgr_1$ (partially mixed mode) $PARR_{expgr1}=24.4\%$	$expgr_3$ (unimode) $PARR_{expgr3}=29.1\%$
	<i>web survey on stationary internet</i> $PARR_{st}=31.3\%$	$expgr_2$ (partially mixed mode) $PARR_{expgr2}=40.4\%$	$expgr_4$ (mixed mode) $PARR_{expgr4}=22.2\%$

$PARR_t=29.0\%$, $N=5,124$.

Moreover, $PARR_e=32.4\%$ of panelists invited by e-mail took part in the survey, while only $PARR_s=25.7\%$ of those invited by SMS complied with the survey request. The corresponding difference in variance was highly significant, of a small effect size ($\omega=.122$; $p=.000***$)⁴⁵³. Table 6-2 gives an overview of the participation rates obtained in the course of the main study.

In line with the previous results, $expgr_2$ – which consisted out of panelists who were invited to a stationary web survey by e-mail – showed the highest participation of $PARR_{expgr2}=40.4\%$. Furthermore, the participation rate of $expgr_3$ with panelists invited to a mobile web survey by SMS was $PARR_{expgr3}=29.1\%$ and, hence, highly significantly lower than for $expgr_2$ ($\omega=.230$; $p=.000***$). This difference was of a small effect size. In total five of the six comparisons of the four experimental groups conducted – which are presented in Table 6-3 – showed highly significant or significant differences in variance of small and medium effect sizes. One comparison showed only an insignificant difference in variance ($\omega=.048$; $p=.898$): For $expgr_1$ – panelists invited to a mobile web survey by e-mail – and $expgr_4$ – panelists invited to a stationary web survey by SMS – participation rates were $PARR_{expgr1}=24.4\%$ and

⁴⁵³ Two tailed χ^2 -test; $\omega=.122$; $\chi^2=12.689$; $df=1$; $p=.000***$; $1-\beta=.992$.

$PARR_{\text{expgr4}}=22.2\%$, respectively. Consequently, in this case the difference of 2.2 percentage points between participation rates of both groups might have occurred by sheer coincidence.

Table 6-3: Experimental Group Differences in Participation Rates of Main Study

<i>N=5,124</i>			
	$PARR_{\text{expgr2}}$ =40.4%	$PARR_{\text{expgr3}}$ =29.1%	$PARR_{\text{expgr4}}$ =22.2%
	$\chi^2\text{-test (two tailed)}$		
<i>N=5,124</i>	<i>N=1,300</i>		
$PARR_{\text{expgr1}}$ =24.4%	$\omega=.381$; $\chi^2=28.782$; $p=.000***$; $1-\beta=1.000$	$\omega=.108$; $\chi^2=6.731$; $p=.009***$; $1-\beta=.973$	$\omega=.048$; $\chi^2=.016$; $p=.898$; $1-\beta=.411$
$PARR_{\text{expgr2}}$ =40.4%	/	$\omega=.230$; $\chi^2=7.798$; $p=.000***$; $1-\beta=1.000$	$\omega=.479$; $\chi^2=27.446$; $p=.000***$; $1-\beta=1.000$
$PARR_{\text{expgr3}}$ =29.1%	/	/	$\omega=.166$; $\chi^2=6.085$; $p=.014**$; $1-\beta=.999$

Optimal sample size a priori estimated for two tailed χ^2 -test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $\omega=.1$ with G*Power 3.1.4 is $N=1,300$; $df=1$.

The results from a univariate evaluation of data indicate that – with the exception of H1, H5, and H7 – all of the first eight hypotheses formulated may not be rejected. At this, for H1 the probability value p is close to the threshold to a non-rejectable hypothesis. Nevertheless, results obtained by means of χ^2 -testing are inferior to those stemming from multivariate analysis as participation in web surveys is not only dependent on the experimental factors manipulated but also other influential covariates⁴⁵⁴. Therefore, subsequently, the results obtained in univariate analysis will have to be confirmed in multivariate analyses by means of Multiple Binary Logistic Regression Analysis. Consequently, further description and in depth analysis of univariate results is forgone here.

⁴⁵⁴ Q.v. Section 3.3.

6.2.3.2 Multivariate Evaluation

Multivariate hypotheses testing have been conducted by means of several Multiple Binary Regression Models in this study. At first, hypotheses were tested in models containing separate survey and invitation modes variables. Thereafter, further models were estimated that included four experimental groups which represented distinct combinations – and, hence, interactions – of different survey and invitation modes⁴⁵⁵.

6.2.3.2.1 Results of the Evaluation of Hypotheses based on a Differentiated View on Survey and Invitation Mode

For the purposes of evaluation of hypotheses H1 and H2, in which survey and invitation modes were treated as two separate variables, the first Multiple Binary Logistic Regression model (model #1) has been estimated. This model contained individual study participation (PAR) as its dependent variable, as well as separate independent dummy variables for survey (mode_{sur}) and invitation mode (mode_{inv}). In addition, further independent variables – previously presented in Table 6-1 – were included in the model for which Logistic Regression coefficients, corresponding odds ratios, and significances have been estimated. At this, all significance testing of Logistic Regression coefficients conducted in the course of this chapter are based on the Wald test (*Hosmer, Lemeshow and Sturdivant 2000, pp. 10-5*).

In order to prevent overfitting, subsequently, the model has been trimmed by means of the IBM SPSS 21.0 “Backward Elimination (Likelihood Ratio)” procedure. It automatically removes uninfluential variables from Logistic Regression models stepwise by testing the probability of their likelihood-ratio statistic. The latter is computed by the program by means of maximum partial likelihood estimates (*IBM 2012b, p. 4*). In this way five variables which, in this case, are irrelevant for web survey participation ($\text{i}u_s$; $\text{i}u_m$; $\text{e}u_s$; $\text{e}u_m$; ii) have been removed from the total model⁴⁵⁶ in six iteration steps. At this, trimming procedures showed only minor effects on goodness-of-fit statistics. The results of the estimations for the trimmed model are presented in the following

Table 6-4. In the following, “B” represents the logit coefficients and “SE” their standard errors.

⁴⁵⁵ Finally, interaction effects were also added to the models in Annex CXIII.

⁴⁵⁶ Q.v. Annex LXXXI.

Table 6-4: Multiple Binary Logistic Regression Trimmed Model #1

	-2LL=5,633.752 -2LR- χ^2 =538.959 R ² =.143				
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
mode _s	.207	.065	10.146	.001***	1.230
mode _i	-.370	.065	32.259	.000***	.691
pp _s	.386	.038	101.966	.000***	1.472
pp _m	.220	.018	142.172	.000***	1.246
ip _e	.096	.024	16.395	.000***	1.100
ip _s	-.176	.032	30.938	.000***	.839
it	.054	.021	6.654	.010**	1.056
age _{ms}	-.141	.069	4.231	.040**	.868
gen	-.573	.067	72.429	.000***	.564
sou	-.474	.099	23.073	.000***	.622
DVA ₁	-.501	.144	12.135	.000***	.606
DVA ₂	-.967	.456	4.491	.034**	.380
const.	-.145	.115	1.586	.208	.865

Dependent variable: PAR; N=5,124.

For the measure of quality of model fit several testing procedures have been conducted. The log likelihood based -2LL deviance statistics (-2LL=5,633.752; df=5,111; p=.000***) (*Singer and Willett 2003, pp. 116-22*), for instance, showed a strong deviation from an ideal case and, therefore, only poor model fit. In contrast, the Likelihood Ratio Test (-2LR- χ^2 =538.959; df=12; p=.000***) (*Greenland and Rothman 2008, pp. 229-30*) showed a highly significant result. It implies that all regression coefficients are not equal to zero and, hence, the independent variables have considerable impact on the dependent variable. Consequently, the results derived from the model are transferable to the main population of this study (*Backhaus et al. 2011, pp. 268-9*). Nevertheless, Nagelkerke-Pseudo-R² statistic (R²=.143) indicated a rather poor model fit at the same time⁴⁵⁷. It shows an unacceptably small share (R²<.2) of explained variance of the dependent variable caused by the independent variables in the model (*Id.*, p. 276).

⁴⁵⁷ Backhaus et al. (2011, pp. 269-81) display model fit by means of Nagelkerke-Pseudo-R²-Statistics. In contrast to Cox and Snell-R² statistics the prior allows a precise content-related interpretation of model fit, as its value ranges from 0 to 1. At this, Nagelkerke-R² values larger than .2 are "acceptable", larger than .4 are "good", and larger than .5 are "very good" (*Id.*, p. 276).

Furthermore, an analysis of classification results by means of a confusion-matrix (*Giudici and Figini 2009, pp. 217-8*) showed that in total 71.5% of all cases were classified correctly (cut value=.50). This hit ratio was slightly higher than the maximum chance level of 71.0%⁴⁵⁸ as well as the proportional chance level of 58.8%⁴⁵⁹. These proportions indicate that the underlying classification result is better than simple random assignment of panelists to the two result classes (*Backhaus et al. 2011, pp. 271-4*).

In this context Backhaus et al. (2011, p. 273) warns researchers against the so called “sampling effect”. This effect describes the circumstance that hit ratios are always inflated in case they are calculated from the same sample which has also been used for prior Multiple Binary Logistic Regression Analysis. They argue that the chosen regression function is maximizing the hit ratio for the given sample and, thus, true hit ratios are always smaller than those calculated from this sample. Instead they suggest determining an adjusted hit ratio with a holdout sample. Therefore, also holdout sample of N=3,344 was left for validation in this study. Here, it has been used in order to calculate an adjusted hit ratio of 72.3%, which is even larger than the previously calculated maximum and proportional chance levels. Oddly, it is also larger than the hit ratio calculated from the study sample used. However, it is suggested in literature that for large samples the sampling effect described above will decrease which could be a explanation for this surprising effect (*Id., p. 273*).

Moreover, Press’ Q-Test ($Q=947.427$; $df=1$; $p=.000***$) (*Hair et al. 2010, p. 367*) confirmed that the results of the classification are highly significantly different from random assignment (*Backhaus et al. 2011, pp. 267-76*). Finally, Hosmer-Lemeshow Test ($\chi^2=14.167$; $df=8$; $p=.078*$) (*Hosmer, Lemeshow and Sturdivant 2000, pp. 157-68*) indicates that there might be a difference between the observed and model-predicted values and, hence, a rather poor model fit (*Backhaus et al. 2011, pp. 271-6*; *Hosmer, Lemeshow and Sturdivant 2000, pp. 153-223*). However, this result comes about only at a low significance level of $\alpha=.10$ (*Burns and Burns 2008, p. 580*) but for a sample size larger than the optimum sample size for χ^2 -test of $N=1,300$.

Regarding the interpretation of the regression coefficients the three nominal dummy variables age, gender and source showed significant and highly significant impact on the participation of panelists in trimmed model #1. For instance, the odds of panelists who are older than 24 years are .868 times ($p=.040**$) lower than of those at 24 years or younger. Moreover, the

⁴⁵⁸ Maximum chance level = $1 - \text{PARR}_t$ (*Backhaus et al. 2011, p. 273*).

⁴⁵⁹ Proportional chance level = $\text{PARR}_t^2 + (1 - \text{PARR}_t)^2$ (*Id.*).

odds of female panelists participating in the study were .564 times ($p=.000^{***}$) smaller than for male panelists. In addition, the odds of panelists recruited from the e-mail distribution lists of universities participating in the study were .622 times ($p=.000^{***}$) smaller than the odds of panelists from other recruitment sources.

These interpretations are permissible provided that all other variables included in the model are held constant. The effect of gender and source both were of small size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). In contrast, the effect of age was reported only at a trivial size (*Id.*). Nevertheless, regarding outcome rates even trivial effect sizes are practically relevant in survey research, as it has previously been shown in this study⁴⁶⁰. In brief summary, these results indicate that younger, male panelists who were recruited from other sources than universities' e-mail lists showed a higher probability and, hence, were more likely to participate in the study than those that were older, female, and recruited from universities' e-mail distribution lists.

Furthermore, this evaluation indicates that panelists' intention to participate in stationary web surveys (pp_s) ($OR=1.472$; $p=.000^{***}$) as well as in mobile web surveys (pp_m) ($OR=1.246$; $p=.000^{***}$) both have a highly significant, positive impact on participation in web surveys. At this, a one unit increase in intention to participate in a stationary web survey increases the odds of participation by a multiplicative factor of 1.472, which constitutes a small effect size (*Id.*). All the same, a one unit increase in intention to participate in a mobile web survey increases the odds of participation by a multiplicative factor of 1.246. This effect, however, is only trivial in size but, nevertheless, of practical relevance for researchers⁴⁶¹.

Additionally, the immediacy of perception of e-mails received on stationary or mobile devices (ip_e) ($OR=1.100$; $p=.000^{***}$) as well as immediacy of the perception of SMS received on mobile devices (ip_s) ($OR=.839$; $p=.000^{***}$) have been investigated. Oddly, the results indicated two highly significant effects of trivial size (*Id.*) in opposing directions. A one unit increase in the immediacy of perception of e-mails increases the odds of participation in a web survey by a multiplicative factor of 1.100. In contrast, a one unit increase in the immediacy of perception of SMS decreases the odds of participation by a multiplicative factor of .839. Obviously, panelists who claim to receive their e-mails more immediate after they have been sent, show a higher probability to participate in a study than those who receive an e-mail less immediately. For SMS, however, the opposite seems to be the case. The logic behind this

⁴⁶⁰ Q.v. Section 4.7.

⁴⁶¹ *Id.*

counter-intuitive effect will require further investigation in follow-up studies as no comprehensive explanation for this phenomenon can be provided here at this point.

Finally, involvement in the topic of the survey (*it*) had a significant positive effect on the participation of panelists. However, only of a trivial (*Id.*) but still practically relevant⁴⁶² size ($OR=1.056$; $p=.010^{**}$). Here, a one unit increase in topic involvement raises the odds of participation by the factor 1.056. Hence, panelists involved in the topic of the survey show a slightly higher probability of participation.

In contrast, no significant effect on participation has been found for the involvement in the incentive (*ii*) offered in this study ($OR=.991$; $p=.674$). Consequently, this variable alongside with other variables – frequency of internet usage on PC or laptop (iu_s) ($OR=.966$; $p=.332$), frequency of internet usage on a smartphone or mobile phone (iu_m) ($OR=1.000$; $p=.997$), frequency of e-mail usage on PC or laptop (eu_s) ($OR=1.018$; $p=.559$), as well as frequency of e-mail usage on a smartphone or mobile phone (eu_m) ($OR=.989$; $p=.667$) – have been removed from the model during trimming procedures⁴⁶³.

Most importantly, for survey mode ($mode_{sur}$) a highly significant ($p=.001^{***}$) odds ratio of $OR=1.230$ has been estimated in model #1⁴⁶⁴. Following the interpretational approach of Jaccard (2001, p. 8), the odds of participating of panelists invited to a stationary web survey are consequently 1.23 times higher than the odds of panelists invited to a mobile web survey. According to Cohen (1988, pp. 24-7) as well as Gray and Kinnear (2012, p. 192), this only corresponds to a trivial, but nevertheless relevant⁴⁶⁵ effect size. Because odds are an alternative concept, which is similar to probabilities, defined as the quotient of probability of an event and its complementary event (Jaccard 2001, pp. 2-3), also panelists invited to stationary web surveys is slightly higher in comparison to the probability of participation of panelists invited to mobile web surveys. Hence, offering a stationary web survey is likely to yield higher participation rates compared to a mobile web survey, however, only of marginal size – but still of practical relevance⁴⁶⁶. Consequently, separately looking on survey mode as an independent variable in Multiple Binary Logistic Regression model #1, hypothesis H1 may not be rejected at a significance level of $\alpha=.01$.

⁴⁶² Q.v. Section 4.7.

⁴⁶³ Q.v. Annex LXXXI for the total model.

⁴⁶⁴ At this, the variable had been coded as dummy with a value of “1” for stationary web surveys and mobile web surveys as reference group with a value of “0”. Q.v. Section 4.5.3.2.1.

⁴⁶⁵ Q.v. Section 4.7.

⁴⁶⁶ *Id.*

All the same, for invitation mode (mode_{sur}) a highly significant ($p=.000^{***}$) odds ratio of $\text{OR}=.691$ has been estimated. It corresponds to a small size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) effect⁴⁶⁷. This implies that the odds of participating in a web survey of panelists invited by SMS are .691 times lower than the odds of panelists invited by e-mail. Following the same logic as stated above, panelists' probability to participate in a web survey when invited by e-mail is higher in comparison to the probability of participation when they were invited by SMS. Hence, inviting panelists by e-mail is likely to yield higher participation rates compared to sending out an SMS invitation. Therefore, looking at the mode of invitation separately, also hypothesis H2 may not be rejected at a significance level of $\alpha=.01$.

While the evaluation of hypothesis H1 and H2 indicates that – as a general rule – stationary web surveys are to a small extent superior to mobile web surveys, and e-mail invitations are to a small extent superior to SMS invitations, it is wrong to believe that this interpretation is generally right. Obviously, as it has been shown in Table 6-2, there are combinations of survey and invitation modes for which e-mail invitations cause inferior participation rates in comparison to SMS invitations. This is the case if panelists were invited to a mobile web survey ($\text{PARR}_{\text{expgr1}} < \text{PARR}_{\text{expgr3}}$). All the same, stationary web surveys are not always superior to mobile web surveys. For instance, this is not the case if panelists were invited by SMS ($\text{PARR}_{\text{expgr3}} > \text{PARR}_{\text{expgr4}}$). In particular, the two groups invited to a stationary web survey showed both the highest ($\text{PARR}_{\text{expgr2}}=40.4\%$) as well as the lowest participation rates ($\text{PARR}_{\text{expgr4}}=22.2\%$) in this study. Here, it is obvious, that there is an interdependence of survey and invitation modes which requires a combined view on both variables. This view will be established in the following section by means of analyzing combinations of survey and invitation as experimental group dummy variables by means of further Multiple Binary Logistic Regression Analyses.

For the sake of completeness, it should be mentioned at this point that for the constant of model #1 an odds ratio of $\text{OR}=.865$ has been estimated. It represents the odds of panelists participating in the study given that all other independent, metric and dummy variables included in model #1 are set to a value of "0". However, this result is insignificant ($p=.208$) and has minor interpretational value for the purpose of hypothesis testing. Therefore, further interpretation of the constant will be foregone here.

⁴⁶⁷ At this, invitations were coded as dummy variables with a value of "1" for SMS invitations and e-mail invitations as reference group with a value of "0". Q.v. Section 4.5.3.2.1.

6.2.3.2.2 Results of the Evaluation of Hypotheses Based on a Combined View on Survey and Invitation Modes as Experimental Groups

For the evaluation of hypotheses H3 through H8, which imply a combined view on survey and invitation modes variables as experimental groups, further four Multiple Binary Logistic Regression models have been established. These models (models #2 to #5) were similar to the first model (model #1) which has been examined in order to test hypotheses H1 and H2 in the previous section. However, instead of including survey (mode_{sur}) and invitation mode (mode_{inv}) as separate independent dummy variables, they comprised four dummy variables (expgr_1 ; expgr_2 ; expgr_3 ; expgr_4) which represented the four experimental groups⁴⁶⁸ surveyed. At this, every group variable entering the model represented a distinct combination of survey and invitation modes. In turn, every model comprised three of the four group dummy variables. The fourth group, which did not enter the model, served as reference group. Every group functioned as reference group exactly once in one of the four models (*Jaccard 2001, p. 23*). For all four total models Logistic Regression coefficients, corresponding odds ratios, and significances have been estimated⁴⁶⁹.

Similar to the first model all four estimated models have been trimmed by means of the IBM SPSS 21.0 “Backward Elimination (Likelihood Ratio)” procedure (*IBM 2012b, p. 4*). The algorithm removed five irrelevant variables (iu_s ; iu_m ; eu_s ; eu_m ; ii). Previously, the same variables had also been removed from the first total model. The results of the model estimations for all four trimmed models are presented in Table 6-5 at the end of this section. In this context, trimming procedures showed only minor improvement on goodness-of-fit statistics. It is important to notice that, as all models are mutual re-specifications, the results of the Multiple Binary Logistic Regression Analyses only differ regarding the four experimental group variables and constants⁴⁷⁰. For all other variables the results of the estimations show no differences across all models⁴⁷¹. Therefore, the individual results of the analyses regarding experimental groups and constants of models #2 to #5 are presented separately from other results. Only the latter results are universally valid for all four models. For the same reason a single goodness-of-fit statistic applies to all four models.

Here, the -2LL deviance statistics (-2LL=5,548.143; df=5,111; $p=.000^{***}$) (*Singer and Willett 2003, pp. 116-22*), as a measure of quality of the model fit, showed only a poor fit. In con-

⁴⁶⁸ Q.v. Section 4.5.3.2.1.

⁴⁶⁹ Q.v. Annex LXXXII.

⁴⁷⁰ Q.v. lower part of Table 6-5.

⁴⁷¹ Q.v. upper part of Table 6-5.

trast, the Likelihood Ratio Test ($-2LR-\chi^2=624.569$; $df=13$; $p=.000***$) (*Greenland and Rothman 2008, pp. 229-30*) showed a highly significant result which implies that the independent variables included in the trimmed models have a considerable impact on the dependent variable. Therefore, the results derived from the models may be transferred to the main population (*Backhaus et al. 2011, pp. 268-9*). Besides, Nagelkerke-Pseudo- R^2 statistic ($R^2=.164$) indicated a poor model fit with an unacceptably small share ($R^2<.2$) of explained variance of the dependent variable caused by the independent variables (*Id., p. 276*). However, it should be mentioned that a larger but, nevertheless, still too small share of variance of the dependent variable has been explained by each of the four models (models #2 to #5) when compared to model #1. The latter included separate dummy variables for survey mode ($mode_{sur}$) and invitation mode ($mode_{inv}$) ($\Delta R^2=.164-.143=.021$). This is an improvement compared to the previously tested models.

For the four estimated models the corresponding confusion-matrix (*Giudici and Figini 2009, pp. 217-8*) showed that a total of 72.5% of all cases were classified correctly (cut value=.50). This hit ratio is slightly larger than the maximum chance level⁴⁷² (71.0%) and proportional chance level (58.8%)⁴⁷³. Same holds true for the adjusted hit ratio of 72.2% calculated from the holdout sample ($N=3,344$). Consequently, the current classification result is better than the result due to a random assignment of panelists to classes (*Backhaus et al. 2011, pp. 271-4*). Moreover, it is an improvement in comparison to the first model previously estimated (model #1)⁴⁷⁴ which contained separate dummy variables for survey mode ($mode_{sur}$) and invitation mode ($mode_{inv}$). Additionally, Press' Q-Test ($Q=1037.610$; $df=1$; $p=.000***$) (*Hair et al. 2010, p. 367*) confirmed that the results of this classification are highly significantly different from random assignment (*Backhaus et al. 2011, pp. 267-76*). Finally, the Hosmer-Lemeshow-Test ($\chi^2=33.331$; $df=8$; $p=.000***$) (*Hosmer, Lemeshow and Sturdivant 2000, pp. 157-68*) indicates that the model does not fit the data. However, the sample size of $N=5,124$ used for this test by far exceeds the optimal sample size of $N=1,300$ for a χ^2 -test estimated with G*Power 3.1.4 (*Faul et al. 2007; Faul et al. 2009*). Hence, this result is rather doubtful due to the "oversensitive" character of the test. Summarizing the results of the test applied on models #2 to #5 regarding the measure of quality of the model fit, the results show no qualitative differences compared to those of model #1 (*Backhaus et al. 2011, pp. 271-6; Hosmer, Lemeshow and Sturdivant 2000, pp. 153-223*).

⁴⁷² Maximum chance level = $1-PARR_t$ (*Backhaus et al. 2011, p. 273*).

⁴⁷³ Proportional chance level = $PARR_t^2 + (1-PARR_t)^2$ (*Id.*).

⁴⁷⁴ In total 71.5% of all cases were classified correctly in model #1.

The significances, categories of effect sizes⁴⁷⁵, and their algebraic signs for the dummy variables age (OR=.862; $p=.031^{**}$), gender (OR=.570; $p=.000^{***}$), and source (OR=.625; $p=.000^{***}$) in models #2 to #5 did not change when compared to the first model (model #1). Consequently, the odds of participation of panelists who are older than 24 years are significantly .862 times smaller than those at 24 years or younger. This is a trivial, but relevant effect size⁴⁷⁶ (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). Moreover, the odds of female panelists participating in the study were highly significantly .570 times smaller than those of male panelists, and the odds of panelists recruited from the e-mail distribution lists of universities were highly significantly .625 times smaller than those of panelists from other recruitment sources. The latter two were small size effects (*Id.*). Consequently, in line with the concept of odds⁴⁷⁷, also the probability of participation was smaller for every group considered in comparison to their reference groups.

Compared to model #1 the significances, categories of effect sizes⁴⁷⁸, algebraic signs and, hence, the interpretation of the metric variables panelists' intention to participate in stationary web (pp_s) (OR=1.485; $p=.000^{***}$) and mobile web surveys (pp_m) (OR=1.256; $p=.000^{***}$) did not change in models #2 to #5 just as well. The same holds true for the immediacy of perception of e-mail received on stationary or mobile devices (ip_e) (OR=1.098; $p=.000^{***}$) as well as SMS received on mobile devices (ip_s) (OR=.830; $p=.000^{***}$), and the involvement in the topic of the survey (it) (OR=1.055; $p=.011^{**}$). Consequently, a one unit increase in one of these variables results in a change in the odds of participation in a web survey by the corresponding multiplicative factor⁴⁷⁹.

In contrast to this, but similar to model #1, no significant effect on participation has been found for the metric variables involvement in the incentive (ii) (OR=.971; $p=.403$), frequency of internet usage on PC or laptop (iu_s) (OR=.996 $p=.890$), frequency of internet usage on a smartphone or mobile phone (iu_m) (OR=1.012; $p=.688$), frequency of e-mail usage on PC or laptop (eu_s) (OR=.988; $p=.645$), as well as frequency of e-mail usage on a smartphone or mobile phone (eu_m) (OR=.995; $p=.799$). As a consequence, step by step these variables have been removed from the total models⁴⁸⁰ during the procedure of trimming.

⁴⁷⁵ Effects of small, medium, or large size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*).

⁴⁷⁶ Q.v. Section 4.7.

⁴⁷⁷ Q.v. Section 6.1.2.1.

⁴⁷⁸ *Id.*

⁴⁷⁹ Which is equal to the odds ratios 1.485, 1.256, 1.098, .830, and 1.055, respectively.

⁴⁸⁰ Q.v. Annex LXXXII.

To begin with, Multiple Binary Logistic Regression model #3 has been estimated in order to shed light on the impact of e-mail invitations in combination with stationary web surveys (expgr_2) in comparison to the other three experimental groups all of which were coded as dummy variables (expgr_1 ; expgr_3 ; expgr_4). Panelists assigned to expgr_2 have been invited to participate in a partial mixed-mode web survey. At this, the group served as reference group within this model.

First, for a comparison between the experimental group variable expgr_1 and the reference group of model #3⁴⁸¹, expgr_2 , a highly significant ($p=.000***$) odds ratio of $\text{OR}=.456$ ^{482 483} has been found. At this, panelists in expgr_1 have been invited to a mobile web survey by e-mail, which represents a partial mixed-mode survey. Following the interpretational approach of Jaccard (2001, p. 8)⁴⁸⁴, the odds of panelists participating in a mobile web survey (expgr_1) are .456 times smaller than the odds in a stationary web (expgr_2) survey, provided that both groups have been invited by e-mail and all other variables included in the model were held constant. This result corresponds to a small effect size (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192). As odds are an alternative concept to probabilities (Jaccard 2001, pp. 2-3), the probability to participate in a stationary web survey (expgr_2) is likewise higher in comparison to the probability of participating in a mobile web survey (expgr_1) if panelists have been invited to by e-mail. Consequently, the participation rates for the latter combination of survey and invitation modes (expgr_1) will be lower than for the prior (expgr_2). Therefore, choosing a combined view on survey and invitation modes, hypothesis H3 may not be rejected at $\alpha=.01$ significance level.

Second, comparing expgr_3 to the reference group expgr_2 a highly significant ($p=.000***$) odds ratio of a small effect size (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192) of $\text{OR}=.589$ has been estimated. Here, panelists in expgr_3 have been invited to a mobile web survey by SMS which, in turn, represents a unimode survey. Consequently, the odds of panelists participating in expgr_3 are .589 smaller than the odds of participating in a stationary web survey to which they have been invited by e-mail (expgr_2) (Jaccard 2001, p. 8). In other words the odds of participating in the partially mixed mode survey (expgr_2) are larger than the odds of participating in the unimode survey (expgr_3). Therefore, the probability to participate

⁴⁸¹ Q.v. Table 6-5 at the end of this section.

⁴⁸² $\text{OR}=1/2.194$.

⁴⁸³ For an easier comparison of effect sizes across different group comparisons some ORs have been inversed, e.g.: If group X has been compared to group Y the odds ratio was $\text{OR} = \frac{\text{Odd}(X)}{\text{Odd}(Y)}$. In case, group Y has been compared to group X, in contrast, the odds ratio was $\text{OR} = \frac{\text{Odd}(Y)}{\text{Odd}(X)} = 1 / \frac{\text{Odd}(X)}{\text{Odd}(Y)}$. Because an odd is present in numerator and denominator of the fraction, the reciprocal of an odds ratio is also an odds ratio.

⁴⁸⁴ Q.v. Section 6.1.2.2.

and, thus, also the participation rates for the latter mode combination (expgr_3) will be lower than for the prior (expgr_2). Consequently, choosing a combined view on survey and invitation modes, hypothesis H4 may not be rejected at a significance level of $\alpha=.01$.

Third, all the same, for the comparison between the expgr_4 and the reference group expgr_2 a highly significant ($\text{OR}=.383$; $p=.000^{***}$) odds ratio of a medium effect size (*Cohen 1988, pp. 24-7*; *Gray and Kinnear 2012, p. 192*) has been detected. At this, only panelists that had been invited to a stationary web survey by SMS have been included in expgr_4 . This corresponds to a pure mixed mode survey. Here, in case both groups have been invited to a stationary web survey, the odds of panelists participating invited by SMS (expgr_4) are .383 times smaller than the odds of panelists invited by e-mail (expgr_2) (*Jaccard 2001, p. 8*). In other words, the odds of participating in a partially mixed mode survey are higher than the odds of participating in a pure mixed mode survey. Therefore, also the probability of participation and, hence, the participation rates for the prior combination of survey and invitation modes (expgr_4) will be lower than for the latter one (expgr_2). Consequently, choosing a combined view on survey and invitation modes, hypothesis H8 may also not be rejected at a significance level of $\alpha=.01$.

For the sake of completeness, it should also be mentioned that for the constant of model #3 an odds ratio of $\text{OR}=1.393$ ($p=.006^{***}$) has been estimated. It represents the odds of panelists participating in the study given that all other variables included in Multiple Binary Logistic Regression model #3 are set to a value of “0”. This corresponds to the odds of participation of all panelists belonging to the reference group – in this case the second experimental group ($\text{expgr}_1=\text{expgr}_3=\text{expgr}_4=0$) – who are male, 24 years or younger, not recruited over the e-mail distribution lists of universities, and who – at the same time – hold a mean score for all metric variables included in the model and, hence, show an average panelist’s behavior⁴⁸⁵ (*Id. 2001, p. 7*). However, this result has only a minor interpretational value for hypothesis testing conducted in the course of this study. Therefore, once again, this constant as well as further constants in similar models will not be further elaborated upon.

Next, the fourth Multiple Binary Logistic Regression model #4⁴⁸⁶ has been estimated for the purpose of researching the impact of SMS invitations in combination with mobile web surveys in expgr_3 compared to the other experimental group dummy variables (expgr_1 ; expgr_2 ;

⁴⁸⁵ All metric variables have previously been grand mean centered. Consequently, the value of “0” represents the mean of any metric variable and, hence, the “average” behavior of panelists.

⁴⁸⁶ Q.v. Table 6-5 at the end of this section.

expgr₄). In this model dummy variable expgr₃ have been coded as reference group. The corresponding experimental group was invited to a unimode survey.

First, for the comparison of expgr₁⁴⁸⁷ to the reference group expgr₃ an odds ratio of OR=.773⁴⁸⁸ has been estimated. Provided that panelists from both experimental groups have been invited to a mobile web survey and all other variables included in the model were held constant – as it is the case for expgr₁ and expgr₃ – the odds of panelists participation when invited by e-mail (expgr₁) are .773 times smaller compared to the odds of when they were invited by SMS (expgr₃) (*Id.* 2001, p. 8). This result is regarded as a highly significant effect ($p=.006^{***}$), however, only of a trivial – but relevant⁴⁸⁹ – effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). Therefore, in case panelists have been invited to a mobile web survey by SMS (expgr₃) the probability of their participation is higher in comparison to the case in which they have been invited to a survey in the same survey mode by e-mail (expgr₁). In other words, the odds of participating in a unimode survey (expgr₃) are larger than the odds of participating in a partial mixed mode survey (expgr₁). Consequently, also the participation rates of the prior combination of survey and invitation modes (expgr₃) will be higher. Because Hypothesis H7 suggests that there will be no difference in participation rates between both experimental groups, choosing a combined view on survey and invitation modes, it has to be rejected even at $\alpha=.10$ significance level.

At this point it is noteworthy to mention that the indiscrimination stated in the aforementioned hypothesis is based on the assessment that the difference in the ease of accessing web surveys between both experimental groups is highly significant, but of a trivial effect size ($d=-.192$; $p=.001^{***}$)⁴⁹⁰ (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*)⁴⁹¹. This trivial effect, however, measured in the course of the recruitment phase, is barely at the threshold to a small effect size (*Id.*). However, in case it would have previously been classified as a small effect, the hypothesis would then predict that an invitation to a mobile web survey by SMS (expgr₃) would yield a higher response rate than an invitation by e-mail (expgr₁). In this case, the corresponding hypothesis would not have been rejected.

⁴⁸⁷ For repetition, panelists in the first group had been invited to a mobile web survey by e-mail, which is considered a partial mixed-mode survey.

⁴⁸⁸ OR=1/1.293.

⁴⁸⁹ Q.v. Section 4.7.

⁴⁹⁰ Q.v. Section 4.6, Table 4-21.

⁴⁹¹ Paired samples t-test: N=327; $d=-.192$; $T=-3.481$; $df=326$; $p=.001^{***}$; $\alpha=.05$; post hoc $1-\beta=.933$.

Second, for a comparison of expgr_4 ⁴⁹² to the reference group expgr_3 a highly significant ($p=.000^{***}$) odds ratio of a small effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) of $\text{OR}=.650$ has been detected. Consequently, in case both groups have been invited by SMS, the odds of panelists participating who were invited to a stationary web survey (expgr_4) are .650 times smaller than the odds of panelists invited to a mobile web survey (expgr_3) (*Jaccard 2001, p. 8*). In other words, the odds of participating in this unimode survey are larger than the odds of participating in the partial mixed mode survey. Therefore, the probability to participate as well as participation rates for the group invited by e-mail (expgr_4) will be lower than for the group invited by SMS (expgr_3). Hence, choosing a combined view on survey and invitation modes hypothesis H6 may also not be rejected at a significance level of $\alpha=.01$ ⁴⁹³.

Third, previously in this chapter it has been found out, that the odds of participating in a stationary web survey when invited by e-mail (expgr_2) are highly significantly ($p=.000^{***}$) 1.697 times higher (or $1/\text{OR}=.589$) compared to the odds of participating in a mobile web survey when invited by SMS (expgr_3) (*Id. 2001, p. 8*). Consequently, hypothesis H4 may not be rejected at a significance level of $\alpha=.01$.

Moreover, for the purpose of researching the impact of e-mail invitations in combination with mobile web surveys (expgr_1) in comparison to the three other experimental group dummy variables (expgr_2 ; expgr_3 ; expgr_4) the second Multiple Binary Logistic Regression model #2 has been estimated. In this model variable expgr_1 functions as reference group. At this, panelists in expgr_1 have been invited to a partial mixed mode survey.

First, for the comparison of the expgr_4 ⁴⁹⁴ to the reference group expgr_1 an odds ratio of $\text{OR}=.841$ has been estimated. If all other variables included in the model were held constant, this ratio indicates that the odds of panelists participating in a stationary web survey invited by SMS (expgr_4) are .841 times smaller than the odds of panelist participating in a mobile web survey invited by e-mail (expgr_1) (*Jaccard 2001, p. 8*). In other words, the odds of participating in a partial mixed mode survey (expgr_1) are higher than the odds of participating in a mixed mode survey (expgr_4). However, this result is only based on a weak significant effect

⁴⁹² For repetition, panelists in the fourth group had been invited to stationary web survey by SMS, which is considered a partial mixed-mode survey.

⁴⁹³ For the sake of completeness, an odds ratio of $\text{OR}=.812$ ($p=.0863^*$) had been estimated for the constant of model #4. However, as explained earlier, this result will not be further enlarged upon, as it has got minor interpretational value for hypothesis testing conducted in the course of this study.

⁴⁹⁴ For repetition, panelists in the expgr_3 had been invited to a stationary web survey by e-mail, which is considered a partial mixed-mode survey.

($p=.076^*$) of a trivial size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). Nevertheless, as trivial effects in participation rates may also constitute practically relevant results⁴⁹⁵, consequently, the probability to participate and, thus, the participation rate of panelists invited by e-mail to a mobile web survey (expgr_1) is higher than of those invited by SMS to a stationary web survey (expgr_4). Therefore, choosing a combined view on survey and invitation modes, hypothesis H5 may not be rejected, however, only with the restriction of a significance level of $\alpha=.10$.⁴⁹⁶ At this point it has to be noted that the participation rate difference between expgr_1 and expgr_4 was already found to be insignificant by univariate χ^2 -testing in the course of Section 6.2.3.1.

Second and third, it has already been shown in this chapter that the odds of panelists participating in stationary web survey when invited by e-mail (expgr_2) ($\text{OR}=2.194$; $p=.000^{***}$)⁴⁹⁷ as well as the odds of participation in a mobile web survey when invited by SMS (expgr_3) ($\text{OR}=1.293$; $p=.006^{***}$)⁴⁹⁸ were highly significantly 2.194 or, respectively, 1.293 times higher than the odds of participation in mobile web surveys when they have been invited by e-mail (expgr_1). Consequently, hypothesis H4 may not be rejected at a significance level of $\alpha=.01$ and H7 also has to be rejected at a significance level of $\alpha=.10$.

Finally, for the sake of completeness, for the purpose of researching the impact of SMS invitations in combination with stationary web surveys (expgr_4) compared to the three other experimental group dummy variables (expgr_1 ; expgr_2 ; expgr_3) the fifth Multiple Binary Logistic Regression model #5 has been estimated. At this, expgr_4 was coded as reference group. Panelists surveyed in this group were invited to participate in a mixed mode group. As the results of this model correspond to those established in the course of evaluation of the previous three models a closer look on the results is omitted. However, the odds of panelists participating when invited by e-mail to a mobile web survey (expgr_1) ($\text{OR}=1.190$; $p=.076^*$)⁴⁹⁹, the odds of participating when invited by e-mail to a stationary web survey (expgr_2) ($\text{OR}=2.610$; $p=.000^{***}$)⁵⁰⁰, and the odds of participating when invited by SMS to a mobile web survey (expgr_3) ($\text{OR}=1.538$; $p=.000^{***}$)⁵⁰¹ are 1.190, 2.610, or respectively 1.538 times higher than the odds of participating in an stationary web survey when invited by e-mail (expgr_4). In other

⁴⁹⁵ Q.v. Section 4.7.

⁴⁹⁶ For the sake of completeness, an odds ratio of $\text{OR}=.628$ ($p=.000^{***}$) had been estimated for the constant of model #2. However, as explained earlier, this result will not be further enlarged upon, as it has minor interpretational value for hypothesis testing conducted in the course of this study.

⁴⁹⁷ $\text{OR}=1/.456$.

⁴⁹⁸ $\text{OR}=1/.773$.

⁴⁹⁹ $\text{OR}=1/.841$.

⁵⁰⁰ $\text{OR}=1/.383$.

⁵⁰¹ $\text{OR}=1/.650$.

words, unimode and partially mixed mode surveys showed higher odds of participation than pure mixed mode surveys. Consequently, choosing a combined view on survey and invitation modes hypothesis H6 and H8 may not be rejected at a significance level of $\alpha=.01$. Furthermore, also hypothesis H5 may not be rejected but only at $\alpha=.10$ significance level.⁵⁰²

⁵⁰² For the sake of completeness, an odds ratio of $OR=.528$ ($p=.000***$) had been estimated for the constant of model #5. However, as explained earlier, this result will not be further enlarged upon, as it has minor interpretational value for hypothesis testing conducted in the course of this study.

Table 6-5: Multiple Binary Logistic Regression Analysis for Trimmed Models #2 to #5

models #2 to #5	-2LL=5,548.143 -2LR- χ^2 =624.569 R ² =.164				
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
expgr _x	<i>see table below</i>				
pp _s	.395	.039	104.579	.000***	1.485
pp _m	.228	.019	149.394	.000***	1.256
ip _e	.094	.024	15.487	.000***	1.098
ip _s	-.186	.032	34.045	.000***	.830
it	.054	.021	6.416	.011**	1.055
age _{ms}	-.149	.069	4.629	.031**	.862
gen	-.563	.068	68.739	.000***	.570
sou	-.469	.099	22.265	.000***	.625
DVA ₁	-.527	.145	13.173	.000***	.591
DVA ₂	-1.029	.461	4.984	.026**	.357
const.	<i>see table below</i>				

Dependent variable: PAR; 1 ≤ x ≤ 4; N=5,124.

<i>model number</i>	<i>reference group</i>	<i>comparison group</i>			<i>const.</i>
		<i>expgr₂</i>	<i>expgr₃</i>	<i>expgr₄</i>	
2	expgr ₁	B=.786 SE=.092 Wald=73.586 p=.000*** OR=2.194	B=.257 SE=.094 Wald=7.418 p=.006*** OR=1.293	B=-.174 SE=.098 Wald=3.150 p=.076* OR=.841	B=-.465 SE=.122 Wald=14.482 p=.000*** OR=.628
3	expgr ₂	/	B=-.529 SE=.089 Wald=35.508 p=.000*** OR=.589	B=-.960 SE=.093 Wald=106.800 p=.000*** OR=.383	B=.321 SE=.118 Wald=7.435 p=.006*** OR=1.379
4	expgr ₃	/	/	B=-.431 SE=.095 Wald=20.348 p=.000*** OR=.650	B=-.208 SE=.120 Wald=2.997 p=.083* OR=.812
5	expgr ₄	/	/	/	B=-.638 SE=.122 Wald=27.220 p=.000*** OR=.528

6.3 Results of the Univariate Evaluation of Variables of Secondary Focus of Research

For the evaluation of several additional variables – as e.g. data quality or response speed – the main dataset (N=5,124) has been filtered for actual participants (PAR=1) of the web surveys previously conducted in the course of the main study. These variables represent the secondary focus of research in this study. In total 1,487 panelists participated in these surveys (PARR_t=29.0%) of which 802 completed a stationary and 685 a mobile web survey questionnaire. 517 of the prior group were invited by e-mail in expgr₂ as well as 285 by SMS in expgr₄. In contrast, of all panelists who participated in a mobile web survey 312 were invited by e-mail in expgr₁ and 373 by SMS in expgr₃. Consequently, in total 829 of 1,487 participants have been invited by e-mail and 658 by SMS.

6.3.1 Results of the Evaluation of Data Quality

In this study data quality was measured by means of item omission, response error, the length of answers given to open end questions by participants, as well as content analysis⁵⁰³. The corresponding results will be presented in the following Sections 6.3.1.1 to 6.3.1.4.

Table 6-6: Evaluation Results Item Omission across Different Survey Modes

<i>IO</i> (N=1,487)			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
<i>stationary web sur- vey</i>	<i>mobile web sur- vey</i>	<i>opt. N</i>	<i>F</i>	<i>P</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
μ=2.85 σ=3.133 N=802	μ=2.71 σ=3.075 N=685	1,310	.735	.391	1.078	1,308	.058	.281	.182

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

6.3.1.1 Item Omission

No significant difference in item omission (IO) was found between participants of stationary ($\mu=2.85$; $\sigma=3.133$) and mobile ($\mu=2.71$; $\sigma=3.075$) web surveys ($d=.058$; $p=.281$). A similar non-significant result was found for the comparison between participants who have been in-

⁵⁰³ Q.v. Section 4.5.3.1.2.

vited by e-mail ($\mu=2.80$; $\sigma=3.166$) and those invited by SMS ($\mu=2.76$; $\sigma=3.032$) ($d=.013$; $p=.818$). Both results are presented in Table 6-6 and Table 6-7.

Table 6-7: Evaluation Results Item Omission across Different Invitation Modes

<i>IO</i> (<i>N=1,487</i>)			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
<i>e-mail invitation</i>	<i>SMS invitation</i>	<i>N (opt.)</i>	<i>F</i>	<i>P</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
$\mu=2.80$ $\sigma=3.166$ $N=829$	$\mu=2.76$ $\sigma=3.032$ $N=658$	1,320	1.912	.167	.230	1,318	.013	.818	.057

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Table 6-8: Evaluation Results Item Omission across Different Experimental Groups

<i>IO</i>			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
<i>group A</i>	<i>group B</i>	<i>opt. N</i>	<i>F</i>	<i>P</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
expgr ₁ $\mu=2.54$ $\sigma=3.145$ $N=312$	expgr ₂ $\mu=2.96$ $\sigma=3.172$ $N=517$	1,388	.022	.881	-1.837	827	-.133	.067*	.458
expgr ₁ $\mu=2.54$ $\sigma=3.145$ $N=312$	expgr ₃ $\mu=2.84$ $\sigma=3.014$ $N=373$	1,312	.587	.444	-1.270	683	-.098	.204	.247
expgr ₁ $\mu=2.54$ $\sigma=3.145$ $N=312$	expgr ₄ $\mu=2.66$ $\sigma=3.057$ $N=285$	1,306	.070	.791	-.438	595	-.039	.662	.076
expgr ₂ $\mu=2.96$ $\sigma=3.172$ $N=517$	expgr ₃ $\mu=2.84$ $\sigma=3.014$ $N=373$	1,338	1.034	.310	.553	888	.039	.580	.088
expgr ₂ $\mu=2.96$ $\sigma=3.172$ $N=517$	expgr ₄ $\mu=2.66$ $\sigma=3.057$ $N=285$	1,422	.192	.662	1.321	800	.096	.187	.255
expgr ₃ $\mu=2.84$ $\sigma=3.014$ $N=373$	expgr ₄ $\mu=2.66$ $\sigma=3.057$ $N=285$	1,326	.232	.630	.789	656	.059	.430	.116

Optimal sample sizes a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

However, one significant standardized mean difference – which is shown in Table 6-8 – was detected between two of the four experimental groups researched. Here, participants who have been invited to a mobile web survey by e-mail in expgr_1 ($\mu=2.54$; $\sigma=3.145$) omitted less items than those invited to a stationary web survey in the same invitation mode in expgr_2 ($\mu=2.96$; $\sigma=3.172$) ($d=-.133$; $p=.067^*$). However, this effect was only trivial in size (*Cohen 1988, pp. 24-7*; *Gray and Kinnear 2012, p. 192*), weakly significant, and of poor power ($1-\beta=.458$). Hence, it may not be excluded that it was rather coincidental. Nevertheless, it is noteworthy to mention that expgr_2 showed a higher, and expgr_1 a lower item omission than any other group researched in this study. Unfortunately, these differences showed no significance compared to other groups. Consequently, it may be assumed that survey and invitation modes likely did not influence IO in this study.

6.3.1.2 Uninformed Response Error

Similar to item omission, no significant difference in uninformed response error (URE) was found between participants of stationary ($\mu=1.63$; $\sigma=2.515$) and mobile ($\mu=1.70$; $\sigma=2.442$) web surveys ($d=-.028$; $p=.606$) as well as participants who have been invited by e-mail ($\mu=1.60$; $\sigma=2.485$) and by SMS ($\mu=1.74$; $\sigma=2.476$) ($d=-.052$; $p=.331$). These results are displayed in Table 6-9 and Table 6-10.

Table 6-9: Evaluation Results Response Error across Different Survey Modes

URE ($N=1,487$)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
stationary web sur- vey	mobile web sur- vey	opt. N	F	P	T	df	d	p	1- β
$\mu=1.63$ $\sigma=2.515$ N=802	$\mu=1.70$ $\sigma=2.442$ N=685	1,310	.006	.936	-.516	1,308	-.028	.606	.079

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

However, as it is shown in Table 6-11, all experimental groups in which panelists were invited by e-mail showed a lower URE in comparison to those invited by SMS. Nevertheless, these results were insignificant. Moreover, subjects invited by SMS to stationary web surveys in

expgr₄ showed a higher URE than any other group researched. Likewise URE was lowest, when panelists have been invited by e-mail to stationary web surveys. However, conducting this comparison of URE by means of univariate testing across all four experimental groups did not unveil significance in a single relationship. Thus, it may be assumed that survey and invitation modes do not have an impact on URE in this study.

Table 6-10: Evaluation Results Response Error across Different Invitation Modes

URE (N=1,487)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
e-mail invitation	SMS invitation	N (opt.)	F	P	T	df	d	p	1-β
μ=1.60 σ=2.485 N=829	μ=1.74 σ=2.476 N=658	1,320	.018	.894	-.973	1,318	-.052	.331	.112

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

6.3.1.3 Length of Answers

By contrast to the previously examined indicators of data quality – item omission (IO) and response error (URE) – there are several significant effects of survey and invitation modes on the length of answers (LOA) given by participating panelists. For instance, when answering to open end questions, participants use more characters in stationary ($\mu=145.66$, $\sigma=122.839$) than in mobile web surveys ($\mu=124.14$, $\sigma=107.165$). This difference is highly significant and of high power ($d=.184$; $p=.001^{***}$). However, it is only of trivial effect size barely at the threshold to a small effect (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). This result is displayed in Table 6-12.

Opposed to the prior result, the length of answers did not significantly differ between participants who have been invited by e-mail ($\mu=134.89$; $\sigma=108.501$) compared to those invited by SMS ($\mu=136.82$; $\sigma=125.598$) ($d=-.002$; $p=.941$). The corresponding results are displayed in Table 6-13.

Table 6-11: Evaluation Results Response Error across Different Experimental Groups

<i>URE</i>			<i>Levene's Test of Equality of Variances</i>		<i>independent samples t-test (two tailed)</i>				
<i>group A</i>	<i>group B</i>	<i>opt. N</i>	<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
expgr ₁ μ=1.65 σ=2.499 N=312	expgr ₂ μ=1.57 σ=2.477 N=517	1,388	.188	.664	.489	827	.032	.625	.073
expgr ₁ μ=1.65 σ=2.499 N=312	expgr ₃ μ=1.74 σ=2.395 N=373	1,312	.290	.590	-.459	683	-.037	.646	.077
expgr ₁ μ=1.65 σ=2.499 N=312	expgr ₄ μ=1.75 σ=2.582 N=285	1,306	.057	.811	-.449	595	-.039	.653	.076
expgr ₂ μ=1.57 σ=2.477 N=517	expgr ₃ μ=1.74 σ=2.395 N=373	1,338	.017	.896	-1.044	888	-.070	.297	.177
expgr ₂ μ=1.57 σ=2.477 N=517	expgr ₄ μ=1.75 σ=2.582 N=285	1,422	.462	.497	-.973	800	-.072	.331	.164
expgr ₃ μ=1.74 σ=2.395 N=373	expgr ₄ μ=1.75 σ=2.582 N=285	1,326	.593	.441	-.038	656	-.004	.970	.077

Optimal sample sizes a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Table 6-12: Evaluation Results Length of Answers across Different Survey Modes

<i>LOA (N=1,487)</i>			<i>Levene's Test of Equality of Variances</i>		<i>independent samples t-test (two tailed)</i>				
<i>stationary web survey</i>	<i>mobile web survey</i>	<i>opt. N</i>	<i>F</i>	<i>P</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
μ=145.66 σ=122.839 N=829	μ=124.14 σ=107.165 N=658	1,310	6.065	.014**	3.329	1,307.968	.184	.001***	.941

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Table 6-13: Evaluation Results Length of Answers across Different Invitation Modes

LOA (N=1,487)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
<i>e-mail invitation</i>	<i>SMS invi- tation</i>	<i>N (opt.)</i>	<i>F</i>	<i>P</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
μ=134.89 σ=108.501 N=829	μ=136.82 σ=125.598 N=658	1,320	.321	.571	-.074	1,318	-.002	.941	.050

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Prior analysis in this section showed differences regarding LOA between stationary and mobile web surveys. Here, answers to open end questions in stationary web surveys were longer. An in-depth analysis of experimental groups confirms these results. Here, a significant standardized mean difference regarding LOA of a small effect size ($d=-.261$; $p=.001^{***}$) between panelists who have been invited to a mobile web survey by SMS in expgr_3 ($\mu=122.60$; $\sigma=111.573$) compared to those invited in the same mode to a stationary web survey in expgr_4 ($\mu=155.44$; $\sigma=139.908$) has been found. At this, the latter group typed in the longest and the prior group the shortest answers in this study. Moreover, LOA differs ($d=-.132$; $p=.066^*$) between participants invited to a mobile web survey by e-mail in expgr_1 ($\mu=125.98$; $\sigma=101.794$) and those who received an invitation to a stationary web survey in the same mode in expgr_2 ($\mu=140.27$; $\sigma=112.109$). However, this difference is only weakly significant and trivial in effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). In addition the corresponding test lacks statistical power ($1-\beta=.452$). Therefore, it should be repeated with a larger sample size.

Moreover, two other effects were unveiled in this research: First, there is a highly significant difference of small effect size ($d=-.241$; $p=.004^{***}$) (*Id.*) between expgr_1 , the group invited by e-mail to a mobile web survey ($\mu=125.98$; $\sigma=101.794$), when compared to the group invited to a stationary web survey by SMS in expgr_4 ($\mu=155.44$; $\sigma=139.908$). Second, there is a significant difference ($d=.158$; $p=.020^{**}$) between the LOA of participants invited by e-mail to stationary web surveys in expgr_2 ($\mu=140.27$; $\sigma=112.109$) and those invited by SMS to mobile web surveys in expgr_3 ($\mu=122.60$; $\sigma=111.573$). Again both tests show higher LOA in stationary web surveys compared to their mobile counterparts. Nonetheless, the latter test lacks some power ($1-\beta=.642$) and therefore should be repeated with a larger sample.

Thus, in summary above results suggest that panelists' answers to open end questions in stationary web surveys are always at least weakly significantly longer than answers to the same questions asked in mobile web surveys in this study. This was confirmed for all relevant comparisons conducted in this study. However, some studies lacked power and should therefore be repeated with a larger sample. All other pairs of experimental groups tested did not show any significant results. The corresponding figures are displayed in Table 6-14.

Table 6-14: Evaluation Results Length of Answers across Different Experimental Groups

LOA			Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
group A	group B	opt. N	F	p	T	df	d	p	1- β
expgr ₁ $\mu=125.98$ $\sigma=101.794$ N=312	expgr ₂ $\mu=140.27$ $\sigma=112.109$ N=517	1,388	.565	.452	-1.840	827	-.132	.066*	.452
expgr ₁ $\mu=125.98$ $\sigma=101.794$ N=312	expgr ₃ $\mu=122.60$ $\sigma=111.573$ N=373	1,312	.559	.455	.411	683	.031	.681	.069
expgr ₁ $\mu=125.98$ $\sigma=101.794$ N=312	expgr ₄ $\mu=155.44$ $\sigma=139.908$ N=285	1,306	7.296	.007***	-2.918	515.084	-.241	.004***	.836
expgr ₂ $\mu=140.27$ $\sigma=112.109$ N=517	expgr ₃ $\mu=122.60$ $\sigma=111.573$ N=373	1,338	2.334	.127	2.325	888	.158	.020**	.642
expgr ₂ $\mu=140.27$ $\sigma=112.109$ N=517	expgr ₄ $\mu=155.44$ $\sigma=139.908$ N=285	1,422	5.397	.020***	-1.573	487.044	-.123	.116	.384
expgr ₃ $\mu=122.60$ $\sigma=111.573$ N=373	expgr ₄ $\mu=155.44$ $\sigma=139.908$ N=285	1,326	10.188	.001***	-3.349	656	-.261	.001***	.912

Optimal sample sizes a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

6.3.1.4 Content Analysis

For the purpose of content analysis in open end questions ratings of themes and elaborations, interjudge reliabilities of two independent judges have been computed by means of Pearson's

product-moment correlations coefficient r (Sheskin 2004, *p.* 1104). This happened for each of the three open end questions included in the main study. At this, the resulting reliabilities were all highly significant and ranged from $r=.655$ to $.858$ for themes and from $r=.519$ to $.554$ for elaborations. Furthermore, for the sums of themes and elaborations over all three questions highly significant correlations of $r=.856$ for themes and $r=.687$ for elaborations have been found. Cohen (1988, *pp.* 77-81) considered Pearson's product-moments correlations with $r>.50$ as large effects. Consequently, the judge's ratings of themes and elaborations measured in the course of this study are likely highly reliable. Table 6-15 displays the interjudge reliabilities for themes and elaborations in open end questions 1 to 3 as well as its totals.

Table 6-15: Interjudge Reliability of Themes and Elaborations in Open End Questions

	<i>themes</i>			<i>elaborations</i>		
	<i>r</i>	<i>p</i>	<i>N</i>	<i>r</i>	<i>p</i>	<i>N</i>
<i>question 1</i>	.858	.000***	1,459	.533	.000***	1,459
<i>question 2</i>	.781	.000***	1,460	.519	.000***	1,460
<i>question 3</i>	.655	.000***	1,472	.554	.000***	1,472
<i>sum</i>	.856	.000***	1,439	.687	.000***	1,439

Two tailed Pearson's product-moments correlations.

6.3.1.4.1 Number of Themes

For the comparison of the number of themes, mentioned by participants in open end questions across different survey modes, a highly significant difference between panelists participating in stationary ($\mu=4.96$; $\sigma=1.993$) and mobile ($\mu=4.64$; $\sigma=1.797$) web survey mode have been found. This difference was in favor of stationary web surveys ($d=.151$; $p=.006***$). At this, panelists participating in the stationary mode on average mentioned .33 more themes than panelists answering in the mobile mode. Nevertheless, this is only an effect of trivial size (Cohen 1988, *pp.* 24-7; Gray and Kinnear 2012, *p.* 192) and lacks a bit power ($1-\beta=.776$). On the contrary, no statistically significant difference ($d=-.022$; $p=.688$) was found between panelists invited by e-mail ($\mu=4.81$; $\sigma=1.872$) and SMS ($\mu=4.82$; $\sigma=1.963$). The corresponding data is displayed in Table 6-16 and Table 6-17.

In addition, an in depth analysis revealed that there are also significant differences of small effect size (*Id.*) between different experimental groups researched regarding themes. For instance, a difference ($d=-.223$; $p=.006^{***}$) in favor for the stationary mode exists between panelists participating in mobile ($\mu=4.63$; $\sigma=1.823$) and stationary web surveys ($\mu=5.07$; $\sigma=2.109$) in case both have been invited by SMS in expgr_3 or expgr_4 . This effect has almost an acceptable power ($1-\beta=.794$). At this, similar to the comparison of the length of answers (LOA) given, results indicate that the highest number of themes was mentioned in expgr_4 and the lowest number in expgr_3 . Moreover, in case panelists in both groups have been invited by e-mail the stationary mode in expgr_2 ($\mu=4.90$; $\sigma=1.926$) also succeeded over the mobile mode in expgr_1 ($\mu=4.66$; $\sigma=1.769$). Here, however, only a weakly significant difference has been noted ($d=-.128$; $p=.079^*$). In addition the effect was only trivial in size (*Id.*) and power far below an acceptable value ($1-\beta=.418$). Therefore, a similar test with a larger sample size will have to be repeated in subsequent studies.

Table 6-16: Evaluation Results Number of Themes across Different Survey Modes

Themes ($N=1,439$)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
stationary web sur- vey	mobile web sur- vey	opt. N	F	p	T	df	d	p	1- β
$\mu=4.96$ $\sigma=1.993$ N=782	$\mu=4.63$ $\sigma=1.797$ N=657	1,312	3.327	.068*	2.757	1,301.519	.151	.006***	.776

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Table 6-17: Evaluation Results Number of Themes across Different Invitation Modes

Themes ($N=1,439$)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
e-mail invitation	SMS invi- tation	N (opt.)	F	p	T	df	d	p	1- β
$\mu=4.81$ $\sigma=1.872$ N=805	$\mu=4.82$ $\sigma=1.963$ N=634	1,322	.328	.567	.402	1,320	-.022	.688	.068

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Table 6-18: Evaluation Results Number of Themes across Different Experimental Groups

Themes			Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
group A	group B	opt. N	F	p	T	df	d	p	1- β
expgr ₁ $\mu=4.66$ $\sigma=1.769$ N=299	expgr ₂ $\mu=4.90$ $\sigma=1.926$ N=506	1,394	.679	.410	-1.758	803	-.128	.079*	.418
expgr ₁ $\mu=4.66$ $\sigma=1.769$ N=299	expgr ₃ $\mu=4.63$ $\sigma=1.823$ N=358	1,312	.064	.801	.162	655	.013	.871	.053
expgr ₁ $\mu=4.66$ $\sigma=1.769$ N=299	expgr ₄ $\mu=5.07$ $\sigma=2.109$ N=276	1,304	4.161	.042**	-2.546	538.587	-.213	.011**	.721
expgr ₂ $\mu=4.90$ $\sigma=1.926$ N=506	expgr ₃ $\mu=4.63$ $\sigma=1.823$ N=358	1,342	1.217	.270	2.018	862	.139	.044**	.520
expgr ₂ $\mu=4.90$ $\sigma=1.926$ N=506	expgr ₄ $\mu=5.07$ $\sigma=2.109$ N=276	1,426	2.012	.156	-1.177	780	-.088	.240	.217
expgr ₃ $\mu=4.63$ $\sigma=1.823$ N=358	expgr ₄ $\mu=5.07$ $\sigma=2.109$ N=276	1,324	5.089	.024***	-2.749	543.987	-.223	.006***	.794

Optimal sample sizes a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Furthermore, a stationary web survey to which panelists in expgr₄ have been invited by SMS ($\mu=5.07$; $\sigma=2.109$) also yielded more themes than a mobile web survey combined with e-mail invitations in expgr₁ ($\mu=4.66$; $\sigma=1.769$). This difference was statistically significant and of small effect size ($d=-.213$; $p=.011^{**}$) (*Id.*). Finally, another significant difference regarding themes in favor of stationary mode has been found between stationary web surveys to which panelists in expgr₂ have been invited by e-mail ($\mu=4.90$; $\sigma=1.926$) and mobile web surveys to which panelist have been invited by SMS in expgr₃ ($\mu=4.63$; $\sigma=1.823$) ($d=.139$; $p=.044^{**}$). However, sample sizes used for hypotheses testing here were notably below the optimum size. Consequently, the power of the prior ($1-\beta=.721$) and latter test ($1-\beta=.520$) were shortly or, respectively, considerably below the threshold to an acceptable value. The corresponding data is displayed in Table 6-18 above. Nevertheless, as all comparisons of stationary to mobile web surveys conducted here always show at least a weakly significant difference in favor for

stationary web surveys, hence, it may be assumed that panelists mention a higher number of themes in the stationary than in the mobile mode.

6.3.1.4.2 Number of Elaborations

Likewise, for the comparison of the number of elaborations in open ended questions participants on average entered more elaborations when they took a stationary web survey ($\mu=3.04$; $\sigma=1.509$) than in a comparable mobile web survey ($\mu=2.80$; $\sigma=1.427$). This positive effect is displayed in Table 6-19 and has proven to be significant. Nevertheless, it is only of trivial effect size ($d=.141$; $p=.011^{**}$) (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192). Additionally, the test lacks some power ($1-\beta=.759$).

Table 6-19: Evaluation Results Number of Elaborations across Different Survey Modes

Elaborations (N=1,439)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
stationary web sur- vey	mobile web sur- vey	opt. N	F	p	T	df	d	p	1- β
$\mu=3.04$ $\sigma=1.509$ N=782	$\mu=2.80$ $\sigma=1.427$ N=657	1,312	1.203	.273	2.539	1,310	.141	.011**	.759

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Moreover, a high, positive, and highly significant correlation was found between themes and elaborations ($N=1,439$; $r=.792$; $p=.000^{***}$). Therefore, for the same experimental groups for which significant effects have been previously detected during the analysis of themes, similar effects in the same direction have been detected for evaluations. All of these effects, which are displayed in the following Table 6-21, were trivial in size and partly of unacceptable statistical power. Therefore, no reliable results may be derived from this analysis. Furthermore, in contrast to the evaluation of themes, in expgr_2 the most elaborations, and in expgr_3 the least elaborations were given by panelists.

It is striking that the number of elaborations is always at least weakly significantly higher for participants of stationary in comparison to mobile web surveys. This result will have to be further examined in future research with a larger sample. Due to this first state of evidence, it

is assumed that stationary web surveys cause a higher number of elaborations than mobile web surveys.

Finally, for the sake of completeness, it should be mentioned that no significances have been detected in the comparison of different invitation modes ($d=.004$; $p=.950$), as Table 6-20 suggests. Obviously it is also not important for the number of elaborations in open end questions, whether participants were invited by e-mail ($\mu=2.94$; $\sigma=1.458$) or SMS ($\mu=2.92$; $\sigma=1.499$).

Table 6-20: Evaluation Results Number of Elaborations across Different Invitation Modes

<i>Elaborations</i> ($N=1,439$)			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
<i>e-mail invitation</i>	<i>SMS invi- tation</i>	<i>opt. N</i>	<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
$\mu=2.94$ $\sigma=1.458$ $N=805$	$\mu=2.92$ $\sigma=1.499$ $N=634$	1,322	.116	.773	.063	1,320	.004	.950	.051

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

To sum up the findings of the last two sections, both the number of themes and elaborations in open ended question identified in this study are larger for participants answering in the stationary than in the mobile mode. Consequently, in this regard data quality should be higher in stationary than in mobile web surveys. However, the tests conducted sometimes lacked necessary power and should therefore be repeated again with a larger sample size in the future. Moreover, the mode of invitation does not seem to have an impact on the number of themes and elaborations and, hence, on data quality.

Table 6-21: Evaluation Results Number of Elaborations across Different Experimental Groups

<i>Elaborations</i>			<i>Levene's Test of Equality of Variances</i>		<i>independent samples t-test (two tailed)</i>				
<i>group A</i>	<i>group B</i>	<i>opt. N</i>	<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
expgr ₁ μ=2.81 σ=1.427 N=299	expgr ₂ μ=3.02 σ=1.473 N=506	1,394	.002	.965	-1.922	803	-.140	.055*	.483
expgr ₁ μ=2.81 σ=1.427 N=299	expgr ₃ μ=2.79 σ=1.428 N=358	1,312	.141	.708	.211	655	.017	.833	.055
expgr ₁ μ=2.81 σ=1.427 N=299	expgr ₄ μ=3.08 σ=1.574 N=276	1,304	1.511	.219	-2.119	573	-.176	.035**	.558
expgr ₂ μ=3.02 σ=1.473 N=506	expgr ₃ μ=2.79 σ=1.428 N=358	1,342	.205	.651	2.267	862	.156	.024**	.617
expgr ₂ μ=3.02 σ=1.473 N=506	expgr ₄ μ=3.08 σ=1.574 N=276	1,426	1.655	.199	-.541	780	.041	.589	.085
expgr ₃ μ=2.79 σ=1.428 N=358	expgr ₄ μ=3.08 σ=1.574 N=276	1,324	2.579	.109	-2.414	632	-.193	.016**	.672

Optimal sample sizes a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

6.3.2 Results of the Evaluation of Response Time

Highly significant differences in response time (RT) of medium effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) have been found between participants of stationary ($\mu=884.51$; $\sigma=448.855$) and mobile ($\mu=1,146.95$; $\sigma=504.714$) web surveys ($d=-.540$; $p=.000***$). At this, participants who answered in the stationary mode needed on average 262.44 seconds less – which is equal to a time difference of approximately 4 ½ minutes – to complete the entire survey compared to those answering in the mobile mode. At the same time only a significant difference of trivial effect size (*Id.*) and of weak power has been found between participants invited by e-mail ($\mu=973.97$; $\sigma=489.435$) and those invited by SMS

($\mu=1,040.34$; $\sigma=494.114$) ($d=-.140$; $p=.013^{**}$). The latter comparison, however, lacks statistical power ($1-\beta=.699$). Both results are displayed in Table 6-22 and Table 6-23⁵⁰⁴.

Table 6-22: Evaluation Results Response Time across Different Survey Modes

<i>RT</i> (<i>N=1,438</i>)			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
<i>stationary web survey</i>	<i>mobile web survey</i>	<i>opt. N</i>	<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
$\mu=884.51$ $\sigma=448.855$ $N=787$	$\mu=1,146.95$ $\sigma=504.716$ $N=651$	1,314	5.546	.019**	-9.855	1,176.420	-.540	.000***	1.000

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Table 6-23: Evaluation Results Response Time across Different Invitation Modes

<i>RT</i> (<i>N=1,438</i>)			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
<i>e-mail invitation</i>	<i>SMS invi- tation</i>	<i>opt. N</i>	<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
$\mu=973.97$ $\sigma=489.435$ $N=802$	$\mu=1,040.34$ $\sigma=494.114$ $N=636$	1,320	.345	.557	-2.488	1,275	-.140	.013**	.699

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

The prior result – that participants complete stationary faster than mobile web surveys – has been confirmed across all experimental groups. At this, panelists participating in the stationary mode showed highly significantly faster response times compared to groups with panelists participating in the mobile mode. These effects were all of medium and small size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). In particular panelists invited by e-mail in expgr_2 answered faster to questions in stationary web surveys ($\mu=866.88$; $\sigma=433.662$) than in mobile web surveys in expgr_1 ($\mu=1,157.03$; $\sigma=524.590$) ($d=.593$; $p=.000^{***}$). Notably, in this study expgr_2 showed the fastest response time, while panelists in expgr_1 were the slowest. Similar holds true in case participants of stationary web surveys in expgr_4 ($\mu=916.27$;

⁵⁰⁴ For the analysis of response time 49 participants had been filtered from the dataset who needed more than one hour to complete the survey. Thereof, 16 participants belonged to expgr_1 , 11 to expgr_2 , 18 to expgr_3 , and 4 to expgr_4 .

$\sigma=474.129$) and mobile web surveys in expgr_3 ($\mu=1,138.54$; $\sigma=488.113$) were invited by SMS ($d=.450$; $p=.000^{***}$). Moreover, expgr_4 ($\mu=916.27$; $\sigma=474.129$) completed answers faster in comparison to panelists in expgr_1 invited by e-mail to mobile web-surveys ($\mu=1,157.03$; $\sigma=524.590$) ($d=.468$; $p=.000^{***}$). Likewise, panelists invited by e-mail to stationary web surveys in expgr_2 ($\mu=866.88$; $\sigma=433.662$) needed less completion time in comparison to panelists invited by SMS to mobile web surveys in expgr_3 ($\mu=1,138.54$; $\sigma=488.113$) ($d=-.571$; $p=.000^{***}$). In vast contrast to prior findings in this section, there were no significant group differences regarding response time when only the mode of invitation is altered while at the same time holding constant the mode of survey. This is, for instance, the case when comparing expgr_1 to expgr_3 ($d=.036$; $p=.642$) or expgr_2 to expgr_4 ($d=-.110$; $p=.150$). All of these results are displayed in Table 6-24.

Table 6-24: Evaluation Results Response Time across Different Experimental Groups

LOA			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
group A	group B	opt. N	F	p	T	df	d	p	1- β
expgr_1 $\mu=1,157.03$ $\sigma=524.590$ N=296	expgr_2 $\mu=866.88$ $\sigma=433.662$ N=506	1,398	12.875	.000***	8.043	528.653	.593	.000***	1.000
expgr_1 $\mu=1,157.03$ $\sigma=524.590$ N=296	expgr_3 $\mu=1,138.54$ $\sigma=488.113$ N=355	1,314	2.393	.122	.465	649	.036	.642	.074
expgr_1 $\mu=1,157.03$ $\sigma=524.590$ N=296	expgr_4 $\mu=916.27$ $\sigma=474.129$ N=281	1,304	1.923	.166	5.774	575	.468	.000***	.999
expgr_2 $\mu=866.88$ $\sigma=433.662$ N=506	expgr_3 $\mu=1,138.54$ $\sigma=488.113$ N=355	1,344	3.748	.053*	-8.413	703.422	-.571	.000***	1.000
expgr_2 $\mu=866.88$ $\sigma=433.662$ N=506	expgr_4 $\mu=916.27$ $\sigma=474.129$ N=281	1,418	4.008	.046**	-1.443	536.408	-.110	.150	.315
expgr_3 $\mu=1,138.54$ $\sigma=488.113$ N=355	expgr_4 $\mu=916.27$ $\sigma=474.129$ N=281	1,320	.016	.900	5.775	634	.450	.000***	.999

Optimal sample sizes a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

In summary, it is on the dice that the mode in which a survey is conducted influences response time in this study. In particular, all experimental groups which completed a stationary web survey answered highly significantly faster in comparison to groups which completed a mobile web survey. However, the reasons for this advantage of stationary web survey will have to be researched in depth in subsequent studies. Moreover, mixed results were found for the comparison between the modes of invitation used in this study. These will require further research just as well.

6.3.3 Results of the Evaluation of Response Speed

Besides different measures of data quality – which have been analyzed prior in this chapter – also other variables, important for the comparison of different types of web surveys, have been assessed in the course of this study. For instance, response speed measured in this study significantly differed between participants of the stationary ($\mu=3.10$; $\sigma=4.883$) and mobile web surveys ($\mu=2.55$; $\sigma=4.081$). In particular, the participants of the prior, stationary web survey needed approximately half a day longer to respond to the survey request. Unfortunately, this positive effect is only trivial in size and lacks statistical power ($d=.119$; $p=.033^{**}$; $1-\beta=.573$) (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192). It is fully displayed in Table 6-25.

Table 6-25: Evaluation Results Response Speed Across Different Survey Modes

RS (N=1,487)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
stationary web sur- vey	mobile web sur- vey	opt. N	F	p	T	df	d	p	1- β
$\mu=3.10$ $\sigma=4.883$ N=802	$\mu=2.55$ $\sigma=4.081$ N=685	1,310	9.703	.002***	2.157	1,307.982	.119	.033**	.573

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Prior results are likely due to a highly significant difference of a small effect size (*Id.*) ($d=-.215$; $p=.008^{***}$). It may be found between participants of mobile ($\mu=2.42$; $\sigma=3.876$) and stationary web surveys ($\mu=3.35$; $\sigma=4.796$) in expgr_3 and expgr_4 , that have been invited by SMS.

At this, expgr_3 and expgr_4 were the conditions in which participants answered the fastest and slowest in this study. Participants invited to the mobile condition on average answered a little less than a day faster than those participating in a stationary web survey. Unfortunately, this test is also a bit short of power ($1-\beta=.779$), just below an acceptable threshold, so that it will have to be repeated again in later studies with a larger sample. Conversely, there is no significant difference ($d=-.057$; $p=.424$) regarding response speed between participants of mobile ($\mu=2.70$; $\sigma=4.315$) and stationary ($\mu=2.97$; $\sigma=4.929$) web surveys in expgr_1 and expgr_2 in case both groups previously have been invited by e-mail. This result implies that mobile web surveys do not per se show a higher response speed in comparison to stationary web surveys. They only do so in case panelists have been invited by SMS.

Table 6-26: Evaluation Results Response Speed Across Different Invitation Modes

RS (N=1,487)			Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
e-mail invitation	SMS invitation	N (opt.)	F	p	T	df	d	p	1- β
$\mu=2.86$ $\sigma=4.707$ N=829	$\mu=2.83$ $\sigma=4.320$ N=658	1,320	.050	.822	.092	1,318	.006	.926	.051

Optimal sample size a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

Other tests between different experimental groups conducted resulted in insignificance or only weak significant, trivial effects (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) paired with unacceptable low power. In particular there is only a trivial, weakly significant difference of unacceptable power for panelists invited to stationary web surveys by e-mail in expgr_2 ($\mu=2.97$; $\sigma=4.929$) and those invited to mobile web surveys by SMS in expgr_3 ($\mu=2.42$; $\sigma=3.876$) to the advantage of the latter ($d=.122$; $p=.067$; $1-\beta=.355$). For the sake of completeness a weakly significant difference ($d=.143$; $p=.081^*$; $1-\beta=.414$) regarding RS was also found between expgr_1 – panelists invited by e-mail to a mobile web survey – and expgr_4 – panelists invited by SMS to a stationary web survey – to the advantage of the prior. All of this is shown in Table 6-27. Nevertheless, it is striking that panelist in all stationary web survey conditions always needed more time to react to an invitation in comparison to those in the

mobile condition. However, all of these effects lacked statistical power, so that evidence on the impact of survey mode on response speed is not reliable.

Finally, as displayed in Table 6-26, no significant difference ($d=.006$; $p=.926$) was found between participants who have been invited by e-mail ($\mu=2.86$; $\sigma=4.707$) and those invited by SMS ($\mu=2.83$; $\sigma=4.320$). Consequently, particular focus of further studies will have to be put on the effect of combinations of different survey and invitation modes in mobile web surveys. In this regard it is of particular interest why RS is higher in mobile compared to stationary web surveys, when participants have been invited by SMS. Moreover, it is interesting why this is different in case they have been invited by e-mail. The fact that, in general, e-mails and SMS have no significant impact on response speed makes this question worthwhile researching.

Table 6-27: Evaluation Results Response Speed Across Different Experimental Groups

<i>RS</i>			<i>Levene's Test of Equality of Variances</i>		<i>independent samples t-test (two tailed)</i>				
<i>group A</i>	<i>group B</i>	<i>opt. N</i>	<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
expgr ₁ $\mu=2.70$ $\sigma=4.315$ $N=312$	expgr ₂ $\mu=2.97$ $\sigma=4.929$ $N=517$	1,388	1.481	.224	-.799	827	-.057	.424	.125
expgr ₁ $\mu=2.70$ $\sigma=4.315$ $N=312$	expgr ₃ $\mu=2.42$ $\sigma=3.876$ $N=373$	1,312	1.253	.263	.868	683	.068	.386	.143
expgr ₁ $\mu=2.70$ $\sigma=4.315$ $N=312$	expgr ₄ $\mu=3.35$ $\sigma=4.796$ $N=285$	1,306	6.053	.014**	-1.749	573.104	.143	.081*	.414
expgr ₂ $\mu=2.97$ $\sigma=4.929$ $N=517$	expgr ₃ $\mu=2.42$ $\sigma=3.876$ $N=373$	1,338	6.142	.013**	1.833	881.428	.122	.067*	.355
expgr ₂ $\mu=2.97$ $\sigma=4.929$ $N=517$	expgr ₄ $\mu=3.35$ $\sigma=4.796$ $N=285$	1,422	1.771	.184	-1.071	800	-.078	.285	.184
expgr ₃ $\mu=2.42$ $\sigma=3.876$ $N=373$	expgr ₄ $\mu=3.35$ $\sigma=4.796$ $N=285$	1,326	14.338	.000***	-2.666	536.234	-.215	.008***	.779

Optimal sample sizes a priori estimated for two tailed independent samples t-test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $d=.2$ with G*Power 3.1.4.

6.3.4 Results of the Evaluation of Recommendation to Others

In total only 41 of 1,485 participants⁵⁰⁵ recommended participation in the main study to other people. With as little as 2.76% of participants complying with the recommendation request a meaningful evaluation of this variable is impossible and was therefore omitted. It may be speculated that the reason for the lack of compliance is due to the fact that panelists were already asked to recommend this study to their peers during recruitment phase by entering their e-mail addresses in a similar text field⁵⁰⁶.

6.3.5 Results of the Evaluation of Willingness to Participate Again

After participants from all four experimental groups had completed the survey task, they were subsequently asked to sign up for another survey. It was communicated to them that this survey is going to be conducted by a different researcher in an unspecified survey and invitation modes at an undisclosed later point in time. This procedure aimed to measure the participants' willingness to participate again (WPAR) in a different survey. Here, a highly significant, small size effect (*Cohen 1988, pp. 224-7*) ($\omega=.157$; $p=.004^{***}$) in favor of the stationary (WPAR=37.0%) over the mobile web survey mode (WPAR=29.8%) was found. Obviously, larger shares of participants in a web survey were willing to participate again in comparison to participants that had previously completed a mobile web survey. As the content of both surveys was identical this effect is exclusively due to experimental manipulation.

Table 6-28: Evaluation Results Willingness to Participate Again Across Different Survey Modes

WPAR (N=1,485)		χ^2 -test (two tailed)				
stationary web survey	mobile web survey	N	ω	χ^2	p	1- β
37.0%	29.8%	1,300	.157	8.396	.004***	.999

Optimal sample size a priori estimated for two tailed χ^2 -test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $\omega=.1$ with G*Power 3.1.4 is N=1,300; df=1.

⁵⁰⁵ Two participants broke off the survey before reaching the page with the recommendation form.

⁵⁰⁶ Q.v. Section 4.2.

In this regard, especially those participants who were invited by SMS and previously participated in a stationary web survey ($WPAR_{\text{expgr4}}=38.9\%$) showed a highly significantly higher ($\omega=.218$; $p=.008^{***}$) willingness to participate again, compared to those who participated in a mobile web survey ($WPAR_{\text{expgr3}}=29.0\%$). These groups showed the highest and lowest willingness to participate again measured in this study. All the same, the prior group ($WPAR_{\text{expgr4}}=38.9\%$) is significantly superior regarding participants' willingness to participate again in case it is compared with the group of panelists who completed a mobile web survey to which they have been invited by e-mail ($WPAR_{\text{expgr1}}=30.8\%$) ($\omega=.174$; $p=.036^{**}$). In addition, participants of stationary web surveys to which they have been invited by e-mail ($WPAR_{\text{expgr2}}=35.9\%$) showed significantly higher willingness compared to those who participated in mobile web surveys invited by SMS ($WPAR_{\text{expgr3}}=29.0\%$) ($\omega=.144$; $p=.033^{**}$). The entire aforementioned effects are regarded as small size in literature (*Cohen 1988, pp. 224-7*).

Unfortunately, the difference in willingness to participate again between panelists participating in stationary ($WPAR_{\text{expgr2}}=35.9\%$) and mobile web surveys ($WPAR_{\text{expgr1}}=30.8\%$) to which they have previously been invited by e-mail is not significant ($\omega=.110$; $p=.134$). This, however, may be due to a too small sample size used. It lay noticeably below the optimum of $N=1,300$. Noteworthy, all experimental groups which stationary web surveys have been conducted with showed a higher willingness to participate again in comparison to all mobile web survey conditions. This is in line with the prior finding that the willingness to participate again in a survey is generally higher in stationary, than in mobile web surveys. The results elucidated above are displayed in Table 6-28 and Table 6-30.

Table 6-29: Evaluation Results Willingness to Participate Again Across Different Invitation Modes

WPAR ($N=1,485$)		χ^2 -test (two tailed)				
e-mail invitation	SMS invitation	N	ω	χ^2	p	1- β
33.9%	33.3%	1,300	.013	.060	.807	.076

Optimal sample size a priori estimated for two tailed χ^2 -test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $\omega=.1$ with G*Power 3.1.4 is $N=1,300$; $df=1$.

Finally, for the sake of completeness, also no significant difference in willingness to participate again was found between panelists who have previously been invited by e-mail (WPAR=33.9%) and those invited by SMS (WPAR=33.3%) ($\omega=.013$; $p=.807$). The latter results displayed in Table 6-29. To sum up the results of this section, stationary web surveys conducted in the course of this study were superior to their mobile counterparts regarding WPAR. The reason for this finding will have to be further researched in subsequent studies.

Table 6-30: Evaluation Results Willingness to Participate Again Across Different Experimental Groups

$N=1,485$	WPAR _{expgr2} =35.9%	WPAR _{expgr3} =29.0%	WPAR _{expgr4} =38.9%
	χ^2 -test (two tailed)		
WPAR _{expgr1} =30.8%	$\omega=.110$; $\chi^2=2.241$; $p=.134$; $1-\beta=.889$ $N=828$	$\omega=.039$; $\chi^2=.245$; $p=.621$; $1-\beta=.175$ $N=684$	$\omega=.174$; $\chi^2=4.398$; $p=.036^{**}$; $1-\beta=.990$ $N=597$
WPAR _{expgr2} =35.9%	/	$\omega=.144$; $\chi^2=4.548$; $p=.033^{**}$; $1-\beta=.990$ $N=888$	$\omega=.063$; $\chi^2=.755$; $p=.385$; $1-\beta=.425$ $N=801$
WPAR _{expgr3} =29.0%	/	/	$\omega=.218$; $\chi^2=7.139$; $p=.008^{***}$; $1-\beta=1.000$ $N=657$

Optimal sample size a priori estimated for two tailed χ^2 -test, with $\alpha=\beta=.05$, $1-\beta=.95$, and $\omega=.1$ with G*Power 3.1.4 is $N=1,300$; $df=1$.

6.3.6 Results of the Evaluation of Metric Variables, Constructs and Factors Measured

In order to determine whether the choice of survey and invitation modes had an influence on the values of variables measured, results have been compared across different survey and invitation modes as well as experimental groups. For this purpose 608 independent samples t-test⁵⁰⁷ have been conducted with all 76 metric variables assessed. As a result only 55 (3.13%) of all tests showed a significant standardized mean difference across different groups at $\alpha=.05$

⁵⁰⁷ The results of all 2,342 t-tests conducted may be found in the Annex XCIV to Annex CI of this doctoral dissertation.

level. Moreover, only five (0.2%) of these tests indicated a small statistical effect (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) and showed a sufficient statistical power ($1-\beta > .8$). Consequently, only in rare cases the results of the tests conducted in this survey were biased by the choice of survey and invitation modes. However, as the results show, every time the bias appeared its impact was rather small in size. The corresponding results are displayed on the left side of Table 6-31.

Table 6-31: Frequencies of Significant Differences in Comparisons of Variables and Constructs Found with Independent Sample t-Tests

		608 independent samples t-tests (two tailed) conducted with 76 metric variables				96 independent samples t-tests (two tailed) conducted with 12 constructs			
		frequency of							
comparison of variables and constructs between		$p<.05;$	$p<.05;$ $ d >.2$	$p<.05;$ $1-\beta>.8$	$p<.05;$ $ d >.2;$ $1-\beta>.8$	$p<.05$	$p<.05;$ $ d >.2$	$p<.05;$ $1-\beta>.8$	$p<.05;$ $ d >.2;$ $1-\beta>.8$
stationary web survey	mobile web survey	9	0	3	0	1	0	0	0
e-mail invita- tions	SMS invitations	6	0	1	0	0	0	0	0
expgr ₁	expgr ₂	8	2	1	1	1	0	0	0
expgr ₁	expgr ₃	0	0	0	0	0	0	0	0
expgr ₁	expgr ₄	3	2	0	0	0	0	0	0
expgr ₂	expgr ₃	9	2	2	2	1	0	0	0
expgr ₂	expgr ₄	11	2	2	2	0	0	0	0
expgr ₃	expgr ₄	9	0	0	0	0	0	0	0
totals		55	8	9	5	3	0	0	0

Furthermore, 96 independent sample t-tests⁵⁰⁸ have been conducted in order to examine whether the choice of survey and invitation modes had an influence on the constructs and factors measured in this study. At this, 12 different constructs and factors have been formed from the 76 variables measured. They showed reliabilities with Cronbach's α value between .517 and .904. At this, the factor "antecedents of value corruption" from the Public Opinion on Advertizing scale (*Pollay and Mittal 1993, pp. 108-13*) showed a particularly low reliability

⁵⁰⁸ The results of all 96 t-tests conducted may be found in the Annex CII to Annex CX of this doctoral dissertation.

of $\alpha=.222$. Hammond (2006, *p. 198*), however, suggested that α values should be greater than .70 in order to assume reliability of a scale.

Table 6-32: Evaluation Results of Reliability of Constructs Measured in Main Study

<i>scale</i>	<i>construct</i>	<i>construct / factor description</i>	<i>items (before removal)</i>	<i>Cronbach's α</i>
Informational and Transformational Ad Content (Puto and Wells 1984, <i>p. 641</i>)	iac	informational ad content	6 (8)	.678
	tac	transformational ad content	10 (15)	.904
Public Opinion on Advertizing (Pollay and Mittal 1993, <i>pp. 108-13</i>)	pota _{ga}	global attitudes	2	.780
	pota _{in}	information	2 (3)	.624
	pota _{fns}	falsity / no sense	2 (3)	.586
	pota _{hp}	hedonic / pleasure	3	.656
	pota _{sri}	social role and image	3	.691
	pota _{ma}	materialism	4	.740
	pota _{vc}	value corruption	2	.629
	pota _{avc}	antecedent value corruption	2	.222
	pota _{gfe}	good for the economy	3	.517
	pota _{agfe}	antecedent good for the economy	2 (3)	.769

Items removed before evaluation in order to improve reliability: iac₂, iac₅, tac₂, tac₈, tac₁₀, tac₁₁, tac₁₃, pota_{in1}, pota_{fns3}, pota_{gfe3}; Items reversed before evaluation: iac₃, iac₄, iac₅, tac₂, tac₉, tac₁₃, pota_{ga2}, pota_{fns3}, pota_{gfe2}.

In total only 3 of 96 tests (3.13%) showed significant standardized mean differences across different modes and experimental groups at $\alpha=.05$ level. However, all of these differences were trivial in effect size (Cohen 1988, *pp. 24-7*; Gray and Kinnear 2012, *p. 192*) and had only insufficient statistical power. Consequently, the values of measured constructs or factors were likely not influenced by survey or invitation mode in this study. It may therefore be assumed that the effects previously found for individual metric variables dissolved in case the variables were combined into constructs or factors. The corresponding results may be found on the right hand side of Table 6-31 and in Table 6-32.

7 Summary and Limitations

7.1 Summary

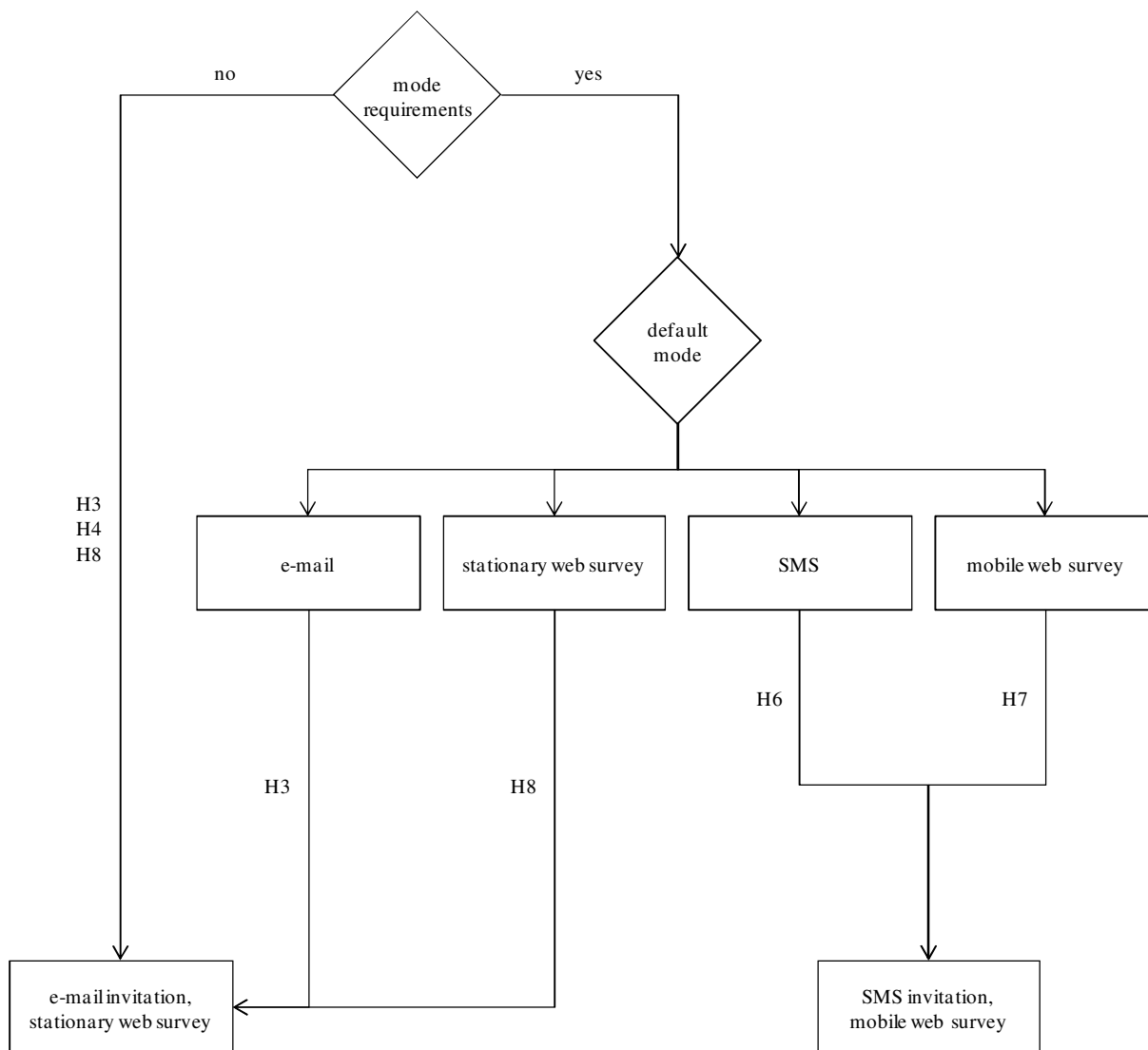
This study aims to deepen knowledge in the research field on outcome rates and on the topic of individual survey participation in stationary and mobile web surveys. It is primarily focused on the impact of survey and invitation modes on participation and, hence, the outcome rates of surveys. At this, it explores how the researchers' choice of these modes is moderated by the sampled panelists' anticipated ease of accessing web surveys. In literature low outcome rates in academic and industrial surveys are referred to as survey nonresponse. The latter is regarded as particularly problematic as it reduces the amount of available response data and, hence, limits the number of applicable statistical evaluations methods (*Wagner and Kemmerling 2010, p. 359*). Moreover, the results obtained become less generalizable and, therefore, show a lower representativity regarding the sampled population (*Green 1996, pp. 171-2; Furse and Stewart 1984, p. 80; Groves, Cialdini and Couper 1992, p. 475*). Finally, also nonresponse error is facilitated by low outcome rates. It refers to the event of systematic failure of giving response by certain segments of the sample⁵⁰⁹. By researching the topic of outcome rates and participation in web surveys this study aims to alleviate the downsides of survey nonresponse. It intends to do so by boosting individual survey participation by guiding the choice of survey and answer mode whilst taking into account the ease of accessing web surveys in a given combination of modes.

Researchers in academia and industry who plan a research project that requires conducting a web survey are sometimes put in a situation in which they are forced to offer their potential respondents a single combination of invitation and web survey mode. Such a limitation may for instance be driven by their reflections about costs. For example, address data containing both subjects e-mail addresses and mobile phone numbers will likely be more expensive than only purchasing one of these two available options. Likewise, only one type of contact data may be available in a given panel. In addition, it may also be required to limit response to only one survey mode. For instance, in case of designated device surveys, for which a web survey that is supposed to be conducted, had been optimized for one type of device only, e.g. PCs or mobile phones. Consequently, usage of other devices would likely bring along bias. Similarly, a survey application may only be compatible to one type of operating system and,

⁵⁰⁹ Q.v. Section 2.6.1.

hence, require devices of one type. In case researchers find themselves in such situations, the results of this research suggest following the subsequent decision tree, presented in Figure 7-1, in their process of choosing a combination of invitation and survey modes. This ensures a maximization of their web survey outcome rates.

Figure 7-1: Decision Tree for Choosing a Single Combination of Invitation and Web Survey Modes which Maximizes Survey Participation



Undisputedly the most important result of this study is the fact that the odds and probabilities of participation and, hence, participation rates were always the highest in case panelists have

been invited to stationary web surveys by e-mail ($PARR_{\text{expgr}_2}=40.4\%$), as in expgr_2 ⁵¹⁰, compared to other combinations of modes. In particular, e-mail invitations were superior to SMS invitations in stationary web surveys ($PARR_{\text{expgr}_4}=22.2\%$), like those conducted in expgr_4 (H8: $OR=2.611$, $p=.000***$)⁵¹¹. This result replicated the work of Bosnjak et al. (2008, p. 220) who found similar effects of comparable size ($OR=2.83$ and $OR=2.89$) in their research. All the same, the prior combination of invitation and survey modes was highly significantly superior to mobile web surveys paired with SMS invitations ($PARR_{\text{expgr}_3}=29.1\%$) used in expgr_3 (H4: $OR=1.697$, $p=.000***$)⁵¹² as well as e-mail invitations ($PARR_{\text{expgr}_1}=24.4\%$) in expgr_1 (H3: $OR=2.194$, $p=.000***$)⁵¹³. Consequently, if there are no mode requirements present in a study – which means the researcher may freely choose a combination of invitation and survey modes offered to panelists – it is highly recommended to invite all of them to a stationary web survey by e-mail. This will maximize participation in the survey.

Likewise, the upper results imply that in case there are constraints in regards to the choice of invitation mode, which require the researcher to invite panelists by e-mail, they should preferably be invited to a stationary web survey like in expgr_2 instead of a mobile web survey as in expgr_1 (H3: $OR=2.194$, $p=.000***$). All the same, in case there are constraints regarding the survey mode which require the researcher to conduct a stationary web survey, it is best to invite panelists by e-mail like in expgr_2 instead of SMS as in expgr_4 (H8: $OR=2.611$, $p=.000***$). Consequently, in both cases it is suggested to conduct a stationary web survey to which panelists will be invited by e-mail similar to expgr_2 .

A first naive examination⁵¹⁴ suggested that e-mail invitations ($PARR_e=32.4\%$) lead to higher participation in web surveys than SMS invitations ($PARR_s=25.7\%$) (H2: $OR=1.447$, $p=.000***$). Moreover, it is suggested that offering stationary web surveys ($PARR_{st}=31.3\%$) to panelists leads to higher participation than mobile web surveys ($PARR_{mo}=26.7\%$) (H1: $OR=1.230$, $p=.001***$). However, this is not always the case as these results do not provide an answer to everything as they overlook joint effects of survey and invitation modes. For instance, in case there is a constraint that invitations to web surveys have to be sent out by SMS choosing a mobile web survey, like in expgr_3 , instead of a stationary web survey, as in

⁵¹⁰ Q.v. Section 6.2.3.2.2, model #3.

⁵¹¹ $OR=1/.383$.

⁵¹² $OR=1/.589$.

⁵¹³ $OR=1/.456$.

⁵¹⁴ Q.v. Section 6.2.3.2.1, model #1.

expgr_4 , maximizes response rates (H6: $\text{OR}=1.538$, $p=.000^{***}$)⁵¹⁵. All the same, in case constraints require a mobile web survey to be conducted it is the best in terms of participation to invite subjects by SMS, like in expgr_3 instead of e-mail, as in expgr_1 (H7: $\text{OR}=1.293$, $p=.006^{***}$)⁵¹⁶. Hence, in both cases it is suggested to conduct a mobile web survey to which panelists will be invited by SMS, similar to expgr_3 . However, at the end of the day, inviting panelists to a mobile web survey by SMS will still not lead to higher participation than inviting them to a stationary web survey by e-mail like in expgr_2 (H4: $\text{OR}=.589$, $p=.000^{***}$)⁵¹⁷.

Finally, for the sake of completeness, in case researchers – for whatever reasons – face a decision on a similar problem, it should be mentioned at this point that results of this study also indicated that mobile web surveys to which participants were invited by e-mail, like in expgr_1 , lead to weekly significantly higher participation than stationary web surveys to which they have been invited by SMS, as in expgr_4 (H5: $\text{OR}=1.1190$, $p=.076^*$)⁵¹⁸.

The following Table 7-1 gives an overview of the results of all hypotheses which were tested in the course of the evaluation of this study.

⁵¹⁵ Q.v. Section 6.2.3.2.2, model #4, $\text{OR}=1/.650$.

⁵¹⁶ $1/\text{OR}=.773$. Hypothesis H7 had been rejected, because it suggested that there is no difference between participation in expgr_1 and expgr_3 .

⁵¹⁷ Q.v. Section 6.2.3.2.2, model #3.

⁵¹⁸ Q.v. Section 6.2.3.2.2, model #2, $\text{OR}=1/.841$.

Table 7-1: Evaluation Results Research Guiding Hypotheses Regarding Main Effects

<i>hypothesis</i>	<i>wording</i>	<i>result</i>
H1:	<i>The probability of participation of panelists invited to stationary web surveys ($mode_{sur}=1$) is higher in comparison to the probability of participation of panelists invited to mobile web surveys ($mode_{sur}=0$).</i>	not rejected ($\alpha=.01$)
H2:	<i>The probability of participation of panelists invited by e-mail ($mode_{inv}=0$) is higher in comparison to the probability of participation of panelists invited by SMS ($mode_{inv}=1$).</i>	not rejected ($\alpha=.01$)
H3:	<i>The probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) is higher in comparison to the probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_1$).</i>	not rejected ($\alpha=.01$)
H4:	<i>The probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) is higher in comparison to the probability of participation of panelists invited to mobile web surveys by SMS ($expgr_3$).</i>	not rejected ($\alpha=.01$)
H5:	<i>The probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_1$) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$).</i>	not rejected ($\alpha=.10$)
H6:	<i>The probability of participation of panelists invited to mobile web surveys by SMS ($expgr_3$) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$).</i>	not rejected ($\alpha=.01$)
H7:	<i>The probability of participation of panelists invited to mobile web surveys by SMS ($expgr_1$) does not differ from the probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_3$).</i>	rejected ($\alpha=.10$)
H8:	<i>The probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) is higher in comparison to the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$).</i>	not rejected ($\alpha=.01$)

Besides the main effects tested, several covariates showed significant impact on participation throughout models #2 to #5. Most importantly, small effects (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) were detected for three variables. At this, both gender ($OR=.570$; $p=.000^{***}$) and source ($OR=.625$; $p=.000^{***}$) showed small size negative impact on participation. Here, the odds of women participating were smaller than for men. Similarly, panelists recruited from e-mail distribution lists of universities were less likely to participate than panelists recruited from other sources. In contrast, the intention to participate in stationary web

surveys (pp_s) showed a small (*Id.*) positive effect on the odds of overall participation ($OR=1.485$; $p=.000^{***}$).

Likewise, the intention to participate in mobile web surveys (pp_m) raised the odds of overall participation, however, only by an effect trivial in size ($OR=1.256$; $p=.000^{***}$) (*Id.*). All the same, the effect of the involvement in the survey topic ($OR=1.055$; $p=.011^{**}$) on participation was significantly positive but trivial. Oddly, for the immediacy of perception of e-mails received on stationary or mobile devices ($OR=1.098$; $p\leq .000^{***}$) and the immediacy of perception of SMS received on mobile device ($OR=.830$; $p=.000^{***}$) two effects in the opposite direction have been estimated. At this, participation is higher for panelists who perceive newly incoming e-mails more immediate than others, but it decreases for those who perceive newly incoming SMS more immediate. This counterintuitive result will have to be further examined in subsequent studies. The estimation for the variable age ($OR=.862$; $p=.031^{**}$) showed a trivial (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) significant, negative effect, which indicated that the odds of participation decrease for panelists older than 24 years. Once again, at this point it should be mentioned that regarding outcome rates in survey research even small effects may have a substantial impact on the costs of a survey project⁵¹⁹.

At the same time, no significant effects were found for the frequency of internet usage on a PC or laptop as well as the frequency of e-mail usage on a smartphone or mobile phone. In addition, the frequency of e-mail usage on PCs and laptops, involvement in the incentive offered, and the frequency of internet usage on a smartphone or mobile phone were insignificant across all models tested. An overview of the results regarding all covariates estimated may be found in previous Table 6-5.

In addition to the prior evaluation of research guiding hypotheses by means of Multiple Binary Logistic Regression Analysis several variables of secondary focus of research were analyzed by means of univariate testing without prior hypothesizing and in depth literature review. All of this would have gone beyond the scope of the study. However, these “byproducts” of this research still may serve as important insights for other researchers. Therefore, it is important to publish them here.

First, data quality was analyzed by means of item omission, uninformed response error, the length of answers given to open questions, as well as content analysis⁵²⁰. At this, no signifi-

⁵¹⁹ Q.v. Section 4.7.

⁵²⁰ Q.v. Section 6.3.1.

cant differences between invitation and survey modes as well as different experimental groups were found for the variables item omission and uninformed response error. This confirms previous results of Mavletova (2013, p. 738), McClain, Crawford and Dugan (2012, p. 3), and Zahariev et al. (2009, p. 10). However, the prior results are opposed to findings by Wells, Bailey, Link (2013b, p. 15). They claimed that participants, who self-selected the survey mode in which they wanted to participate in, left 10.7% unanswered items in stationary web surveys and 7.8% in mobile web surveys. All the same, McGeeney and Marlar (2013, p. 30) found higher item nonresponse in stationary compared to mobile web surveys. These results, however, were not confirmed in this study.

Moreover, it has been discovered that stationary web surveys show highly significant as well as significant advantages over mobile web surveys regarding the length of answers given ($d=.184$; $p=.001^{***}$), as well as the number of themes ($d=.151$; $p=.006^{***}$) and elaborations ($d=.141$; $p=.011^{**}$) mentioned by panelists in open end questions. However, these effects were only trivial in size (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192). In addition, all comparisons of experimental groups conducted in this regard confirmed the upper result. In this in depth analysis some small size effects (*Id.*) were found, e.g. in the comparison of themes between expgr_1 and expgr_4 ($d=-.213$; $p=.011^{**}$), as well as expgr_3 and expgr_4 ($d=-.223$; $p=.006^{***}$).

In summary, these results hint towards the finding that stationary web surveys are superior to mobile web surveys regarding some facets of data quality, e.g. in open end questions. However, as some of the results lack statistical power it is recommended to repeat this analysis with a larger size sample. This result is opposed to those of Zahariev et al. (2009, p. 10), who found no significant difference between the length of answers to open end questions in stationary and mobile web surveys (44 vs. 42 characters). However, other authors claim that mobile participants in their study were highly accustomed with their mobile devices (Wells, Bailey and Link 2013c, p. 3). This result is in contrast to the findings of Mavletova (2013, p. 737), who found that significantly more characters were typed into open end questions in the stationary than in the mobile mode (85 vs. 55 characters). Finally, no evidence was found that data quality might differ regarding different invitation modes.

Additionally, the comparison of response time between stationary and mobile web surveys yielded further advantage for the stationary mode ($d=-.540$; $p=.000^{*}$). Obviously, respondents in this mode answered faster than those surveyed in the mobile mode. Again, this result was completely supported by the comparison of different experimental groups in which high-

ly significant effects in favor of stationary web surveys were unveiled for all pairs compared. At this, all effects were of small or medium effect size (*Id.*) and showed high statistical power. Hence, it is ensured to claim that it takes panelists less time to complete a stationary in comparison to a mobile web survey. This result is in line with previous research in this area. Several authors found that completion of mobile surveys requires more time compared with stationary web surveys. For instance, Saunders et al. (2012, *p.* 17) found out in their study that the actual time panelists required to complete a survey (2.60 vs. 3.77 minutes) and the time perceived they needed to complete a survey (5.31 vs. 5.74 minutes) was significantly longer in mobile compared to stationary web surveys. De Bruijne and Wijnant (2013, *p.* 491) found similar results of highly significant difference between computers and mobile devices regarding subjective survey length measured on a 7-point-scale (3.76 vs. 4.19) and objective survey length (338.77 vs. 542.29 seconds). Similarly, subjects of Zahariev et al. (2009, *p.* 13) needed 2 minutes to complete a stationary in comparison to 6 minutes for a mobile web survey. In a study by Wells, Bailey, Link (2013b, *p.* 15) participants that self-selected in which survey mode they wanted to participate, needed significantly longer to complete a mobile (8.9 minutes) in comparison to a stationary web survey (5.3 minutes). Moreover, Mavletova (2013, *p.* 731) claimed that it took panelists 5.28 minutes to complete a short version of a stationary and 15.46 to complete a similar mobile web survey. All the same, it took 9.66 minutes to finish the long version in the stationary and 29.46 minutes in the mobile web survey mode. At this, she claimed that both differences were significant. Moreover, she suggested that disadvantage of the mobile mode may stem from the speed of internet connection, small screens, keyboards and touchscreens, as well as the higher probability to encounter distraction while being on the go.

Similar results – but with a different algebraic sign and, hence, with an effect in the opposite direction – were found for the variable response speed. Here, panelists that were invited to a stationary web survey reacted slower on the invitational contact than their mobile counterparts ($d=.119$; $p=.033^{**}$). Although, regarding survey mode, most comparisons across different experimental groups were significant and confirmed upper finding, only one comparison lacked significance. Unfortunately, all of these comparisons lacked statistical power. Hence, these findings indicate that response speed is likely higher in mobile than in stationary web surveys. Nevertheless, the tests conducted in the course of this study should be repeated with a larger sample size in order to improve validity of this result. The latter is in keeping with

previous findings regarding response speed (*Tarkus 2009, p. 155; Thunig 2009, pp. 22-3*) which claimed that the mobile mode is superior regarding response speed.

On the contrary, only mixed evidence was found for the case that response times were compared between panelists who were invited to web surveys either by SMS or e-mail. At this, a first comparison among all panelists suggest that there is a significant but trivial difference between the two groups ($d = -.140$; $p = .013^{**}$) in favor of those invited by e-mail. This first impression, however, cannot be backed by comparisons of different experimental groups which were invited either by SMS or e-mail. Moreover, there is no significant evidence that SMS and e-mail invitations induce participation at different response speed.

Regarding the panelists' willingness to participate again in a subsequent study by a different researcher, it is suggested that participants who previously completed the stationary web survey are more frequently willing to participate again, than those who participated in a mobile web survey ($\omega = .157$; $p = .004^{***}$)⁵²¹. This difference was highly significant and of a small effect size (*Cohen 1988, pp. 224-7*). Moreover, all experimental groups for which the same test has been conducted showed the similar significant or highly significant result, with the exception of one comparison for which the test was insignificant. At this, participants in *expgr₄* showed the highest and in *expgr₃* the lowest willingness to participate again in another study. Hence, it is acceptable to claim that the experience of participating in a stationary web survey in this study generated a higher willingness to participate again in a web survey when compared to participation in a mobile web survey.

Finally, of 608 independent sample t-tests conducted, only five (0.82%) showed a significant difference ($p < .05$) of at least a small effect size (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) and acceptable statistical power between the mean values measured in different survey and invitation modes or experimental groups. Moreover, none of the 96 tests conducted with 12 different constructs measured, showed significant differences in the same regard. Consequently, it is assumed that in general differences in the impact of survey and invitation modes on the values measured may occur. However, this impact is rather small in effect size (*Id.*) and very rare. Moreover, it is so seldom that it "dissolves" in case constructs are formed out of several variables and compared across different modes.

⁵²¹ $\omega = .1$ (small effect), $\omega = .3$ (medium effect), $\omega = .5$ (large effect) (*Cohen 1988, pp. 224-7*).

7.2 Limitations

There are several limitations to the study presented in this doctoral dissertation: First, there are limitations regarding the recruitment method as well as the sample used, in particular, that it is not probability based. Panelists in this study were recruited from different sources. At this, most panelists have been contacted by means of mailing lists of different universities and other university-level institutions in Germany, Austria, and Switzerland (89.1%)⁵²². In addition, some were also recruited from other sources – printed invitation letters, e-mail recommendations, or social networks, just to name a few. In order to control the impact of the diversity of recruitment sources on participation a corresponding variable was entered into the evaluation model⁵²³. However, with this high diversity of recruitment paths, it is not known how many panelists were actually reached by or got in touch with the diverse efforts or recruitment stimuli. Consequently, the actual population underlying this sample is unquantifiable. As a consequence, the probability with which a panelist will enter the panel from the main population is also unknown to the researcher⁵²⁴. Likely, this probability will also differ regarding the source of recruitment considered.

Although it has previously been attempted to overcome this shortcoming by recruiting a large sample from a known population this attempt failed due to external factors. Here, the researcher delegated a “professional” company to deliver 100,000 printed invitational mailings – spatially inclusive and comprehensive (“blanket coverage”) – among all households in Aachen, a German town in the federated state of North-Rhine Westphalia with 248,137 inhabitants (*Aachen 2012, p. 1*). In case such recruitment, solely by means of postal delivery, had succeeded it would have boasted representativity and provided a probability based sample for this study. However, the hired organization failed to deliver the invitations as arranged by contract. In vast contrast to prior pretests conducted by the researcher and associated student research assistants, in which a registration rate of 7.1% had been obtained, a registration rate of only .206% has been obtained with the external mail delivery service provider. Therefore, in adversity, other alternative recruitment paths, as e.g. mailing lists and social networks, had to be chosen, which in turn did not foster probability based sampling.

⁵²² Q.v. Section 4.6.

⁵²³ Q.v. Section 6.2.2.

⁵²⁴ In particular, universities were largely reluctant to provide the number of people contacted via their e-mail distribution lists.

Due to the fact that the vast majority of panelists have been recruited from e-mail distribution lists of universities the sample may largely be regarded as a student sample. It has been frequently warned in literature to solely rely on such samples, for instance because they show a reduced external validity due to their “*unrepresentative nature*” (Maniaci and Rogge 2014, p. 444). Most importantly panelists in this sample were younger ($\mu=24.90$; $\sigma=5.298$) than the average German citizen (43.9 years old) (Statistisches Bundesamt 2014). However, other sources argue that student samples are particularly suited for research on internet related issues as students are similar to the “average” internet user (Bauer, Fischer and Sauer 2000, p. 1144; Bauer, Mäder and Fischer 2003, p. 235). Therefore, evaluating the results of this study, one should keep in mind that the results are derived from a student source. Replications and subsequent studies, however, should rather be conducted with representative probability based samples and confirmed across different cultural settings.

Subjects recruited for the panel received both an SMS and e-mail pre-notification before the study⁵²⁵. This has been done in order to test whether panelists entered existing mobile phone numbers and e-mail addresses into the recruitment form and in order to eliminate non-existent numbers. However, it was not tested whether the number and e-mail address entered were actually their personal number or just some random, occasionally existent number entered by the panelists. In case the researcher sends an invitational SMS or e-mail to these phone numbers and addresses their holders may receive the message but still not participate in the survey because they did not sign up for the study in first place. An additional test of phone number and e-mail address ownership could have been conducted by sending an activation link to the newly registered panelists. In order to prevent mode effects, however, it is not sufficient to send this link by (inexpensive) e-mails only. It is rather required also to send an SMS which entails additional costs for the researcher just as well. Moreover, introducing such a complicated procedure would have likely reduced the number of valid registrations and, hence, further increased recruitment costs. As these costs of recruitment would have overrun this studies’ budget, it was chosen to renounce this procedure. Therefore, in case the subjects’ probability of entering a wrong phone number is higher than entering a wrong e-mail address and going unnoticed, there is a risk that the participation rates obtained in this study may be biased.

Second, there are several limitations regarding the setting and procedure of the experiment conducted in this study. For instance, SMS and e-mail pre-notifications and invitations sent to

⁵²⁵ Q.v. Section 4.5.2.

panelists in all four experimental groups contained a text of similar length. At this, critical readers may argue that it is unusual for e-mails to consist of as little words as SMS. Therefore, the participation rates obtained in the experimental groups pre-notified and invited by e-mail may not be the maximum rates obtainable. On one hand it may be argued that further optimization of the invitational e-mails, for instance inclusion of further motivational elements which will require more available text space, would have led to even higher response rates in experimental groups invited by e-mail in this study. On the contrary, it is held out against the prior, that parallelization across different experimental groups requires sending out survey contacts which are similar in length, if that is possible. Consequently, the researcher will always face a trade of between preferring either a realistic experimental setting with texts of different length, or the parallelization of experimental groups with text of the same length. In this study, however, the researcher previously revealed in a pretest that the participation rates of panelists contacted by e-mails of short length were higher than those contacted by SMS⁵²⁶. Therefore, it has been assumed that the experiment may be conducted with invitational texts of similar length across modes. This procedure ensures the parallelization of experimental groups in this study.

Furthermore, it is another limitation of this study that tablet computers constitute a logical flaw in the dyad of devices used within the experimental manipulation of the survey mode factor⁵²⁷. Tablets take an intermediate spot between mobiles and stationary devices. For instance, they may easily be used “on the road” just like smartphones and are powered by similar operating systems. In fact, they look very similar to smartphones. On the contrary, they are larger than most regular smartphones – some are even of the size of a regular laptop, just thinner. Additionally, some bestselling tablets, as the Apple iPad for instance, prohibit SMS functions. Therefore, it is unrewarding to treat them as mobile devices and include tablets in the mobile experimental groups like other researchers did before (*De Bruijne and Wijnant 2013, p. 487*). Moreover, as own estimations show only 12.12% of the relevant population accessed the internet with a tablet at the time of recruitment while 55.3% used smartphones and almost 100% a PC or laptop. This would have exacerbated the effort of recruiting an adequate sample size suitable for multivariate testing. Hence, it has been decided to exclude tablet devices from this study by means of a php-mobile-detect-script (*Google 2012*)⁵²⁸. Nevertheless, the growing importance of tablet devices is non-neglectable. Recent reports suggest

⁵²⁶ Q.v. Section 4.4.

⁵²⁷ Q.v. Section 4.5.1.

⁵²⁸ Id.

that the share of tablets has already grown to 19% among online users in the German population (*Van Eimeren 2013, p. 387*). Therefore, future studies will have to show whether findings derived regarding mobile devices as smartphones – such as those found in this study – are also applicable to tablets.

In addition, for reasons of complexity reduction, it has “gone by the board” that e-mails may also be accessed on devices other than PCs, laptops, smartphones or other mobile phones only. According to the recent annual Online Study jointly conducted by ARD and ZDF (2013), none of these other devices were (at least rarely) used by more than 12% of online users in the population in order to access the internet⁵²⁹. Moreover, not all users who used these devices to access the internet used them to read their e-mails. Therefore, it is redundant to acknowledge these devices by forming additional experimental groups because they are regarded as least important internet or e-mail access options. However, not including them as possible options of receiving an e-mail may also have biased the immediacy of perception and ease of access variables in this study for some panelists who actually prefer reading their e-mails on these devices. For the calculation of these variables the frequencies of usage of e-mailing services on different devices were used to weight the ease of access of the corresponding access paths⁵³⁰. Not including these weights, however, biases the calculated ease with which an e-mail may be accessed, disregarding the device it may be received on. The same holds true for immediacy of perception. Consequently, estimations conducted in the course of the study may be biased by these variables.

Furthermore, besides lacking to comprise experimental groups which only consist of users of devices which were rarely used, for reasons of complexity reduction, there was also no group included in this study in which panelists may freely – without any provisions by the researcher – choose the mode in which they want to access the web survey. Millar and Dillman (2012, p. 4) have shown that offering a choice will cause significantly higher outcome rates than offering standalone stationary and mobile web surveys. All the same, there is no experimental group included in this study in which all panelists received both an invitational SMS and e-mail from the researcher at the same time. All of this would have overly magnified the amount of experimental groups and, hence, the sample size necessary to conduct multivariate hypotheses testing.

⁵²⁹ Television sets 12%, video game console 9%, iPod/mp3-players, others 5%.

⁵³⁰ Q.v. Sections 4.5.3.2.3 and 4.5.3.2.4.

Moreover, it has to be mentioned at this point that despite severe precautionary measures in order to prohibit access to a web survey designated for one type of device by different devices, such access can never be completely excluded. For instance, it cannot be prohibited that after logging into the questionnaire on a mobile device the URL address line shown in the mobile browser is transferred to the browser of a stationary device. By completing the survey on a device not designated to do so, the variables of secondary interest⁵³¹ investigated in this study might be biased. It has been tried to remove the URL address line in the browser by using HTML inlineframes (so called iframes) or JAVA script. However, both would have caused a distorted display of the web survey questionnaire on the small screens of mobile devices. Therefore, it has been chosen to detect this type of “cheating” participants by controlling for the user agent string of their devices⁵³². Nevertheless, also user agent strings may be simulated by software, e.g. by means of a browser add-on (*Pederick 2011*). However, it is assumed that the vast majority of participants in this study lack necessary computer knowledge as well as motivation to make every effort to counter the researcher’s instructions to answer on a particular device.

Further, the EFS Mobile Extension add-on to EFS Survey software, caused minor issues with the display of different types of scales. In particular, the add-on which dynamically switches the output format of the survey, e.g. to HTML, XHTML-MP, WML, dependent on the browser used by the participant (*QuestBack 2012, p. 76*), caused that similar scales looked differently, even when displayed on the same page of one device. It has been warned by several authors that different display of scales on mobile devices will influence participants’ behavior and may cause a variation in survey results (*Peytchev and Hill 2010, pp. 325-9; Saunders et al. 2012, p. 22*). However, other authors have found no such influence (*de Bruijne and Wijnant 2013, p. 489; Mavletova 2013, p. 735*). Nonetheless, influence of this kind cannot be completely excluded.

Third, there are also some limitations regarding the measurement and operationalization of variables in this study. For instance, there is a time gap of about 4½ months between both recruitment activities and the preliminary study conducted, which started June 10th, and the main study which started October 30th, 2012. In this time span some values of psychological variables measured in the preliminary study might already have changed. In particular, involvement in the survey topic of headphones and the tablet used as incentive may change be-

⁵³¹ Q.v. Section 4.5.3.1.2.

⁵³² Q.v. Section 4.3.1.

cause of an immediately imminent or long bygone purchase of such devices (*Steffenhagen 1996, p. 32*). Similar, the frequency of device usage will likely change over time (*Van Eimeren 2013; Van Eimeren and Frees 2013; Müller 2013*). In this case it might be argued that the measurement conducted was not valid anymore. However, profile surveys as the one conducted in the preliminary study are common in the market research industry. Moreover, frequent repetitions of such profile surveys are likely to have a negative impact on panel attrition, which is the “percentage of members who drop out of the panel in a defined time period” (*Callegaro and DiSogra 2008, p. 1024*). Here attrition may increase due to the “oversurveying” of some panel members (*Groves et al. 2009, p. 198*)⁵³³. Moreover, conducting another survey would have made panelists even more experienced in one mode and also could have biased the results. Therefore, it was decided not to repeat the profile survey and accept that data measured might be biased by changes over time to an unknown extent.

Moreover, in the course of this study single-item-measures have been used to operationalize several variables, as e.g. the frequency of internet and e-mail usage on mobile and stationary devices or the anticipated ease of accessing web surveys⁵³⁴. *Bergkvist and Rossiter (2007, p. 176)* are prominent proponents of single-item-measures and introduce several practical and theoretical arguments advocating for them. The authors claim that replacing multi-item- by single-item-measures has the practical advantage of reducing the length of a survey and, hence, maximizing outcome rates by minimizing break-offs. As a consequence, the costs of data collection and processing decrease. They theoretically underpin their demand with the C-OAR-SE procedure for scale development (*Rossiter 2002*) which requires constructs to be “doubly concrete” (*Bergkvist and Rossiter 2007, p. 176*) in order to be suitable for measurement by single-item-scales. This means that the construct as well as the attribute of the construct have to be concrete. That implies they both can be “easily and uniformly imagined” (*Bergkvist and Rossiter 2007, p. 176*) by the rater. As these requirements certainly hold true for the frequency of internet and e-mail usage as well as the anticipated ease of accessing web surveys it is appropriate to operationalize these constructs as single-item-measures in this study. However, at this point it should not be concealed that recently the appropriateness of single-item-measures has been challenged again. A simulation study by *Diamantopoulos et al. (2012)* showed that the predictive validity of single-item-measures may fluctuate across different research contexts, e.g. constructs, product categories, or stimuli. Therefore, the authors

⁵³³ Q.v. Section 3.3.3.

⁵³⁴ Variable Categories A, B, and G.

warn to rely on single-item-measurement and recommend using multi-item-measurement with at least four items instead (*Diamantopoulos et al. 2012*)⁵³⁵.

Fourth, there are further limitations regarding the preparation of experimental data. For instance, all metric data had to be rounded to the nearest integer in order to be able to analyze variables' values, which previously showed decimal places that were generated by means of the Expectation Maximization Algorithm (*Bailey 1994, pp. 387-9*)⁵³⁶, in cross tabs. Moreover, the variables "age" and "source of recruitment", which have been identified as the cause of large numbers of null cells, were transliterated into dummy variables in order to heal the violation of the requirement of no complete separation⁵³⁷. This may be regarded as a severe loss of information present in data and, hence, bias. Despite collapsing of these two variables further null cells remained present in data. That is because it was impracticable and tied to further severe loss of information to collapse these variables measured on 7-point-rating-scales (*Bailey 1994, pp. 387-9*). Nevertheless, the Multiple Binary Logistic Regression Analysis conducted without collapsing led to no unusually large standard errors of regression coefficients. Therefore, the Maximum Likelihood Estimation is assumed to be non-problematic, converging, and error-free.

Fifth and finally, there are also limitations regarding the evaluation of data. Most importantly, it may be criticized that a Multiple Binary Logistic Regression has been chosen instead of a Multinomial Logistic Regression Analysis⁵³⁸ as evaluation method. At this, it may be argued that – besides "participation" and "non-participation" – there are further relevant categories of the dependent variable present in data and therefore would have required a more sophisticated, multinomial analytical treatment. Especially break offs and partial responses should be regarded as separate categories and not as non-response. However, both of these potential categories individually occurred with a frequency of 3.7% of cases only. Consequently, the methodological requirement of value distribution of the dependent variable⁵³⁹ which demands that every category of the dependent variable is chosen by at least 10% of panelists would be severely violated. It is suggested in literature that in this case Maximum Likelihood Estimation would not converge and lead to biased, implausible valuations (*Urban and Mayerl 2011, p. 349*). For this reason it has been preferred to conduct the evaluation by means of a Multiple Binary Logistic Regression Analysis instead.

⁵³⁵ However, the field phase of this study had already been conducted by the time this paper was published.

⁵³⁶ Q.v. Section 4.3.2.

⁵³⁷ Id.

⁵³⁸ Q.v. Section 6.1.1.

⁵³⁹ Q.v. Section 6.1.3.1.

Finally, it may be argued that the Multiple Comparison Problem (*e.g. Westfall, Tobias, Wolfinger 2011*) has been widely overlooked in the analysis of data in this study. In a nutshell, this problem states that under the assumption that two variables are unrelated and show no difference in their mean – that is the null hypothesis holds true indeed – there is still a chance by the amount of the rate of type I error α , that the null hypothesis is wrongly rejected by marking the relationship between the variables as statistically significant and thereby accepting the alternative hypothesis. Furthermore, in case n relationships between several unrelated variables were studied, for all of which the null hypothesis holds true indeed (“universal null hypothesis”), the probability that at least one of these relations will be wrongly marked as statistically significant amounts to $1 - (1 - \alpha)^n$. Overall, however, correct null hypotheses will still be rejected at an arbitrary level of α , *e.g. 5%* (*Rothman 1990, p. 42*).

Nevertheless, with a large number of hypotheses tested the absolute number of wrongly not rejected null hypotheses will increase (*Id., p. 43*). Therefore, in order to cope with this problem it has been frequently suggested (*e.g. Bannerman-Thompson, Rao and Chakraborty 2012, p. 201*) to apply diverse adjustment procedures for multiple comparisons – *e.g. Bonferroni correction (Dunn 1961)*, Holm–Bonferroni method (*Holm 1979*), Šidák correction (*Šidák 1967*), or the false discovery rate (*Benjamini and Hochberg 1995*). Most of these procedures raise the p -value so that fewer relationships become statistically significant. At this, the p -value is the probability under the assumption of the null hypothesis that a difference between two variables will be found in data which is due to sampling only (*Feise 2002, p. 2; Rothman 1990, p. 44*). Despite the large amount of available correction procedures, there is no method which established itself as best practice yet (*Feise 2002, p. 2*).

In contrast to supporters of aforementioned adjustment procedures, Rothman (*1990, pp. 43-6*) claims that such corrections are not only not necessary but also detrimental. On one hand, he argues that all such adjustments require the premise of the “universal null hypothesis” that there are no true differences in any pair of variables researched except measurable differences which are due to random variation (*e.g. sampling error*) (*Feise 2002, p. 2*). This premise, however, is unsustainable because it implies that all variation in data is only caused randomly – by chance – and, hence, it is unobservable as it does not follow natural or psychological laws. This, however, would make empirical research redundant as it “*contradicts everything we know*” (*Rothman, p. 45*). On the other hand, he argues that there is no truly “random” but only unpredictable variation in data which is so far unexplainable to researchers. He constitutes that at the end of a day the outcome of every individual coin toss and the throwing of a

dice underlie certain laws of physics and not pure randomness. In turn, advancing theoretical knowledge can further reduce this variation in data and make it more predictable in the future. By labeling them *ex ante* as random, however, the purpose of science is further undermined as the scientist is reluctant to provide new theories that might explain these phenomena (*Id.*, p. 46).

In addition, he claims that by applying adjustments to the Multiple Comparisons Problem scientists punish themselves with a “penalty for peeking”. This is due to the fact that all of these corrections increase p-values with a rise of *n*. Consequently, it becomes harder to find significances the more tests are conducted. Moreover, it is paradox that a relationship between two variables, which have been marked as significant at the beginning, may become insignificant in the further course of the study simply because more and more similar tests were conducted (*Id.*, p. 46). Feise (2002, p. 2) even further ridicules this concept by claiming that regarding one research field the number of tests conducted by several different researchers should be summed up in order to calculate the adjusted p-value and updated every time after a new paper has been published. Finally, applying such correction procedures reduces type I error but instead increases the probability of type II error β , which is the rate at which the researcher is failing to reject the wrong null hypothesis (Feise 2002, p. 2; Rothman 1990, p. 44). Consequently, sample sizes have to be increased in order to reduce β error, and with it also study costs will increase⁵⁴⁰. Thus, healing one problem causes a new one.

Therefore, in accordance with the reflections of Rothman (1990, pp. 44-6) and Feise (2002, pp. 1-4), no corrections were applied regarding the Multiple Comparisons Problem in this study. Instead all tests conducted by the researcher were presented and all individual p-values, effect sizes, type I, and type II errors were computed and openly reported to the interested reader.

⁵⁴⁰ Q.v. Section 4.7.

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Annex I: Layout of Paper Invitations



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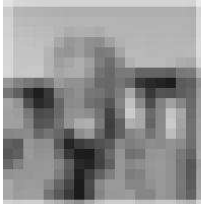
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Anonymized illustration.

Annex II: English Translation of Paper Invitations

German Paper Invitation	English Translation
<u>Betreff:</u> <i>Unterstützen Sie unsere Forschung und gewinnen Sie ein iPad3!</i> Sehr geehrte Damen und Herren, ich möchte Sie als Teilnehmer für unsere MOBIstudie gewinnen. Das ist eine hochinteressante, rein wissenschaftliche, nicht kommerzielle Studie, die zwei meiner Mitarbeiter im Rahmen ihrer Doktorarbeiten durchführen. Mit Ihrer Teilnahme unterstützen Sie das Promotionsvorhaben von zwei jungen, engagierten Nachwuchswissenschaftlern und die Forschung an unserer Hochschule! Wenn Sie an der MOBIstudie teilnehmen, werden wir Sie im Sommer 2012 online nach Ihrer Meinung zu einem Ihnen zuvor übermittelten Bild befragen. Diese Befragung erfolgt <u>einmalig und freiwillig</u> - entweder über das Internet an Ihrem PC oder über das mobile Internet auf Ihrem Handy. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Wir werden Sie zu Befragungszwecken jedoch <u>niemals anrufen</u>. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse.	<u>Subject:</u> <i>Support our research and win an iPad3!</i> Dear Sir or Madam, I would like to gain you over to participate in our MOBIstudie. It is a most interesting, purely scientific, non-commercial study, which is conducted by two of my research assistants within the scope of their doctoral theses. By your participation you will support the PhD project of two young, dedicated, talented scientists, as well as the research at our university! In case you will participate in the MOBIstudie, we are going to query you online about your opinion regarding a previously transmitted image in the summer of 2012. This survey is conducted <u>one time only, voluntarily</u> - either on the internet on your PC or the mobile internet on your mobile phone. You will receive an invitation containing a link via e-mail or SMS just in time. However, we will <u>never call you</u> for the purpose of surveying. Furthermore, you will receive insight into the results of the study after it ended.

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Sincerely yours,
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Annex III: English Translation of Invitational E-Mail for Students

German Invitational E-Mail sent to Students	English Translation
<u>Betreff:</u> Unterstützen Sie meine Doktorarbeit und gewinnen Sie ein iPad3! Liebe Studentinnen, liebe Studenten der ###, ich möchte Sie als Teilnehmer für meine MOBIstudie gewinnen. Das ist eine 5- bis 10-minütige Online-Studie, die ich im Rahmen meiner Doktorarbeit an der RWTH Aachen durchführe. Die Studie ist rein wissenschaftlich, nicht kommerziell und beschäftigt sich – soviel sei vorab verraten – mit dem Thema „Unterhaltungselektronik“ und dem Internet. Für die Studie suche ich insbesondere nach Menschen, die das Internet auf Ihrem Handy bzw. Smartphone nutzen – das ist aber keine Voraussetzung um teilnehmen zu können. Wenn Sie an der MOBIstudie teilnehmen, werden Sie in Kürze online nach Ihrer Meinung zu einem Ihnen zuvor übermittelten Bild befragt. Diese Befragung erfolgt <u>einmalig und freiwillig</u> - entweder über das Internet an Ihrem PC oder über das mobile Internet auf Ihrem Handy. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Ich werde Sie zu Befragungszwecken jedoch <u>niemals anrufen</u> und Ihre Daten auch <u>nicht an Dritte weitergeben</u>. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse und Ihre persönlichen Daten werden gelöscht.	<u>Subject:</u> Support my doctoral thesis and win an iPad3! Dear students of ###, I would like to gain you over to participate in my MOBIstudie. It is a five-to-ten-minute long online study, which I am currently conducting within the scope of my doctoral thesis at RWTH Aachen University. The study is purely scientific, non-commercial, and deals – this much I may reveal in advance – with the topic of “consumer electronics” and the internet. I am particularly looking for people, who use the internet on their mobile phone or smartphone to participate in the study – however, this is no prerequisite to participation. In case you will participate in the MOBIstudie, you are going to be queried online within a short time about your opinion regarding a previously transmitted image. This survey is conducted <u>one time only, voluntarily</u> - either on the internet on your PC or the mobile internet on your mobile phone. You will receive an invitation containing a link via e-mail or SMS just in time. However, I will <u>never call you</u> for the purpose of surveying and <u>never hand on your data to third parties</u>. Furthermore, you will receive insight into the results of the study and your personal data will be deleted after it ended.

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Mit freundlichen Grüßen
Daniel Dziewiecki

Your registration for the **MOBIstudie** takes just a few minutes. As a “little thank-you” I am going to raffle an **Apple iPad3** and other material prizes among all participants. Register for the **MOBIstudie** now, by following the subsequent link in your web browser:

<http://www.MOBISTudie.de/>

I will will gladly provide further details about our **MOBIstudie** (by e-mail ##@###.rwth-aachen.de and via call number 0241-80 #####). I would like to thank you for supporting my doctoral thesis in advance. I am looking forward to your participation!

Sincerely yours,
Daniel Dziewiecki

Annex IV: English Translation of Invitational E-Mails for Former Participants

German Invitational E-Mails for Former Participants	English Translation
<u>Betreff:</u> Unterstützen Sie die Forschung an der RWTH Aachen und gewinnen Sie ein iPad3! Sehr geehrte Damen und Herren, Sie haben im Sommer 2011 an der Studie von Frau ### bzw. an der Studie von Herrn ### teilgenommen und Interesse an der Teilnahme an weiteren Studien des Lehrstuhls für Marketing (RWTH Aachen) bekundet. Daher möchte ich Sie heute als Teilnehmer für unsere MOBIstudie gewinnen. Das ist eine hochinteressante, rein wissenschaftliche, nicht kommerzielle Studie, die zwei meiner Mitarbeiter im Rahmen ihrer Doktorarbeiten durchführen. Mit Ihrer Teilnahme unterstützen Sie das Promotionsvorhaben von zwei jungen, engagierten Nachwuchswissenschaftlern und die Forschung an unserer Hochschule! Wenn Sie an der MOBIstudie teilnehmen, werden wir Sie im Sommer 2012 online nach Ihrer Meinung zu einem Ihnen zuvor übermittelten Bild befragen. Diese Befragung erfolgt <u>einmalig und freiwillig</u> - entweder über das Internet an Ihrem PC oder über das mobile Internet auf Ihrem Handy. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Wir werden Sie zu Befragungszwecken jedoch <u>niemals anrufen</u>. Nach Beendigung der Studie erhalten Sie online Ein-	<u>Subject:</u> Support research at RWTH Aachen University and win an iPad3! Dear Sir or Madam, You participated in the study of Mrs. ### respectively Mr. ### and indicated interest in participating in further studies conducted by the Chair of Marketing (RWTH Aachen). Therefore, I would like to gain you over to participate in our MOBIstudie today. It is a most interesting, purely scientific, non-commercial study, which is conducted by two of my research assistants within the scope of their doctoral theses. By your participation you will support the PhD project of two young, dedicated, talented scientists, as well as the research at our university! In case you will participate in the MOBIstudie, we are going to query you online about your opinion regarding a previously transmitted image in the summer of 2012. This survey is conducted <u>one time only, voluntarily</u> - either on the internet on your PC or the mobile internet on your mobile phone. You will receive an invitation containing a link via e-mail or SMS just in time. However, we will <u>never call you</u> for the purpose of surveying. Furthermore, you will receive insight into the results of the study after

blick in die Forschungsergebnisse.

Ihre Anmeldung zur **MOBIstudie** dauert nicht länger als 2-3 Minuten. Wir benötigen dabei einzig Ihre E-Mail-Adresse, Handynummer, Alter und Geschlecht. Nach Ihrem Namen oder der Anschrift fragen wir nicht. Ihre Anmeldung ist unverbindlich, kostenfrei und kann jederzeit widerrufen werden. Die Anmeldedaten werden stets vertraulich behandelt und ausschließlich zu Forschungszwecken verwendet. Nur meine Mitarbeiter und ich haben darauf Zugriff. Die erhobenen Studiendaten werden nicht personenbezogen gespeichert. Nach der Studie werden Ihre persönlichen Daten gelöscht. Als „kleines Dankeschön“ für Ihre Anmeldung verlosen wir ein **Apple iPad3** und weitere Sachpreise.

Melden Sie sich jetzt zur **MOBIstudie** an, indem Sie den nachfolgenden Link in Ihrem Webbrowser öffnen:

<http://www.MOBIstudie.de/>

Weitere Auskünfte zu unserer **MOBIstudie** erteilen Ihnen gerne meine Mitarbeiter (per E-Mail ##@###.rwth-aachen.de und unter der Rufnummer 0241-80 #####). Im Voraus danke ich Ihnen herzlich für Ihre Unterstützung meiner Doktoranden und freue mich auf Ihre Teilnahme!

Mit freundlichen Grüßen,
Univ.-Prof. Dr. Hartwig Steffenhagen

it ended.

Your registration for the **MOBIstudie** takes no longer than 2-3 minutes. At this, we will only need your e-mail address, your mobile phone number, age and gender. We will not ask you for your name or postal address. Your registration is nonbinding, cost-free, and may be cancelled at any time. Your credentials are always treated as confidential and are exclusively used for scientific purposes. Only my assistants and I are granted access to it. The gathered survey data will not be saved specifically regarding individuals. After the study is finished your personal data will be deleted. As a “little thank-you” for your registration we are going to raffle an **Apple iPad3** and other material prizes.

Register for the **MOBIstudie** now, by following the subsequent link in your web browser:

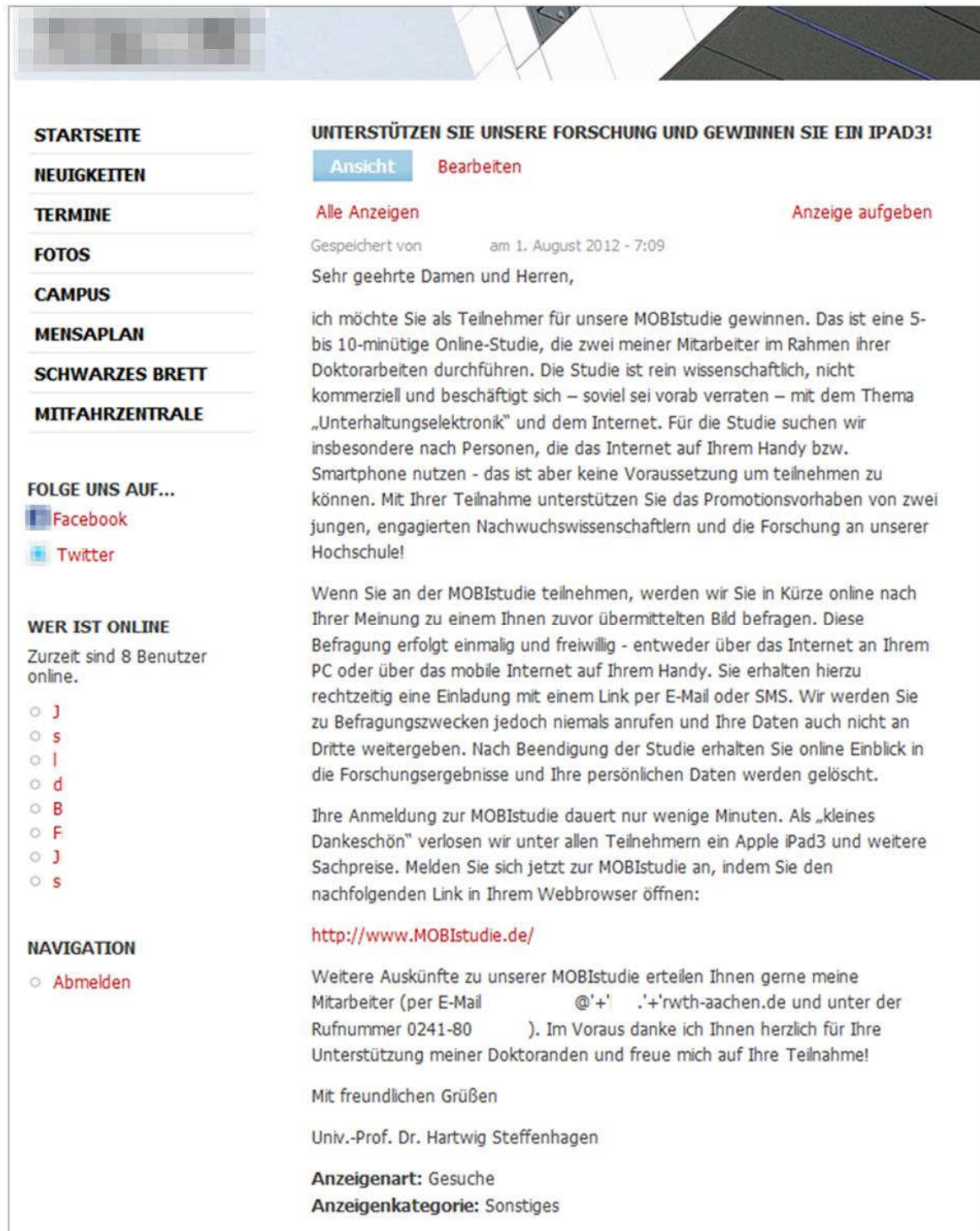
<http://www.MOBIstudie.de/>

My assistants will gladly provide further details about our **MOBIstudie** (by e-mail ##@###.rwth-aachen.de and via call number 0241-80 #####).

I would like to thank you for supporting my doctoral students in advance. I am looking forward to your participation!

Sincerely yours,
Univ.-Prof. Dr. Hartwig Steffenhagen

Annex V: Screenshot of Invitations in Online Forums



STARTSEITE
NEUIGKEITEN
TERMINE
FOTOS
CAMPUS
MENSAPLAN
SCHWARZES BRETT
MITFAHRZENTRALE

FOLGE UNS AUF...
 Facebook
 Twitter

WER IST ONLINE
 Zurzeit sind 8 Benutzer online.
 ○ J
 ○ s
 ○ l
 ○ d
 ○ B
 ○ F
 ○ J
 ○ s

NAVIGATION
 ○ Abmelden

UNTERSTÜTZEN SIE UNSERE FORSCHUNG UND GEWINNEN SIE EIN IPAD3!
 Ansicht Bearbeiten

Alle Anzeigen Anzeige aufgeben

Gespeichert von am 1. August 2012 - 7:09

Sehr geehrte Damen und Herren,

ich möchte Sie als Teilnehmer für unsere MOBISTUDIE gewinnen. Das ist eine 5- bis 10-minütige Online-Studie, die zwei meiner Mitarbeiter im Rahmen ihrer Doktorarbeiten durchführen. Die Studie ist rein wissenschaftlich, nicht kommerziell und beschäftigt sich – soviel sei vorab verraten – mit dem Thema „Unterhaltungselektronik“ und dem Internet. Für die Studie suchen wir insbesondere nach Personen, die das Internet auf Ihrem Handy bzw. Smartphone nutzen - das ist aber keine Voraussetzung um teilnehmen zu können. Mit Ihrer Teilnahme unterstützen Sie das Promotionsvorhaben von zwei jungen, engagierten Nachwuchswissenschaftlern und die Forschung an unserer Hochschule!

Wenn Sie an der MOBISTUDIE teilnehmen, werden wir Sie in Kürze online nach Ihrer Meinung zu einem Ihnen zuvor übermittelten Bild befragen. Diese Befragung erfolgt einmalig und freiwillig - entweder über das Internet an Ihrem PC oder über das mobile Internet auf Ihrem Handy. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Wir werden Sie zu Befragungszwecken jedoch niemals anrufen und Ihre Daten auch nicht an Dritte weitergeben. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse und Ihre persönlichen Daten werden gelöscht.

Ihre Anmeldung zur MOBISTUDIE dauert nur wenige Minuten. Als „kleines Dankeschön“ verlosen wir unter allen Teilnehmern ein Apple iPad3 und weitere Sachpreise. Melden Sie sich jetzt zur MOBISTUDIE an, indem Sie den nachfolgenden Link in Ihrem Webbrowser öffnen:

<http://www.MOBISTUDIE.de/>

Weitere Auskünfte zu unserer MOBISTUDIE erteilen Ihnen gerne meine Mitarbeiter (per E-Mail @'+ ' '+rwth-aachen.de und unter der Rufnummer 0241-80). Im Voraus danke ich Ihnen herzlich für Ihre Unterstützung meiner Doktoranden und freue mich auf Ihre Teilnahme!

Mit freundlichen Grüßen

Univ.-Prof. Dr. Hartwig Steffenhagen

Anzeigenart: Gesuche
Anzeigenkategorie: Sonstiges

Anonymized illustration.

Annex VI: English Translation of Invitations in Online Forums

German Invitations in Online Forums	English Translation
<u>Betreff:</u> UNTERSTÜTZEN SIE UNSERE FORSCHUNG UND GEWINNEN SIE EIN IPAD3! Sehr geehrte Damen und Herren, ich möchte Sie als Teilnehmer für unsere MOBIstudie gewinnen. Das ist eine 5- bis 10-minütige Online-Studie, die zwei meiner Mitarbeiter im Rahmen ihrer Doktorarbeiten durchführen. Die Studie ist rein wissenschaftlich, nicht kommerziell und beschäftigt sich – soviel sei vorab verraten – mit dem Thema „Unterhaltungselektronik“ und dem Internet. Für die Studie suchen wir insbesondere nach Personen, die das Internet auf Ihrem Handy bzw. Smartphone nutzen – das ist aber keine Voraussetzung um teilnehmen zu können. Mit Ihrer Teilnahme unterstützen Sie das Promotionsvorhaben von zwei jungen, engagierten Nachwuchswissenschaftlern und die Forschung an unserer Hochschule! Wenn Sie an der MOBIstudie teilnehmen, werden wir Sie im Sommer 2012 online nach Ihrer Meinung zu einem Ihnen zuvor übermittelten Bild befragen. Diese Befragung erfolgt einmalig und freiwillig - entweder über das Internet an Ihrem PC oder über das mobile Internet auf Ihrem Handy. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Wir werden Sie zu Befragungszwecken jedoch niemals anrufen und Ihre	<u>Subject:</u> SUPPORT OUR RESEARCH AND WIN AN IPAD3! Dear Sir or Madam, I would like to gain you over to participate in our MOBIstudie. It is a five-to-ten-minute long online study, which is conducted by two of my research assistants within the scope of their doctoral theses. The study is purely scientific, non-commercial, and deals – this much I may reveal in advance – with the topic of “consumer electronics” and the internet. We are particularly looking for people, who use the internet on their mobile phone or smartphone to participate in the study – however, this is no prerequisite to participation. By participating you are supporting the PhD project of two young, dedicated, talented scientists, as well as the research at our university! In case you will participate in the MOBIstudie, we are going to query you online about your opinion regarding a previously transmitted image in the summer of 2012. This survey is conducted one time only, voluntarily - either on the internet on your PC or the mobile internet on your mobile phone. You will receive an invitation containing a link via e-mail or SMS just in time. However, we will never call you for the purpose of surveying and never hand on your

Daten auch nicht an Dritte weitergeben. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse und Ihre persönlichen Daten werden gelöscht.

Ihre Anmeldung zur MOBISTUDIE dauert nicht länger als 10 Minuten. Als „kleines Dankeschön“ verlosen wir ein Apple iPad3 und weitere Sachpreise. Melden Sie sich jetzt zur MOBISTUDIE an, indem Sie den nachfolgenden Link in Ihrem Webbrowser öffnen:
<http://www.MOBISTUDIE.de/>

Weitere Auskünfte zu unserer MOBISTUDIE erteilen Ihnen gerne meine Mitarbeiter (per E-Mail #####@'+####.'+rwth-aachen.de und unter der Rufnummer 0241-80 #####). Im Voraus danke ich Ihnen herzlich für Ihre Unterstützung meiner Doktoranden und freue mich auf Ihre Teilnahme!

Mit freundlichen Grüßen
Univ.-Prof. Dr. Hartwig Steffenhagen

data to third parties.

Furthermore, you will receive insight into the results of the study and your personal data will be deleted after it ended.

Your registration for the MOBISTUDIE takes just a few minutes. As a “little thank-you” we are going to raffle an Apple iPad3 and other material prizes among all participants. Register for the MOBISTUDIE now, by following the subsequent link in your web browser:
<http://www.MOBISTUDIE.de/>

My assistants will gladly provide further details about our MOBISTUDIE (by e-mail #####@rwth-aachen.de and via call number 0241-80 #####). I would like to thank you for supporting my doctoral students in advance. I am looking forward to your participation!

Sincerely yours,
Univ.-Prof. Dr. Hartwig Steffenhagen

Annex VII: Screenshot of Facebook Advertisements



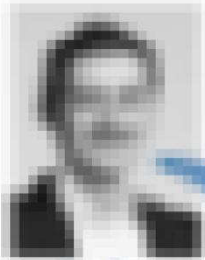
Anonymized illustration.

Annex VIII: English Translation of Facebook Advertisements

German Facebook Advertisement	English Translation
Unterstütze meine Forschung und gewinne ein iPad3!	Support my research and win an iPad3!
Melde Dich jetzt zur MOBIstudie an: http://www.MOBIstudie.de	Sign up for the MOBIstudie now: http://www.MOBIstudie.de
Bitte hilf mir bei meiner Doktorarbeit: Teile das folgende Bild mit Deinen Freunden auf Facebook und melde Dich zu meiner Studie an! http://www.MOBIstudie.de	Please help me with my doctoral thesis: Share the following image with your friends on facebook and sign up for my study! http://www.MOBIstudie.de

Annex IX: Layout of Poster Advertisements

Für die MOBIstudie, eine 5- bis 10-minütige Online-Studie im Rahmen meiner Doktorarbeit, suche ich insbesondere nach Menschen, die das Internet auf dem Handy bzw. Smartphone verwenden – das ist aber keine Voraussetzung um teilnehmen zu können.



**Unterstützen Sie
meine Forschung
und gewinnen Sie
ein iPad3!**

*Dipl.-Kfm.
Daniel Dziewiecki*

Nehmen Sie an meiner MOBIstudie teil:
<http://www.MOBIstudie.de/>






LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS



Anonymized illustration.

Annex X: English Translation of Poster Advertisements

German Poster Advertisement	English Translation
Für die MOBIstudie, eine 5- bis 10-minütige Online-Studie im Rahmen meiner Doktorarbeit, suche ich insbesondere nach Menschen, die das Internet auf dem Handy bzw. Smartphone verwenden.	For the MOBIstudie, a five-to-ten-minute long online study, which I am conducting in the course of my doctoral thesis, I am particularly looking for people, who use the internet on their mobile phone or smartphone.
Unterstützen Sie meine Forschung und gewinnen Sie ein iPad3!	Support my research and win an iPad3!
Nehmen Sie an meiner MOBIstudie teil: http://www.MOBIstudie.de	Participate in my MOBIstudie: http://www.MOBIstudie.de

Annex XI: Layout and English Translation of Flyer Advertisements



Anonymized illustration.

German Flyer Advertisement	English Translation
Unterstütze meine Forschung und gewinne ein iPad3!	Support my research and win an iPad3!
Melde Dich jetzt zur MOBistudie an: http://www.MOBistudie.de	Sign up for the MOBistudie, now: http://www.MOBistudie.de

Annex XII: Comparison of Different Types of Invitations

	<i>Paper Invitation</i>	<i>E-Mail Former Participants</i>	<i>Entry into Online Forum</i>	<i>E-Mail to Students</i>	<i>E-Mail Recommendation</i>
invitation form	printed letter	e-mail	website	e-mail	e-mail
salutatory address	sir or madam	sir or madam	sir or madam	students of university	hello
specialty	no	address of former participants	no	no	name and e-mail address of person recommending
sender	supervisor	supervisor	supervisor	researcher	researcher
clue on date of study	summer 2012	summer 2012	summer 2012	within short time	within short time
clue on duration of registration	2-3 minutes	2-3 minutes	ca. 10 minutes	few minutes	few minutes
clue on length of study	no	no	5-10 minutes	5-10 minutes	5-10 minutes
clue that data will not be handed over to 3rd parties	no	no	yes	yes	yes
clue on target group	no	no	yes	yes	yes

	<i>Paper Invitation</i>	<i>E-Mail Former Participants</i>	<i>Entry into Online Forum</i>	<i>E-Mail to Students</i>	<i>E-Mail Recommendation</i>
clue on topic	no	no	yes	yes	yes
clue on incentive provided (tablet PC)	yes	yes	yes	yes	yes
clue on scientific, non-commercial character of study	yes	yes	yes	yes	yes
researchers contact data provided	yes	yes	yes	yes	yes
explanation of study procedure	yes	yes	yes	yes	yes
explanation of data protection regulations	yes	yes	yes	yes	yes
clue on promised results	yes	yes	yes	yes	yes
highlighting of important text elements	yes	yes	no	yes	yes

Annex XIII: Translation of Recruitment Website and Questionnaire

German Recruitment Website and Questionnaire	English Translation
Sehr geehrte Damen und Herren, vielen Dank für Ihr Interesse an der MOBIstudie! Das ist eine hochinteressante, rein wissenschaftliche, nicht kommerzielle Studie, die zwei meiner Mitarbeiter im Rahmen ihrer Doktorarbeiten durchführen. Mit Ihrer Teilnahme unterstützen Sie das Promotionsvorhaben von zwei jungen, engagierten Nachwuchswissenschaftlern und die Forschung an unserer Hochschule! Wenn Sie an der MOBIstudie teilnehmen, werden wir Sie in Kürze online nach Ihrer Meinung zu einem Ihnen zuvor übermittelten Bild befragen. Diese Befragung erfolgt <u>einmalig</u> - entweder über das Internet an Ihrem PC oder das mobile Internet auf Ihrem Handy. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Wir werden Sie zu Befragungszwecken jedoch <u>niemals anrufen</u> und Ihre Daten auch <u>nicht</u> an Dritte <u>weitergeben</u>. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse und Ihre persönlichen Daten werden wieder gelöscht. Als „kleines Dankeschön“ für Ihre Anmeldung <u>verlosen wir ein Apple iPad3</u> und weitere Sachpreise.	Dear Sir or Madam, thank you for your interest in the MOBIstudie! It is a most interesting, purely scientific, non-commercial study, which is conducted by two of my research assistants within the scope of their doctoral theses. By your participation you will support the PhD project of two young, dedicated, talented scientists, as well as the research at our university! In case you will participate in the MOBIstudie, we are going to query you online about your opinion regarding a previously transmitted image. This survey is conducted <u>one time only</u> - either on the internet on your PC or the mobile internet on your mobile phone. You will receive an invitation containing a link via e-mail or SMS just in time. However, we will <u>never call you</u> for the purpose of surveying and <u>never hand on your data to third parties</u>. Furthermore, you will receive insight into the results of the study and your personal data will be deleted after it ended. As a “little thank-you” for your registration <u>we are going to raffle an Apple iPad3</u> and other material prizes.

Melden Sie sich jetzt zur **MOBIstudie** an, indem Sie die nachfolgende Eingabemaske vollständig ausfüllen.

Mit freundlichen Grüßen,
Univ.-Prof. Dr. (em.) Hartwig Steffenhagen

Anmeldung zur **MOBIstudie**:

Geschlecht: _____

Alter: _____

E-Mail-Adresse: _____

Handynummer: _____

(*) Hinweis: Wir führen **keine Telefoninterviews** durch und werden Sie zu Befragungszwecken **niemals anrufen!** Sie werden von uns lediglich eine E-Mail oder SMS, z.B. mit einem Link zu einer Online-Befragung für das stationäre Internet am PC oder das mobile Internet an Ihrem Handy, erhalten.

Falls Sie mehrere Handys besitzen, geben Sie bitte die Nummer des Handys an, mit dem Sie **am häufigsten E-Mails von der von Ihnen angegebenen E-Mail-Adresse abrufen.**

Klicken Sie jetzt auf "**Weiter**", wenn Sie an der **MOBIstudie** teilnehmen wollen und unsere Hinweise zur Teilnahme und zum Datenschutz akzeptieren. Mit etwas Glück können Sie ein Apple iPad 3 gewinnen.

Register for the MOBIstudie now, by **entirely completing the following form.**

Sincerely yours,
Univ.-Prof. Dr. (em.) Hartwig Steffenhagen

Registration for the **MOBIstudie**:

Gender: _____

Age: _____

E-mail-address: _____

Mobile phone number: _____

(*) Please note: We **do not conduct phone** interviews and will **never call you** for the purpose of surveying! You will solely receive an e-mail or SMS, e.g. containing a link to a web survey conducted on the stationary internet on your PC or the mobile internet on your mobile phone.

In case you own more than one mobile phone, please specify the number of the telephone, which **you use most frequently to access your e-mails from the e-mail address you have stated.**

Please click "continue" now, if you want to participate in the **MOBIstudie** and accept our participation and data protection regulations. With a bit of luck you can win an Apple iPad3.

Annex XIV: Screenshot of Recruitment Website and Questionnaire



Sehr geehrte Damen und Herren,

vielen Dank für Ihr Interesse an der **MOBISstudie**! Das ist eine hochinteressante, rein wissenschaftliche, nicht kommerzielle Studie, die zwei meiner Mitarbeiter im Rahmen des Anmeldeverfahrens möchten wir Sie bitten einige zusätzliche Fragen zu Ihren Internet-Nutzungsgewohnheiten zu beantworten. Dies dauert ungefähr 5 Minuten.

Wenn Sie an der **MOBISstudie** teilnehmen, werden wir Sie in Kürze online nach Ihrer Teilnahme eingeladen. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Wir werden Sie zu Befragungszwecken jedoch **niemals** anrufen und Ihre Daten auch nicht an Dritte weitergeben. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse und Ihre persönlichen Daten werden wieder gelöscht.

Als „kleines Dankeschön“ für Ihre Anmeldung verlosen wir ein Apple iPad3 und weitere Sachpreise.



Melden Sie sich jetzt zur **MOBISstudie** an, indem Sie die **nachfolgende Eingabemaske vollständig ausfüllen**.

Mit freundlichen Grüßen,
Univ.-Prof. Dr. (em.) Hartwig Steffenhagen

Anmeldung zur MOBISstudie:

Geschlecht:

☐ Männlich ☐ Weiblich

Alter:

E-Mail-Adresse:

Handynummer: (*)

(*) Hinweis: Wir führen **keine Telefoninterviews** durch und werden Sie zu Befragungszwecken **niemals anrufen**! Sie werden stattdessen zu Befragungen zu einem Link zu einer Online-Befragung für das stationäre Internet am PC oder das mobile Internet an Ihrem Handy, erhalten.

Falls Sie mehrere Handys besitzen, geben Sie bitte die Nummer des Handys an, mit dem Sie **am häufigsten E-Mails von der von Ihnen angegebenen E-Mail-Adresse abrufen**.

Klicken Sie jetzt auf **„Weiter“**, wenn Sie an der **MOBISstudie** teilnehmen wollen und unsere Hinweise zur Teilnahme und zum Datenschutz akzeptieren. Mit etwas Glück können Sie ein Apple iPad 3 gewinnen.

Weiter



Vielen Dank für Ihre erfolgreiche Anmeldung für die **MOBISstudie**. Wir freuen uns über Ihre Teilnahme!

Als „Dankeschön“ für Ihre Anmeldung verlosen wir ein original Apple iPad 3. Der Gewinner wird nach Abschluss der Registrierungsphase per E-Mail von uns benachrichtigt.

Im Rahmen des Anmeldeverfahrens möchten wir Sie bitten einige zusätzliche Fragen zu Ihren Internet-Nutzungsgewohnheiten zu beantworten. Dies dauert ungefähr 5 Minuten.

Im Durchschnitt gesehen, wie häufig an einem Tag nutzen Sie das Internet auf den nachfolgenden Gerätetypen?

Bitte klicken Sie die zutreffenden Antworten an (1 = ganztägig; 7 = nie).

	ganztägig 1	2	3	4	5	6	nie 7	weiß nicht
auf einem PC/Laptop	☐	☐	☐	☐	☐	☐	☐	☐
auf einem Handy/Smartphone	☐	☐	☐	☐	☐	☐	☐	☐

Im Durchschnitt gesehen, wie häufig an einem Tag lesen Sie E-Mails auf den nachfolgenden Geräten?

Bitte klicken Sie die zutreffenden Antworten an (1 = ganztägig; 7 = nie).

	ganztägig 1	2	3	4	5	6	nie 7	weiß nicht
auf einem PC/Laptop	☐	☐	☐	☐	☐	☐	☐	☐
auf einem Handy/Smartphone	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Anonymized Illustration.

Annex XVI: Screenshot of Preliminary Questionnaire Page 2

RWTH AACHEN UNIVERSITY
LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

Inwieweit stimmen Sie den folgenden Aussagen über das Internet auf einem PC/Laptop zu?
Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu).

	1	2	3	4	5	6	7
	stimme voll und ganz zu						stimme ganz und gar nicht zu
Mit einem PC/Laptop fällt es leicht Bilder und Texte in Internet zu betrachten.	☐	☐	☐	☐	☐	☐	☐
Es ist preisgünstig das Internet auf dem PC/Laptop zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Das Internet auf dem PC/Laptop lässt sich ohne Verbindungsstörungen nutzen.	☐	☐	☐	☐	☐	☐	☐
Mit einem PC/Laptop kann man einfach auf Internetseiten navigieren .	☐	☐	☐	☐	☐	☐	☐
Bei der Nutzung des Internets auf einem PC/Laptop ist man anonym .	☐	☐	☐	☐	☐	☐	☐
Es ist einfach kurze Texte über die Tastatur eines PCs/Laptops einzugeben.	☐	☐	☐	☐	☐	☐	☐
In vielen privaten Situationen ist das Internet auf einem PC/Laptop sehr nützlich.	☐	☐	☐	☐	☐	☐	☐
Es macht Spaß das Internet auf einem PC/Laptop zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Es ist sicher das Internet auf dem PC/Laptop zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Das Internet auf dem PC/Laptop ist schnell .	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XVII: Screenshot of Preliminary Questionnaire Page 3

RWTH AACHEN UNIVERSITY
LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

Inwieweit stimmen Sie den folgenden Aussagen über das Internet auf einem PC/Laptop zu?
Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu).

	1	2	3	4	5	6	7
	stimme voll und ganz zu						stimme ganz und gar nicht zu
Mit dem PC/Laptop kann man auch Internetzeitschriften leicht auf das Internet zugreifen.	☐	☐	☐	☐	☐	☐	☐
Die Nutzung des Internets auf dem PC/Laptop ist etwas sehr Persönliches .	☐	☐	☐	☐	☐	☐	☐
Ich bin anderen Menschen , die das Internet auf einem PC/Laptop nutzen, sehr ähnlich .	☐	☐	☐	☐	☐	☐	☐
Es ist teuer das Internet auf dem PC/Laptop zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Das Internet auf dem PC/Laptop ist langsam .	☐	☐	☐	☐	☐	☐	☐
In vielen beruflichen Situationen ist das Internet auf einem PC/Laptop sehr nützlich.	☐	☐	☐	☐	☐	☐	☐
Mit dem PC/Laptop kann man auch ganz spontan auf das Internet zugreifen.	☐	☐	☐	☐	☐	☐	☐
Die meisten Menschen, deren Meinung ich schätze, würden das Internet auf einem PC/Laptop nutzen.	☐	☐	☐	☐	☐	☐	☐
Die Nutzung des Internets auf dem PC/Laptop bietet mir große Vorteile (gegenüber der Nichtnutzung).	☐	☐	☐	☐	☐	☐	☐
Bei der Nutzung des Internets auf dem PC/Laptop muss ich große Nachteile (gegenüber der Nichtnutzung) in Kauf nehmen.	☐	☐	☐	☐	☐	☐	☐
Insgesamt betrachtet bietet mir die Nutzung des Internet auf einem PC/Laptop mehr Vorteile als Nachteile .	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XXI: Screenshot of Preliminary Questionnaire Page 7

RWTH AACHEN
UNIVERSITY

LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

Wie häufig nutzen Sie auf Ihrem Handy/Smartphone mit der Rufnummer  die folgenden Funktionen, die Sie auf eine neu eingetretene SMS aufmerksam machen sollen?

Bitte klicken Sie die zutreffenden Antworten an (1=immer; 7=nie).

	1	2	3	4	5	6	7	weiß nicht
immer							nie	
Benachrichtigungssymbol/-text (z.B. ein Benachrichtigungssymbol wird angezeigt)	☐	☐	☐	☐	☐	☐	☐	☐
Benachrichtigungston	☐	☐	☐	☐	☐	☐	☐	☐
Vibrationsalarm	☐	☐	☐	☐	☐	☐	☐	☐
Lichteffect (z.B. das Leuchten/Blinken einer LED)	☐	☐	☐	☐	☐	☐	☐	☐

Wie häufig nutzen Sie auf Ihrem Handy/Smartphone mit der Rufnummer  die folgenden Funktionen, die Sie auf eine neu eingetretene E-Mail aufmerksam machen sollen?

Bitte klicken Sie die zutreffenden Antworten an (1=immer; 7=nie).

	1	2	3	4	5	6	7	weiß nicht
immer							nie	
Benachrichtigungssymbol/-text (z.B. ein Benachrichtigungssymbol wird angezeigt)	☐	☐	☐	☐	☐	☐	☐	☐
Benachrichtigungston	☐	☐	☐	☐	☐	☐	☐	☐
Vibrationsalarm	☐	☐	☐	☐	☐	☐	☐	☐
Lichteffect (z.B. das Leuchten, Blinken einer LED)	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Anonymized illustration.

Annex XXIV: Screenshot of Preliminary Questionnaire Page 10



Dies sind die letzten Fragen im Rahmen des Anmeldeverfahrens.

Inwieweit stimmen Sie den folgenden Aussagen über die Produktkategorien **Tablet-Computer** (wie z.B. das Apple iPad) und **Audio-Kopfhörer** (die z.B. zum Musikhören verwendet werden) zu?

Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu);

	7						
	1	2	3	4	5	6	7
	stimme voll und ganz zu						stimme ganz und gar nicht zu
Tablet-Computer sind mir sehr wichtig.	☐	☐	☐	☐	☐	☐	☐
Audio-Kopfhörer sind mir sehr wichtig.	☐	☐	☐	☐	☐	☐	☐
Tablet-Computer bedeuten mir viel.	☐	☐	☐	☐	☐	☐	☐
Audio-Kopfhörer bedeuten mir viel.	☐	☐	☐	☐	☐	☐	☐
Ich interessiere mich sehr für Tablet-Computer .	☐	☐	☐	☐	☐	☐	☐
Ich interessiere mich sehr für Audio-Kopfhörer .	☐	☐	☐	☐	☐	☐	☐
Es langweilt mich, wenn andere über Tablet-Computer reden.	☐	☐	☐	☐	☐	☐	☐
Es langweilt mich, wenn andere über Audio-Kopfhörer reden.	☐	☐	☐	☐	☐	☐	☐
Tablet-Computer sind für mich sehr relevant.	☐	☐	☐	☐	☐	☐	☐
Audio-Kopfhörer sind für mich sehr relevant.	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XXV: Translation of Preliminary Questionnaire

variable category	page #	category description	German question	English translation	source of question	variable label
A	1	frequency of internet usage	Im Durchschnitt gesehen, wie häufig an einem Tag nutzen Sie das Internet auf den nachfolgenden Gerätetypen? <i>Bitte klicken Sie die zutreffenden Antworten an</i> (1 = <i>ganztägig</i> ; 7 = <i>nie</i>).	On average, how often per day do you use the internet on one of the following devices? <i>Please click on the correct answer (1 = all-day; 7 = never).</i>		iu
A1		▪ on a PC/laptop	auf einem PC/Laptop	on a PC/laptop		iu _p
A2		▪ on a mobile phone/smartphone	auf einem Handy /Smartphone	on a mobile phone /smartphone		iu _m

variable category	page #	category description	German question	English translation	source of question	variable label
B	1	frequency of e-mail usage	Im Durchschnitt gesehen, <u>wie häufig</u> an einem Tag lesen Sie <u>E-Mails</u> auf den nachfolgenden Geräten? <i>Bitte klicken Sie die zutreffenden Antworten an (1 = ganz häufig; 7 = nie).</i>	On average, <u>how often</u> per day do you read your e-mails on one of the following devices? <i>Please click on the correct answer (1 = all-day; 7 = never).</i>		eu
B1		▪ on a PC/laptop	auf einem PC/Laptop	on a PC/laptop	custom	eu _p
B2		▪ on a mobile phone/smartphone	auf einem Handy /Smartphone	on a mobile phone /smartphone	custom	eu _m

variable category	page #	category description	German question	English translation	source of question	variable label
C1	2 and 3 or 4 and 5	level of agreement to statements on the benefits and costs of internet usage on a PC/laptop	Inwieweit stimmen Sie den folgenden Aussagen über das Internet auf einem PC/Laptop zu? <i>Bitte klicken Sie die zutreffenden Antworten an (1= stimme voll und ganz zu; 7= stimme ganz und gar nicht zu).</i>	To what extent do you agree to the following statements about the internet on a PC/laptop ? <i>Please click on the correct answer (1= completely agree; 7= completely disagree).</i>	custom	bc _p
C1	2 or 4	<i>see above</i>	Es ist preisgünstig das Internet auf dem PC/Laptop zu nutzen.	It is cheap to use the internet on a PC/laptop .	personal & expert interviews	bc _{p1}
C1	2 or 4	<i>see above</i>	Das Internet auf dem PC/Laptop ist schnell .	The internet on a PC/laptop is fast .	personal & expert interviews	bc _{p2}
C1	2 or 4	<i>see above</i>	Es ist sicher das Internet auf dem PC/Laptop zu nutzen.	It is safe to use the internet on a PC/laptop .	personal & expert interviews	bc _{p3}
C1	2 or 4	<i>see above</i>	Bei der Nutzung des Internets auf einem PC/Laptop ist man anonym .	Using the internet on a PC/laptop one remains anonymous .	personal & expert interviews	bc _{p4}
C1	2 or 4	<i>see above</i>	Es ist einfach kurze Texte über die Tastatur/den Touch-screen eines PC/Laptop einzugeben.	It is simple to input short texts by means of a key-board/touchscreen of a PC/laptop .	personal & expert interviews	bc _{p5}
C1	2 or 4	<i>see above</i>	Mit einem PC/Laptop kann man einfach auf Internetseiten navigieren .	One can easily navigate on internet pages with a PC/laptop .	personal & expert interviews	bc _{p6}
C1	2 or 4	<i>see above</i>	Mit einem PC/Laptop fällt es leicht Bilder und Texte im Internet zu betrachten .	It is simple to view images and texts on the internet with a PC/laptop .	personal & expert interviews	bc _{p7}
C1	2 or 4	<i>see above</i>	Es macht Spaß das Internet auf einem PC/Laptop zu nutzen.	It is fun to use the internet on a PC/laptop .	personal & expert interviews	bc _{p8}

C1	2 or 4	<i>see above</i>	Das Internet auf dem PC/Laptop lässt sich ohne Verbindungsstörungen nutzen.	One can use the internet on a PC/laptop without connection failures .	personal & expert interviews	bC _{p9}
C1	2 or 4	<i>see above</i>	In vielen privaten Situa-tionen ist das Internet auf einem PC/Laptop sehr nützlich.	The internet on a PC/laptop is useful in many private situa-tions .	expert interviews	bC _{p10}
C1	3 or 5	<i>see above</i>	Die meisten Menschen, deren Meinung ich schätze , würden das Internet auf einem PC/Laptop nutzen.	Most people, whose opinion I value , would use the internet on a PC/laptop .	Bosnjak, Metzger and Gräf 2011; Bosnjak, Tuten and Wittmann 2005	bC _{p11}
C1	3 or 5	<i>see above</i>	Ich bin anderen Menschen , die das Internet auf einem PC/Laptop nutzen, sehr ähnlich .	I am very similar to other people who use the internet on a PC/laptop .	Bosnjak, Metzger and Gräf 2011; Bosnjak, Tuten and Wittmann 2005	bC _{p12}
C1	3 or 5	<i>see above</i>	Mit dem PC/Laptop kann man auch ganz spontan auf das Internet zugreifen .	One can spontaneously access the internet on a PC/laptop .	expert interviews	bC _{p13}
C1	3 or 5	<i>see above</i>	Mit dem PC/Laptop kann man auch unterwegs leicht auf das Internet zugreifen .	One can easily access the internet on the move with a PC/laptop .	expert interviews	bC _{p14}
C1	3 or 5	<i>see above</i>	Die Nutzung des Internets auf dem PC/Laptop ist etwas sehr Persönliches .	Using the internet on a PC/laptop is something very personal .	expert interviews	bC _{p15}
C1	3 or 5	<i>see above</i>	In vielen beruflichen Situationen ist das Internet auf einem PC/Laptop sehr nützlich.	The internet on a PC/laptop is useful in many work-related situations .	expert interviews	bC _{p16}
C1	3 or 5	<i>see above</i>	Das Internet auf dem PC/Laptop ist langsam .	The Internet on a PC/laptop is slow .	personal & expert interviews	bC _{p17}
C1	2 or 4	<i>see above</i>	Es ist teuer das Internet auf dem PC/Laptop zu nutzen.	It is expensive to use the internet on a PC/laptop .	personal & expert interviews	bC _{p18}

C1	3 or 5	<i>see above</i>	Die Nutzung des Internets auf dem PC/Laptop bietet mir große Vorteile (gegenüber der Nichtnutzung).	Using the internet on a PC/laptop offers great advantages (compared to not using it).	custom	bC _{p19}
C1	3 or 5	<i>see above</i>	Bei der Nutzung des Internets auf dem PC/Laptop muss ich große Nachteile (gegenüber der Nichtnutzung) in Kauf nehmen.	One has to accept great disadvantages using the internet on a PC/laptop (compared to not using it).	custom	bC _{p20}
C1	3 or 5	<i>see above</i>	Insgesamt betrachtet bietet mir die Nutzung des Internets auf einem PC/Laptop größere Vorteile als Nachteile.	Taken as a whole, using the internet on a PC/laptop has greater advantages than disadvantages .	custom	bC _{p21}
C2	2 and 3 or 4 and 5	level of agreement to statements on the benefits and costs of internet usage on a mobile phone /smartphone	Inwieweit stimmen Sie den folgenden Aussagen über das Internet auf einem Handy /Smartphone zu? <i>Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu).</i>	To what extent do you agree to the following statements about the internet on a mobile phone /smartphone? <i>Please click on the correct answer (1 = completely agree; 7 = completely disagree).</i>	custom	bC _m
C2	2 or 4	<i>see above</i>	Es ist preisgünstig das Internet auf dem Handy/ Smartphone zu nutzen.	It is cheap to use the internet on a mobile phone /smartphone .	personal & expert interviews	bC _{m1}
C2	2 or 4	<i>see above</i>	Das Internet auf dem Handy/ Smartphone ist schnell .	The internet on a mobile phone/smartphone is fast .	personal & expert interviews	bC _{m2}
C2	2 or 4	<i>see above</i>	Es ist sicher das Internet auf dem Handy/Smartphone zu nutzen.	It is safe to use the internet on a mobile phone/smartphone .	personal & expert interviews	bC _{m3}
C2	2 or 4	<i>see above</i>	Bei der Nutzung des Internets auf einem Handy/Smartphone ist man anonym .	Using the internet on a mobile phone/smartphone one remains anonymous .	personal & expert interviews	bC _{m4}

C2	2 or 4	<i>see above</i>	Es ist einfach kurze Texte über die Tastatur/den Touch-screen eines Handys/Smartphones einzugeben .	It is simple to input short texts by means of a keyboard/touchscreen of a mobile phone/smartphone .	personal & expert interviews	bC _{m5}
C2	2 or 4	<i>see above</i>	Mit einem Handy/Smartphone kann man einfach auf Internetseiten navigieren.	One can easily navigate on internet pages with a mobile phone/smartphone	personal & expert interviews	bC _{m6}
C2	2 or 4	<i>see above</i>	Mit einem Handy/Smartphone fällt es leicht Bilder und Texte im Internet zu betrachten .	It is simple to view images and texts on the internet with a mobile phone /smartphone .	personal & expert interviews	bC _{m7}
C2	2 or 4	<i>see above</i>	Es macht Spaß das Internet auf einem Handy/Smartphone zu nutzen.	It is fun to use the internet on a mobile phone/smartphone .	personal & expert interviews	bC _{m8}
C2	2 or 4	<i>see above</i>	Das Internet auf dem Handy/Smartphone lässt sich ohne Verbindungsstörungen nutzen.	One can use the mobile phone/smartphone without connection failures .	personal & expert interviews	bC _{m9}
C2	2 or 4	<i>see above</i>	In vielen privaten Situationen ist das Internet auf einem Handy/Smartphone sehr nützlich.	The internet on a mobile phone/smartphone is useful in many private situations .	expert interviews	bC _{m10}
C2	3 or 5	<i>see above</i>	Die meisten Menschen, deren Meinung ich schätze , würden das Internet auf einem Handy/Smartphone nutzen.	Most people, whose opinion I value , would use the internet on a mobile phone /smartphone .	Bosnjak, Metzger and Gräf 2011; Bosnjak, Tuten and Wittmann 2005	bC _{m11}
C2	3 or 5	<i>see above</i>	Ich bin anderen Menschen , die das Internet auf einem Handy/Smartphone nutzen, sehr ähnlich .	I am very similar to other people who use the internet on a mobile phone /smartphone .	Bosnjak, Metzger and Gräf 2011; Bosnjak, Tuten and Wittmann 2005	bC _{m12}
C2	3 or 5	<i>see above</i>	Mit dem Handy/Smartphone kann man auch ganz spontan auf das Internet zugreifen .	One can spontaneously access the internet on a mobile phone /smartphone .	expert interviews	bC _{m13}

C2	3 or 5	<i>see above</i>	Mit dem Handy/Smartphone kann man auch unterwegs leicht auf das Internet zugreifen .	One can easily access the internet on a mobile phone /smartphone	expert interviews	bC _{m14}
C2	3 or 5	<i>see above</i>	Die Nutzung des Internets auf dem Handy/Smartphone ist etwas sehr Persönliches .	Using the internet on a mobile phone /smartphone is something very personal .	expert interviews	bC _{m15}
C2	3 or 5	<i>see above</i>	In vielen beruflichen Situationen ist das Internet auf einem Handy/Smartphone sehr nützlich.	The internet on a mobile phone/smartphone is useful in many work-related situations .	expert interviews	bC _{m16}
C2	3 or 5	<i>see above</i>	Das Internet auf dem Handy/Smartphone ist langsam .	The Internet on a mobile phone/smartphone is slow .	personal & expert interviews	bC _{m17}
C2	2 or 4	<i>see above</i>	Es ist preisgünstig das Internet auf dem Handy/ Smartphone zu nutzen.	It is cheap to use the internet on a mobile phone /smartphone .	personal & expert interviews	bC _{m18}
C2	3 or 5	<i>see above</i>	Die Nutzung des Internets auf dem Handy/Smartphone bietet mir große Vorteile (gegenüber der Nichtnutzung).	Using the internet on a mobile phone/smartphone offers great advantages (compared to not using it).	custom	bC _{m19}
C2	3 or 5	<i>see above</i>	Bei der Nutzung des Internets auf dem Handy/Smartphone muss ich große Nachteile (gegenüber der Nichtnutzung) in Kauf nehmen.	One has to accept great disadvantages using the internet on a mobile phone/ smartphone (compared to not using it).	custom	bC _{m20}
C2	3 or 5	<i>see above</i>	Insgesamt betrachtet bietet mir die Nutzung des Internets auf einem Handy/Smartphone größere Vorteile als Nachteile .	Taken as a whole, using the internet on a mobile phone/ smartphone has greater advantages than disadvantages .	custom	bC _{m21}

variable category	page #	category description	German question	English translation	source of question	variable label
D	6	level of agreement to statements on the probability of participation in web surveys	Sie werden im Rahmen der MOBIstudie über das Internet auf Ihrem Handy/Smartphone bzw. Ihrem PC/Laptop befragt werden. Inwieweit stimmen Sie den folgenden Aussagen über die MOBIstudie zu? <i>Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu).</i> Ich werde im Sommer 2012 auf jeden Fall an der MOBIsstudie teilnehmen,...	In the course of the MOBIstudie you will be surveyed on the internet on your mobile phone/smartphone resp. your PC /laptop. To what extent do you agree to the following statements about the MOBIstudie ? <i>Please click on the correct answer (1= completely agree; 7= completely disagree).</i> I will certainly participate in the MOBIstudie in summer 2012,...	custom	pp
D	6	▪ on a mobile phone/smartphone	... wenn ich über das Internet auf dem Handy/Smartphone befragt werde.	... in case I am surveyed on the internet on a mobile phone/smartphone .	custom	pp _m
D	6	▪ on a PC/laptop	... wenn ich über das Internet auf dem Handy/Smartphone	... in case I am surveyed on the internet on a PC/laptop .	custom	pp _p

variable category	page #	category description	German question	English translation	source of question	variable label
E1	7-8	frequency of usage of different notification functions for SMS on mobile phone/smartphone	Wie häufig nutzen Sie auf Ihrem Handy/Smartphone mit der Rufnummer ### die folgenden Funktionen, die Sie auf eine neu eingetroffene SMS aufmerksam machen sollen? <i>Bitte klicken Sie die zutreffenden Antworten an (1=immer; 7=nie).</i>	How often do you use the following functions, which are supposed to call your attention to a newly incoming SMS, on your <u>mobile phone/smartphone</u> , with the <u>call number ###</u> ? <i>Please click on the correct answer (1 = always; 7 = never).</i>	custom	un _{sm}
E1	7	<i>see above</i>	Benachrichtigungssymbol/-text (z.B. ein Briefumschlag wird angezeigt)	notification symbol (e.g. an envelope is shown)	expert interviews	un _{sm1}
E1	7	<i>see above</i>	Benachrichtigungston	notification sound	expert interviews	un _{sm2}
E1	7	<i>see above</i>	Vibrationsalarm	vibrating alert	expert interviews	un _{sm3}
E1	7	<i>see above</i>	Lichteffekt (z.B. das Leuchten/Blinken einer LED)	lighting effect (e.g. the shining/blinking of an LED)	expert interviews	un _{sm4}
E2	7	frequency of usage of different notification functions for e-mail on mobile phone/smartphone	Wie häufig nutzen Sie auf Ihrem Handy/Smartphone mit der Rufnummer ### die folgenden Funktionen, die Sie auf eine neu eingetroffene E-Mail aufmerksam machen sollen? <i>Bitte klicken Sie die zutreffenden Antworten an (1=immer; 7=nie).</i>	How often do you use the following functions, which are supposed to call your attention to a newly incoming <u>e-mail</u> , on your <u>mobile phone/smartphone</u> with the <u>call number ###</u> ? <i>Please click on the correct answer (1 = always; 7 = never).</i>	custom	un _{em}

E2	7	<i>see above</i>	Benachrichtigungssymbol/-text (z.B. ein Briefumschlag wird angezeigt)	notification symbol (e.g. an envelope is shown)	expert interviews	un _{em1}
E2	7	<i>see above</i>	Benachrichtigungston	notification sound	expert interviews	un _{em2}
E2	7	<i>see above</i>	Vibrationsalarm	vibrating alert	expert interviews	un _{em3}
E2	7	<i>see above</i>	Lichteffekt (z.B. das Leuchten/Blinken einer LED)	lighting effect (e.g. the shining/blinking of an LED)	expert interviews	un _{em4}
E3	8	frequency of usage of different notification functions for e-mail on PC/laptop	Denken Sie im Folgenden bitte nur an den PC/Laptop auf dem Sie am häufigsten Ihre E-Mails von der E-Mail-Adresse abrufen. Wie häufig nutzen Sie auf die-sem PC/Laptop die folgen-den Funktionen, die Sie auf eine neu eingetroffene E-Mail aufmerksam machen sollen? <i>Bitte klicken Sie die zutreffende Antwortoption an (1=immer; 7=nie).</i>	In the following, please only think of the PC/laptop, which you use most frequently to access your e-mails. How often do you use the following functions, which are supposed to call your attention to a newly incoming e-mail, on your PC/laptop? <i>Please click on the correct answer (1= always; 7= never).</i>	custom	un _{ep}
E3	8	<i>see above</i>	Pop-up Fenster (ein kleines Fenster springt z.B. in der Ecke des Bildschirms auf)	pop-up window (a little window appears e.g. in the corner of the screen)	expert interviews	un _{ep1}
E3	8	<i>see above</i>	Benachrichtigungssymbol (ein kleines Bild, z.B. ein Briefumschlag, erscheint in der Ecke des Bildschirms)	notification symbol (a little image, e.g. an envelope appears in a corner of the screen)	expert interviews	un _{ep2}
E3	8	<i>see above</i>	Benachrichtigungston	notification sound	expert interviews	un _{ep3}

variable category	page #	category description	German question	English translation	source of question	variable label
F	9	level of agreement to statements on the immediate perception	Denken Sie im Folgenden bitte nur an Ihr Handy /Smartphone mit der Rufnummer ### und den PC /Laptop auf dem Sie am häufigsten E-Mails von der E-Mail-Adresse ### abrufen. Inwieweit stimmen Sie den folgenden Aussagen über SMS und E-Mails auf Ihrem Handy/Smartphone bzw. E-Mails auf Ihrem PC/Laptop zu? Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu).	In the following, please only think of the mobile phone with the call number ### and the PC /laptop, which you use most frequently to access your e-mails on your ### account. To what extent do you agree to the following statements about SMS and e-mails on your mobile phone/smartphone resp. on your PC/laptop? Please click on the correct answer (1 = completely agree; 7 = completely disagree).	custom	ip
F1	9	▪ of SMS on mobile phone/smartphone	Ich nehme eine auf meinem Handy/Smartphone neu eingetroffene SMS in der Regel sofort wahr.	I usually notice a newly incoming SMS immediately on my mobile phone /smartphone.	expert interviews	ip _{sm}
F2	9	▪ of e-mail on mobile phone/smartphone	Ich nehme eine auf meinem Handy/Smartphone neu eingetroffene E-Mail in der Regel sofort wahr.	I usually notice a newly incoming e-mail immediately on my mobile phone /smartphone.	expert interviews	ip _{em}
F3	9	▪ of e-mail on PC/laptop	Ich nehme eine auf meinem PC/Laptop neu eingetroffene E-Mail in der Regel sofort wahr.	I usually notice a newly incoming e-mail immediately on my PC/laptop.	expert interviews	ip _{es}

variable category	page #	category description	German question	English translation	source of question	variable label
G	9	level of agreement to statements on the ease of accessing web survey for which invitational links were	Denken Sie im Folgenden bitte nur an Ihr Handy /Smartphone mit der Rufnummer ### und den PC /Laptop auf dem Sie am häufigsten E-Mails von der E-Mail-Adresse ### abrufen. Inwieweit stimmen Sie den folgenden Aussagen über SMS und E-Mails auf Ihrem Handy/Smartphone bzw. E-Mails auf Ihrem PC/Laptop zu? Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu).	In the following, please only think of the mobile phone with the call number ### and the PC /laptop, which you use most frequently to access your e-mails on your ### account. To what extent do you agree to the following statements about SMS and e-mails on your mobile phone/smartphone resp. on your PC/laptop? Please click on the correct answer (1 = completely agree; 7 = completely disagree).	custom	ea
G	9	sent by SMS, received on mobile phone/smartphone, accessed on mobile phone/smartphone	Es ist einfach, einen Link den ich per SMS auf meinem Handy/ Smartphone erhalten habe, im Browser meines Handys/Smartphones zu öffnen.	It is simple to access a link, which I received via SMS on my mobile phone/smartphone, in the browser of my mobile phone/smartphone.	expert interviews	ea _{smm}

G	9	sent by SMS, received on mobile phone/smartphone, accessed on PC/laptop	Es ist einfach, einen Link den ich <u>per SMS auf meinem Handy/ Smartphone erhalten</u> habe, im Browser meines <u>PCs/Laptops</u> zu öffnen.	It is simple to access a link, which I received <u>via SMS on my mobile phone/smartphone</u> in the browser of my <u>PC/laptop</u> .	expert interviews	ea _{3mp}
G	9	sent by e-mail, received on mobile phone/smartphone, accessed on mobile phone/smartphone	Es ist einfach, einen Link den ich <u>per E-Mail auf meinem Handy/ Smartphone erhalten</u> habe, im Browser meines <u>Handys/Smartphones</u> zu öffnen.	It is simple to access a link, which I received <u>via e-mail on my mobile phone/smartphone</u> , in the browser of my <u>mobile phone/smartphone</u> .	expert interviews	ea _{em}
G	9	sent by e-mail, received on mobile phone/smartphone, accessed on PC/laptop	Es ist einfach, einen Link den ich <u>per E-Mail auf meinem Handy/ Smartphone erhalten</u> habe, im Browser meines <u>PCs/Laptops</u> zu öffnen.	It is simple to access a link, which I received <u>via e-mail on my mobile phone/smartphone</u> , in the browser of my <u>PC/laptop</u> .	expert interviews	ea _{emp}
G	9	sent by e-mail, received on PC/laptop, accessed on PC/laptop	Es ist einfach, einen Link den ich <u>per E-Mail auf meinem PC/Laptop erhalten</u> habe, im Browser meines <u>PCs/Laptops</u> zu öffnen.	It is simple to access a link, which I received <u>via e-mail on my PC/laptop</u> , in the browser of my <u>PC/laptop</u> .	expert interviews	ea _{app}
G	9	sent by e-mail, received on PC/laptop, accessed on mobile phone/smartphone	Es ist einfach, einen Link den ich <u>per E-Mail auf meinem PC/Laptop erhalten</u> habe, im Browser meines <u>Handys/Smartphones</u> zu öffnen.	It is simple to access a link, which I received <u>via e-mail on my PC/laptop</u> , in the browser of my <u>mobile phone/smartphone</u> .	expert interviews	ea _{epm}

variable category	page #	category description	German question	English translation	source of question	variable label
H	10	level of agreement to statements on product class involvement	Inwieweit stimmen Sie den folgenden Aussagen über die Produktkategorien Tablet-Computer (wie z.B. das Apple iPad) und Audio-Kopfhörer (die z.B. zum Musikhören verwendet werden) zu? <i>Bitte klicken Sie die zutreffenden Antworten an (1 = stimme voll und ganz zu; 7 = stimme ganz und gar nicht zu).</i>	To what extent do you agree to the following statements about the product categories tablet PCs (as e.g. the Apple iPad) and audio headphones (which e.g. are used for listening to music)? <i>Please click on the correct answer (1 = completely agree; 7 = completely disagree).</i>	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	ii; it
H1	10	▪ for incentive (here: tablet pcs)	Tablet-Computer sind mir sehr wichtig.	Tablet PCs are important to me.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	ii ₁
H1	10	<i>see above</i>	Tablet-Computer bedeuten mir viel.	Tablet PCs mean a lot to me.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	ii ₂
H1	10	<i>see above</i>	Ich interessiere mich sehr für Tablet-Computer .	I am very interested in Tablet PCs .	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	ii ₃
H1	10	<i>see above</i>	Es langweilt mich, wenn andere über Tablet-Computer reden.	I bores me, when others talk about Tablet PCs .	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	ii ₄
H1	10	<i>see above</i>	Tablet-Computer sind für mich sehr relevant.	Tablet PCs are very relevant to me.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	ii ₅

H2	10	▪ for the topic of the main study (audio headphones)	Audio-Kopfhörer sind mir sehr wichtig.	Audio headphones are important to me.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	it ₁
H2	10	<i>see above</i>	Audio-Kopfhörer bedeuten mir viel.	Audio headphones mean a lot to me.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	it ₂
H2	10	<i>see above</i>	Ich interessiere mich sehr für Audio-Kopfhörer.	I am very interested in audio headphones.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	it ₃
H2	10	<i>see above</i>	Es langweilt mich, wenn andere über Audio-Kopfhörer reden.	It bores me, when others talk about audio headphones.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	it ₄
H2	10	<i>see above</i>	Audio-Kopfhörer sind für mich sehr relevant.	Audio headphones are very relevant to me.	Trommsdorff 2008; Mittal 1995; Zaichkowsky 1985	it ₅

Annex XXIX: Translation of Recommendation E-Mail

German Recommendation E-Mail	English Translation
Betreff: <i>Studie zu meiner Doktorarbeit an der RWTH Aachen: Gewinnen Sie ein iPad3!</i> Guten Tag, Max Musterman (max@musterman.com) hat Ihnen die MOBIstudie weiterempfohlen. Das ist eine 5- bis 10-minütige Online-Studie, die ich im Rahmen meiner Doktorarbeit an der RWTH Aachen durchführe. Die Studie ist rein wissenschaftlich, nicht kommerziell und beschäftigt sich – soviel sei vorab verraten – mit dem Thema „Unterhaltungselektronik“ und dem Internet. Für die Studie suche ich insbesondere nach Menschen, die das Internet auf Ihrem Handy bzw. Smartphone nutzen – das ist jedoch keine Voraussetzung um mitzumachen. Wenn Sie an der MOBIstudie teilnehmen, werden Sie in Kürze online nach Ihrer Meinung zu einem Ihnen zuvor übermittelten Bild befragt. Diese Befragung erfolgt <u>einmalig und freiwillig</u> – entweder über das Internet an Ihrem PC oder über das mobile Internet auf Ihrem Handy. Sie erhalten hierzu rechtzeitig eine Einladung mit einem Link per E-Mail oder SMS. Ich werde Sie zu Befragungszwecken jedoch <u>niemals anrufen</u> und Ihre Daten auch <u>nicht an Dritte weitergeben</u>. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse und Ihre persönlichen Daten werden wieder gelöscht.	Subject: <i>Study in the course of my doctoral thesis at RWTH Aachen University: Win an iPad3!</i> Hello, Max Musterman (max@musterman.com) recommended the MOBIstudie to you. It is a five-to-ten-minute long online study, which I am currently conducting within the scope of my doctoral thesis at RWTH Aachen University. The study is purely scientific, non-commercial, and deals – this much I may reveal in advance – with the topic of “consumer electronics” and the internet. I am particularly looking for people, who use the internet on their mobile phone or smartphone to participate in the study – however, this is no prerequisite to participation. In case you will participate in the MOBIstudie, you are going to be queried online within a short time about your opinion regarding a previously transmitted image. This survey is conducted <u>one time only, voluntarily</u> - either on the internet on your PC or the mobile internet on your mobile phone. You will receive an invitation containing a link via e-mail or SMS just in time. However, I will <u>never call you</u> for the purpose of surveying and <u>never hand on your data to third parties</u>. Furthermore, you will receive insight into the results of the study and your personal data will be deleted after it ended.

Ihre Anmeldung zur **MOBIstudie** dauert nur wenige Minuten. Als „kleines Dankeschön“ verlose ich unter allen Teilnehmern ein **Apple iPad3** und weitere Sachpreise. Melden Sie sich jetzt zur **MOBIstudie** an, indem Sie den nachfolgenden Link in Ihrem Webbrowser öffnen:

<http://www.MOBISTUDIE.de/>

Weitere Auskünfte zur **MOBIstudie** erteile ich Ihnen gerne per E-Mail ##@###.rwth-aachen.de und unter der Rufnummer 0241-80 #####. Im Voraus danke ich Ihnen herzlich für Ihre Unterstützung meiner Doktorarbeit und freue mich auf Ihre Teilnahme!

Mit freundlichen Grüßen
Daniel Dziewiecki

Your registration for the **MOBIstudie** takes just a few minutes. As a “little thank-you” I am going to raffle an **Apple iPad3** and other material prizes among all participants.

Register for the **MOBIstudie** now, by following the subsequent link in your web browser:

<http://www.MOBISTUDIE.de/>

I will will gladly provide further details about our **MOBIstudie** (by e-mail ##@###.rwth-aachen.de and via call number 0241-80 #####).

I would like to thank you for supporting my doctoral thesis in advance. I am looking forward to your participation!

Sincerely yours,
Daniel Dziewiecki

Annex XXX: Translation of Recommendation Tweet

German Recommendation Tweet	English Translation
Unterstütze die Forschung der #RWTH #Aachen und gewinne ein iPad3! Anmelden, RT, @MOBIstudie folgen und gewinnen! http://www.MOBIstudie.de/	Support the research of #RWTH #Aachen and win an iPad3! Sign up, RT, follow @MOBIstudie and win! http://www.MOBIstudie.de

Annex XXXI: Data Cleaning and Outlier Removal Procedures

procedure	datasets
datasets collected in preliminary study from July 10th, 2012 to September 21st, 2012 (“first preliminary sample frame”)	37,351
- datasets missing panelists’ e-mail addresses (16,006 of 37,351)	16,006
- datasets missing panelists’ mobile phone numbers (17,995 of 37,351)	1,964
= datasets containing panelists’ e-mail addresses, mobile phone numbers, age and gender	19,381
- datasets containing invalid e-mail addresses, e.g. addresses with obvious format errors (e.g. no “@” or “.”, addresses containing the word “spam” or addresses associated with domains of known temporary disposable e-mail services (e.g. http://www.10minutemail.com or http://www.10minutemail.net) (32 of 19,381)	32
- datasets containing invalid mobile phone numbers, e.g. (obvious) format errors as well as errors identified with the assistance of national numbering plans (<i>BAKOM 2012; Bundesnetzagentur 2012a; Bundesnetzagentur 2012b; RTR 2012</i>) (454 of 19,381)	441
= datasets containing panelists’ valid e-mail addresses and mobile phone numbers	18,908
- datasets of panelists who do not use the internet on a PC (26 of 18,908)	26
- datasets of panelists who do not use the internet on a mobile phone (3,308 of 18,908)	3,304
= datasets of panelists who use the internet on their PC and their mobile phone	15,578
- datasets of panelists who accessed the recruitment website or participated in the recruitment survey multiple times, identified by double e-mail addresses (836 of 15,578)	868
- datasets of panelists who accessed the recruitment website or participated in the recruitment survey multiple times, identified by double mobile phone numbers (868 of 15,578)	103
- datasets of panelists breaking off the profile survey before the last question (1530 of 15,578)	1,078
- datasets of panelists who used the back button of the browser rendering measurement of questionnaire processing time impossible (1,555 of 15,578)	30
= datasets of unique panelists who have finished the entire recruitment survey without using the browsers back button	13,499

- datasets of panelists who failed to pass at least one of four control items, because of an deviation between item and control items of more than two points on a 7-point-scale (2,107 of 13,499)	2,107
- datasets of panelists with an questionnaire processing time less than five minutes and more than one hour for the quantitative part of the survey (367 of 13,499)	249
- datasets of panelists with a processing time of less than 20 seconds for the last page of the questionnaire (158 of 13,499)	52
- datasets of panelists who gave more than 10% of “don’t know”-answers (784 of 13,499)	604
= datasets of unique panelists not showing unsolicited Survey Response Behavior	10,487
- datasets of panelists below the age of 18 or above the age of 100 (33 of 10,487)	33
- datasets containing mobile phone numbers with country codes of countries other than Germany, Austria, and Switzerland (143 of 10,487)	143
= datasets with unique panelists from the relevant target group	10,311
- datasets missing data on stationary internet usage including “don’t knows” (0 of 10,311)	0
- datasets missing data on mobile internet usage including “don’t knows” (0 of 10,311)	0
- datasets missing data on stationary e-mail usage including “don’t knows” (0 of 10,311)	0
- datasets missing data on mobile e-mail usage including “don’t knows” (0 of 10,311)	0
- datasets with panelists who do not use the stationary internet (0 of 10,311)	0
- datasets with panelists who do not use the mobile internet (0 of 10,311)	0
= datasets with unique panelists from the relevant target group showing relevant stationary and mobile internet usage behavior relevant for pre-notification to the pretest and main study	10,311

continued on next page

continued from previous page

procedure	designated for pretest	designated for main study + holdout	total
preliminary sample frame (before pre-notification)	600	9,711	10,311
- datasets of panelists who failed to receive a pre-notification on their e-mail address, which they previously entered into the recruitment questionnaire	8 (8 of 600)	155 (155 of 9,711)	163 (163 of 10,311)
- datasets of panelists who failed to receive a pre-notification on their phone number, which they previously entered into the recruitment questionnaire	46 (46 of 600)	921 (936 of 9,711)	967 (982 of 10,311)
- datasets of participants claiming by an e-mail or a phone call to the researcher they do not want to participate in the study (anymore) after receiving a pre-notification	2 (2 of 600)	39 (41 of 9,711)	41 (43 of 10,311)
= preliminary sample frame (after pre-notification)	544	8,596	9,140
- datasets of panelists who failed to receive an invitation on their e-mail address, which they previously entered into the recruitment questionnaire	0 (0 of 544)	0 (0 of 8,596)	0 (0 of 9,140)
- datasets of panelists who failed to receive an invitation on their phone number, which they previously entered into the recruitment questionnaire	0 (0 of 544)	0 (0 of 8,596)	0 (0 of 9,140)
- failed open end suspicion probe	1 (1 of 544)	2 (2 of 8,596)	3 (3 of 9,140)
- conspicuous user agent strings	0 (0 of 544)	5 (2 of 8,596)	5 (2 of 9,140)
= preliminary sample frame (before outlier removal)	543	8,589	9,132
- outliers during pretest	5 (5 of 544)	121 (121 of 8,596)	126 (126 of 9,140)
- randomly removed to create equal size experimental groups	2 (2 of 544)	0 (0 of 8,596)	2 (2 of 9,140)
= final sample frame	536	8,468	9,004
- thereof pretest sample			536
- thereof evaluation sample			5,124
- thereof holdout sample			3,344

Annex XXXII: Translation of the Content of E-Mail and SMS Pre-Notifications

German Content	English Translation
Vielen Dank für Ihre Anmeldung zur MOBISTUDIE (RWTH Aachen). In der nächsten Woche erhalten Sie den Link und das Passwort zur Studie. MfG, Ihr MOBISTUDIE-Team	Thank you for your registration to the MOBISTUDIE (RWTH Aachen). During the next week you will receive a link and a password to the study. Regards, your MOBISTUDIE-Team

Annex XXXIII: Translation of Content of E-Mail and SMS Invitations

		German Content of E-Mail and SMS Invitations	English Translation
<i>factor 1: survey mode</i>	<i>mobile web survey</i>	Die MOBISTUDIE wurde für das mobile Internet konzipiert. Die Teilnahme ist nur am Handy/Smartphone möglich: http://www.mobistudie.de/#### ## Passwort: #####	The MOBISTUDIE has been designed for the mobile Internet. Participation is only possible on a mobile phone/smartphone: http://www.mobistudie.de/#### ## password: #####
	<i>stationary web survey</i>	Die MOBISTUDIE wurde für das stationäre Internet konzipiert. Die Teilnahme ist nur am PC/Laptop möglich: http://www.mobistudie.de/#### ## Passwort: #####	The MOBISTUDIE has been designed for the stationary Internet. Participation is only possible on a PC/Laptop: http://www.mobistudie.de/#### ## password: #####

Annex XXXIV: Screenshot Main Study Landing / Login Page
Stationary Internet



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Bitte geben Sie das achtstellige Passwort ein, das Ihnen zusammen mit dem Link zur MOBIstudie zugeschickt wurde und drücken Sie „Weiter“:
Beachten Sie dabei die Groß- und Kleinschreibung

Passwort:

Weiter



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Sie haben nicht das richtige Passwort eingegeben. Bitte überprüfen Sie Ihre Eingaben. Beachten Sie dabei auch die Groß- und Kleinschreibung

Passwort:

Weiter

Annex XXXV: Screenshot Main Study Dead End Page
Stationary Internet

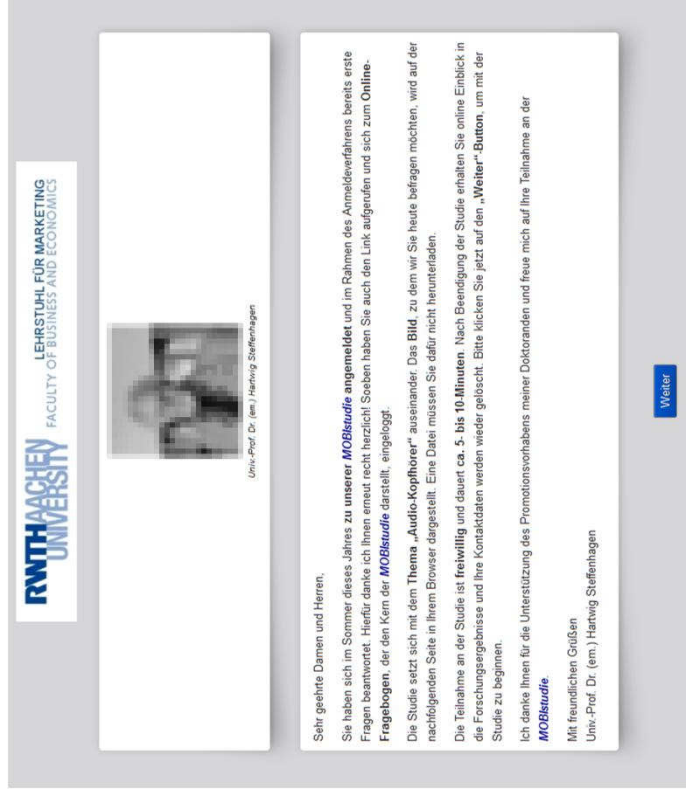


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Bitte öffnen Sie den Link zur *MOBIstudie* auf Ihrem Handy bzw. Smartphone.
Sie versuchen mit einem PC, Laptop oder Tablet an der Studie teilzunehmen. Die *MOBIstudie* wurde aber **nur für das mobile Internet** auf Handy's bzw. Smartphones konzipiert. Eine Teilnahme ist deshalb ausschließlich auf diesen Geräten möglich.
Sollten Sie die Seite von einem Handy bzw. Smartphone aus aufrufen und diese Nachricht fälschlicherweise erhalten haben, kontaktieren Sie uns bitte unter der untenstehenden E-Mail-Adresse.

Lehrstuhl für Marketing
RWTH Aachen
Kaiserstraße 7
D-52072 Aachen
E-Mail: MOBISTudie@iam.rwth-aachen.de

Annex XXXVI: Screenshot Main Study Questionnaire
Stationary Internet Page 1



Anonymized illustration.

Annex XXXVII: Screenshot Main Study Questionnaire
Stationary Internet Page 2

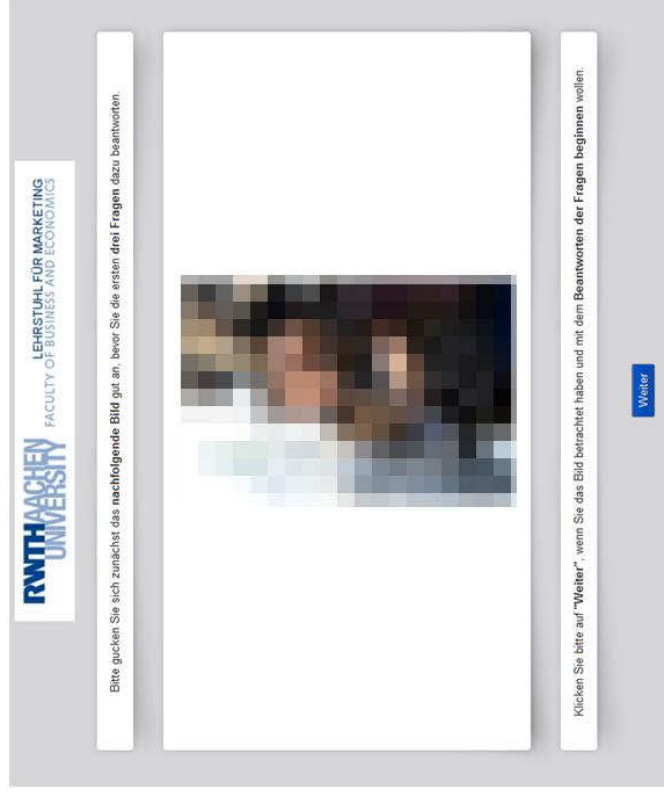
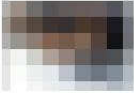


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Annex XXXVIII: Screenshot Main Study Questionnaire
Stationary Internet Page 3



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Was fällt Ihnen spontan zu der Situation auf dem Bild ein?

Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.

Was fällt Ihnen spontan zu der Frau auf dem Bild ein?

Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.

Was fällt Ihnen spontan zu dem Kopfhörer auf dem Bild ein?

Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.

Weiter

Annex XXXIX: Screenshot Main Study Questionnaire
Stationary Internet Page 4



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Stellen Sie sich bitte jetzt einmal vor, die fiktive Kopfhörermarke [you] verwendet das zuvor gezeigte Bild als ganzseitige Werbeanzeige im Rahmen einer Zeitschriftenkampagne. Diese sei im Folgenden dargestellt. Stellen Sie sich bitte vor, die Kopfhörermarke [you] gäbe es wirklich. Bitte gucken Sie sich das Bild gut an, bevor Sie dazu die Fragen auf der nächsten Seite beantworten.



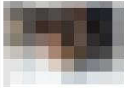
Klicken Sie bitte auf „Weiter“, wenn Sie die fiktive Werbeanzeige betrachtet haben und mit dem Beantworten der Fragen beginnen wollen.

Weiter

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Annex XL: Screenshot Main Study Questionnaire Stationary Internet Page 5

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Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?

Bitte klicken Sie die zutreffenden Antworten an. 1 = **stimme voll und ganz zu**, 7 = **stimme ganz und gar nicht zu**

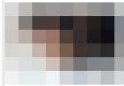
	1	2	3	4	5	6	7	weiß nicht
Es gibt nichts Außergewöhnliches an der Marke [you], das sie von anderen Marken unterscheidet.	☐	☐	☐	☐	☐	☐	☐	☐
Ich würde gerne das, was in der Werbeanzeige gezeigt wird, selbst erleben.	☐	☐	☐	☐	☐	☐	☐	☐
Ich habe aus der Werbeanzeige etwas gelernt, das ich über die Marke [you] vorher noch nicht wusste.	☐	☐	☐	☐	☐	☐	☐	☐
Die Werbeanzeige hat mich nicht unmittelbar angesprochen.	☐	☐	☐	☐	☐	☐	☐	☐
Als ich die Werbeanzeige sah, habe ich mir überlegt, wie die Marke [you] für mich nützlich sein könnte.	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

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Annex XLI: Screenshot Main Study Questionnaire Stationary Internet Page 6

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(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?

Bitte klicken Sie die zutreffenden Antworten an. 1 = **stimme voll und ganz zu**, 7 = **stimme ganz und gar nicht zu**

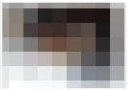
	1	2	3	4	5	6	7	weiß nicht
Die Werbeanzeige hat mich an einige wichtige Fakten über Kopfhörer erinnert, die ich vorher bereits wusste.	☐	☐	☐	☐	☐	☐	☐	☐
Der Hersteller der Marke [you] könnte die Behauptungen aus der Werbeanzeige bestimmt nachweisen, wenn er das machen müsste.	☐	☐	☐	☐	☐	☐	☐	☐
Die Werbeanzeige hat meine Aufmerksamkeit nicht wirklich erregt.	☐	☐	☐	☐	☐	☐	☐	☐
Es ist schwer, dafür einen besonderen Grund zu nennen, aber irgendwie ist die Marke [you] nichts für mich.	☐	☐	☐	☐	☐	☐	☐	☐
Ich würde mich beim Verwenden der Marke [you] wohlfühlen.	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

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Annex XLII: Screenshot Main Study Questionnaire Stationary
Internet Page 7





(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?
Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu, 7 = stimme ganz und gar nicht zu**

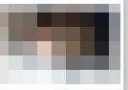
	1	2	3	4	5	6	7	weiß nicht
Das ist die Art von Werbeanzeige, die einem ständig durch den Kopf geht, nachdem man sie gesehen hat.	☐	☐	☐	☐	☐	☐	☐	☐
Die Werbeanzeige hat mich nicht an Erfahrungen oder Gefühle aus meinem eigenen Leben erinnert.	☐	☐	☐	☐	☐	☐	☐	☐
Bevor ich die Werbeanzeige gesehen habe, war ich nicht so fest davon überzeugt, die Marke [you] zu wählen.	☐	☐	☐	☐	☐	☐	☐	☐
Ich bin mir nicht sicher, ob ich die Marke [you] in Zukunft verwenden werde.	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Image alienated due to copyright restrictions. Source of original image: gettyimages B2Mproductions / Photodisc (2012).

Annex XLIII: Screenshot Main Study Questionnaire Stationary
Internet Page 8





(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?
Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu, 7 = stimme ganz und gar nicht zu**

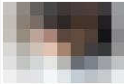
	1	2	3	4	5	6	7	weiß nicht
Ich habe einen guten Bezug zu dieser Werbeanzeige.	☐	☐	☐	☐	☐	☐	☐	☐
Die Werbeanzeige hat mir nicht aufgezeigt, worauf ich achten soll, wenn ich Kopfhörer kaufe.	☐	☐	☐	☐	☐	☐	☐	☐
Meiner Meinung nach war die Werbeanzeige sehr aussagekräftig.	☐	☐	☐	☐	☐	☐	☐	☐
Meiner Meinung nach war die Werbeanzeige nicht informativ.	☐	☐	☐	☐	☐	☐	☐	☐
Die Marke [you] passt gut zu meinem Lebensstil.	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

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Annex XLIV: Screenshot Main Study Questionnaire Stationary Internet Page 9

LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS



(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?

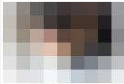
Bitte klicken Sie die zutreffenden Antworten an: 1 = **stimme voll und ganz zu**, 7 = **stimme ganz und gar nicht zu**

	1	2	3	4	5	6	7	weiß nicht
Jetzt kann ich die Marke [you] anhand von Kriterien, die mir wichtig sind, mit anderen Konkurrenzmarken präzise vergleichen.	☐	☐	☐	☐	☐	☐	☐	☐
Wenn ich an die Marke [you] denke, denke ich an diese Werbeanzeige.	☐	☐	☐	☐	☐	☐	☐	☐
Wenn ich meinen Lebensstil ändern könnte, würde ich nicht so leben wollen wie Menschen, die die Marke [you] verwenden.	☐	☐	☐	☐	☐	☐	☐	☐
Ich fühle mich so, als wäre ich genau in derselben Situation, wie in der Werbeanzeige.	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XLV: Screenshot Main Study Questionnaire Stationary Internet Page 10

LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS



Im Folgenden haben wir einige Markennamen von Kopfhörern aufgelistet. Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **kenne ich sehr gut**, 7 = **kenne ich überhaupt nicht**

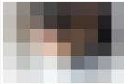
	1	2	3	4	5	6	7	weiß nicht
DSS Sound	☐	☐	☐	☐	☐	☐	☐	☐
HeadEars	☐	☐	☐	☐	☐	☐	☐	☐
Thompson	☐	☐	☐	☐	☐	☐	☐	☐
Philips	☐	☐	☐	☐	☐	☐	☐	☐
Skull Candy	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XLVI: Screenshot Main Study Questionnaire Stationary Internet Page 11

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LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS



(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **kenne ich sehr gut**, 7 = **kenne ich überhaupt nicht**

	1	2	3	4	5	6	7	weiß nicht
Surrounder	☐	☐	☐	☐	☐	☐	☐	☐
Sony	☐	☐	☐	☐	☐	☐	☐	☐
co.came	☐	☐	☐	☐	☐	☐	☐	☐
Bassa	☐	☐	☐	☐	☐	☐	☐	☐
AKG	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XLVII: Screenshot Main Study Questionnaire Stationary Internet Page 12



LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **keine ich sehr gut**, 7 = **keine ich überhaupt nicht**

	1	2	3	4	5	6	7	weiß nicht
Koss	☐	☐	☐	☐	☐	☐	☐	☐
Soundmaschine	☐	☐	☐	☐	☐	☐	☐	☐
Monster Beats	☐	☐	☐	☐	☐	☐	☐	☐
Tonal's	☐	☐	☐	☐	☐	☐	☐	☐
Creative	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XLIX: Screenshot Main Study Questionnaire Stationary Internet Page 14



LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **keine ich sehr gut**, 7 = **keine ich überhaupt nicht**

	1	2	3	4	5	6	7	weiß nicht
Symfonica	☐	☐	☐	☐	☐	☐	☐	☐
Coloud	☐	☐	☐	☐	☐	☐	☐	☐
Senhaiser	☐	☐	☐	☐	☐	☐	☐	☐
Bose	☐	☐	☐	☐	☐	☐	☐	☐
HPS	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex XLVIII: Screenshot Main Study Questionnaire Stationary Internet Page 13



LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **keine ich sehr gut**, 7 = **keine ich überhaupt nicht**

	1	2	3	4	5	6	7	weiß nicht
Pioneer	☐	☐	☐	☐	☐	☐	☐	☐
Panaasonic	☐	☐	☐	☐	☐	☐	☐	☐
beyerdynamic	☐	☐	☐	☐	☐	☐	☐	☐
Soundattaz	☐	☐	☐	☐	☐	☐	☐	☐
Loudi	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

Annex L: Screenshot Main Study Questionnaire Stationary Internet Page 15



LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

Die letzten Fragen dieser Studie setzen sich mit Werbung im Allgemeinen auseinander. Sie beziehen sich nicht auf die zuvor gezeigte Anzeige.

Inwieweit stimmen Sie den folgenden Aussagen über Werbung im Allgemeinen zu?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **stimme voll und ganz zu**, 7 = **stimme ganz und gar nicht zu**

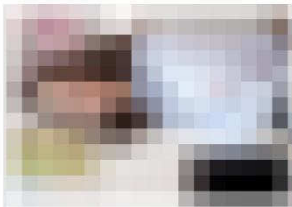
	1	2	3	4	5	6	7	weiß nicht
Werbung ist eine nützliche Informationsquelle für kritische (Sonder-)Verkäufe.	☐	☐	☐	☐	☐	☐	☐	☐
Werbung ist notwendig.	☐	☐	☐	☐	☐	☐	☐	☐
Im Allgemeinen ist Werbung irreführend.	☐	☐	☐	☐	☐	☐	☐	☐
Werbung ist oftmals unterhaltsam und lustig.	☐	☐	☐	☐	☐	☐	☐	☐
Werbung überredet Menschen Sachen zu kaufen, die sie nicht kaufen sollten.	☐	☐	☐	☐	☐	☐	☐	☐

Weiter

**Annex LVII: Screenshot Main Study Questionnaire Stationary
Internet Page 22**

Sie sind am Ende der Studie angelangt. An dieser Stelle bitten wir Sie, uns bei einer weiteren Studie zu unterstützen.

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FACULTY OF BUSINESS AND ECONOMICS



 **extreme Defuzzung des Lehrstuhls**, führt dazu, daß für Ihre Doktorarbeit eine 10-minütige Online-Studie zum Verhalten von Stromkunden durch
Die Studie ist nicht kommerziell und dient einem rein wissenschaftlichen Zweck. Bitte geben Sie Ihre E-Mail-Adresse in das vorgesehene Feld ein, wenn Sie an der
Studie teilnehmen möchten. Sie werden dann per E-Mail eingeladen. Alle E-Mail-Adressen werden im Anschluss an die Studie gelöscht und nicht an Dritte
weitergegeben. Ihre Teilnahme bleibt anonym.

Als „Dankeschön“ werden wir unter den Teilnehmern einen attraktiven Preis!

Klicken Sie bitte in das Feld und tragen Sie Ihre E-Mail-Adresse ein, wenn Sie an der Studie von  teilnehmen wollen.
Lassen Sie das Feld leer, wenn Sie nicht teilnehmen wollen. Drücken Sie im Anschluss den **„Weiter“**-Button um auf die nächste Seite zu gelangen.

Weiter

Anonymized illustration.

RWTH AACHEN
UNIVERSITY

LEHRSTUHL FÜR MARKETING
FACULTY OF BUSINESS AND ECONOMICS

Weichen wissenschaftlichen Zweck bzw. welche wissenschaftliche Fragestellung verfolgt die MOB!studie Ihrer Meinung nach?

Bitte klicken Sie in das leere Textfeld und fügen Sie Ihre Antwort ein.

Falls Sie den Zweck bzw. die Fragestellung der MOB!studie nicht kennen, schreiben Sie bitte "weiß nicht" in das Feld.

Weiter

Annex LIX: Screenshot Main Study Questionnaire Stationary Internet Page 24

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FACULTY OF BUSINESS AND ECONOMICS

Gibt es darüber hinaus noch etwas, was Sie dem MOBISTudie-Projektteam mitteilen möchten?

Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Mitteilung ein. Lassen Sie das Textfeld leer und klicken Sie den "Weiter"-Button, wenn Sie uns nichts mitteilen möchten.

Weiter

**Annex LX: Screenshot Main Study Questionnaire Stationary
Internet Page 25**

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Vielen Dank, Ihre Nachricht wurde übermittelt.

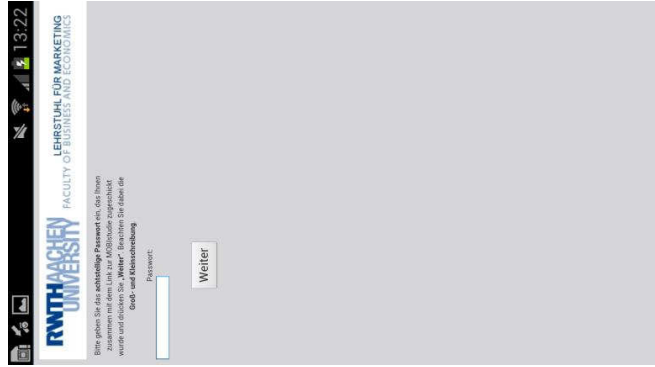
Ich danke Ihnen für die Teilnahme an der **MOBISurfline**! Sobald die Studie ausgewertet ist, erhalten alle Teilnehmer online Einblick in die Forschungsergebnisse.

Sie können das Browser-Fenster jetzt schließen.

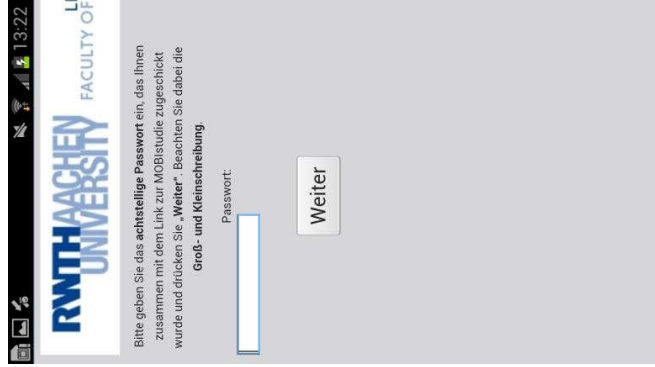
Annex LXI: Screenshot Main Study Landing/Login Page Mobile Internet

Annex LXII: Dead End Page Mobile Internet

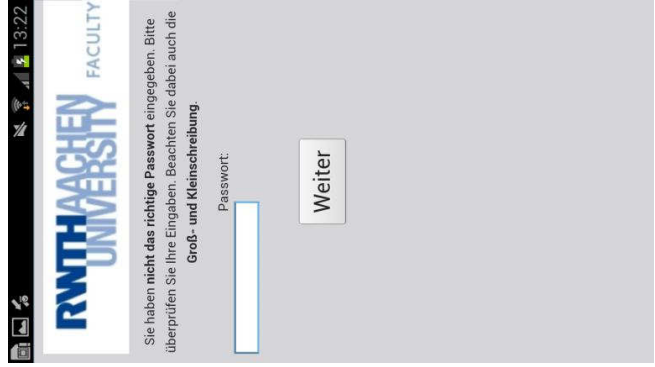
login page



login page (zoom)



error message



dead end page



Annex LXIII: Screenshots Main Study Questionnaire Mobile Internet Pages 1 to 24

Page 1

Sehr geehrte Damen und Herren,

Sie haben sich im Sommer dieses Jahres zu unserer **MOBISTUDIE** angemeldet und im Rahmen des Anmeldeverfahrens bereits erste Fragen beantwortet. Hierfür danke ich Ihnen erneut recht herzlich. Soeben haben Sie auch den Link aufgerufen und sich zum **Online-Fragebogen**, der den Kern der **MOBISTUDIE** darstellt, eingeloggt.

Die Studie setzt sich mit dem Thema **„Audio-Kopfhörer“** auseinander. Das **Bild**, zu dem wir Sie heute befragen möchten, wird auf der nachfolgenden Seite in Ihrem Browser dargestellt. Eine Datei müssen Sie dafür nicht herunterladen.

Die Teilnahme an der Studie ist **freiwillig** und dauert **ca. 5- bis 10-Minuten**. Nach Beendigung der Studie erhalten Sie online Einblick in die Kontakt- und Forschungsdaten sowie Ihre Ergebnisse. Bitte klicken Sie jetzt auf den **„Weiter“**-Button, um mit der Studie zu beginnen. Ich danke Ihnen für die Unterstützung des Promotionsvorhabens meiner Doktoranden und freue mich auf Ihre Teilnahme an der **MOBISTUDIE**.

Mit freundlichen Grüßen
Univ.-Prof. Dr. (em.) Hartwig Steffenhagen

Weiter

Anonymized illustration.

Page 3

Bitte gucken Sie sich zunächst das nachfolgende Bild gut an, bevor Sie die ersten drei Fragen dazu beantworten.

Was fällt Ihnen spontan zu der Situation auf dem Bild ein?

Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.

Was fällt Ihnen spontan zu der Frau auf dem Bild ein?

Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.

Was fällt Ihnen spontan zu dem Kopfhörer auf dem Bild ein?

Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.

Weiter

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Page 4

Stellen Sie sich bitte jetzt einmal vor, die folgende Kopfhörermarke (Bild) verwendet das zuvor gezeigte Bild als Werbemaßnahme. Sie ist in der Werbung zu sehen. Wie würden Sie sich bei folgenden Zwischenfrageumfragen fühlen? Bitte geben Sie eine Antwort an. 1 = stimme voll und ganz zu, 7 = stimme gar nicht zu.

Klicken Sie bitte auf „Weiter“, wenn Sie die folgende Werbemaßnahme betrachtet haben und mit dem Beantworten der Fragen beginnen wollen.

Weiter

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Page 5 (1 of 2)

Inwieweit stimmen Sie den folgenden Aussagen über die Werbemaßnahme zu?

Bitte klicken Sie die zutreffenden Antworten an. 1 = stimme voll und ganz zu, 7 = stimme gar nicht zu.

Die Werbemaßnahme hat mich nicht unmittelbar angesprochen.

Es gibt nichts Außergewöhnliches an der Marke [you], das sie von anderen Marken unterscheidet.

Ich habe aus der Werbemaßnahme etwas gelernt, das ich über die Marke [you] vorher noch nicht wusste.

Weiter

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Page (2 of 2)

Ich würde gerne das, was in der Werbemaßnahme gezeigt wird, selbst erleben.

Als ich die Werbemaßnahme sah, habe ich mir überlegt, wie die Marke [you] für mich nützlich sein könnte.

Weiter

Page 6 (1of 2)

Die Werbeanzeige hat mich nicht an Erfahrungen oder Gefühle aus meinem eigenen Leben erinnert.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Es ist schwer das in Worte zu fassen, aber diese Werbeanzeige hinterlässt bei mir ein gutes Gefühl, dass ich die Marke [you] in Zukunft verwenden werde.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **stimme voll und ganz zu**, 7 = **stimme ganz und gar nicht zu**

Bevor ich die Werbeanzeige gesehen habe, war ich nicht so fest davon überzeugt, die Marke [you] zu verwenden, wie ich es jetzt bin.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Das ist die Art von Werbeanzeige, die einem ständig durch den Kopf geht, nach dem man sie gesehen hat.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

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Page 6 (2 of 2)

Die Werbeanzeige hat mich nicht an Erfahrungen oder Gefühle aus meinem eigenen Leben erinnert.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Es ist schwer das in Worte zu fassen, aber diese Werbeanzeige hinterlässt bei mir ein gutes Gefühl, dass ich die Marke [you] in Zukunft verwenden werde.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

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Page 7 (1of 2)

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **stimme voll und ganz zu**, 7 = **stimme ganz und gar nicht zu**

Meiner Meinung nach war die Werbeanzeige nicht informativ.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Die Marke [you] passt gut zu meinem Lebensstil.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Meiner Meinung nach war die Werbeanzeige sehr aussagekräftig.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

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Page 7 (2 of 2)

Ich habe einen guten Bezug zu dieser Werbeanzeige.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Die Werbeanzeige hat mir nicht aufgezeigt, worauf ich achten soll, wenn ich Kopierware kaufe.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

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Page 8 (1of 2)

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?

Bitte klicken Sie die zutreffenden Antworten an: 1 = **stimme voll und ganz zu**, 7 = **stimme ganz und gar nicht zu**

Jetzt kann ich die Marke [you] anhand von Kriterien, die mir wichtig sind, mit anderen Konkurrenzmarken präzise vergleichen.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Wenn ich meinen Lebensstil ändern könnte, würde ich nicht so leben wollen wie die Menschen, die die Marke [you] verwenden.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Image alienated due to copyright restrictions. Source of original image: gettyimages, B2Mproductions / Photodisc (2012).

Page 8 (2 of 2)

Wenn ich an die Marke [you] denke, denke ich an diese Werbeanzeige.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 9 (1of 2)

nmw **WISSEN** ANALYSE • VERGLEICH • BEWERTUNG



(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über die Werbeanzeige zu?

Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu**, **7 = stimme ganz und gar nicht zu**

Die Werbeanzeige hat meine Aufmerksamkeit nicht wirklich erregt.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Die Werbeanzeige hat mich an einige wichtige Fakten über Kopfhörer erinnert, die ich vorher bereits wusste.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Es ist schwer, dafür einen besonderen Grund zu nennen, aber irgendwie ist die Marke [you] nichts für mich.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 9 (2 of 2)

Ich würde mich beim Verwenden der Marke [you] wohlfühlen.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Der Hersteller der Marke [you] könnte die Behauptungen aus der Werbeanzeige bestimmt nachweisen, wenn er das machen müsste.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Image alienated due to copyright restrictions. Source of original image: gettyimages B2Mproductions / Photodisc (2012).

Page 10 (1of 2)

nmw **WISSEN** ANALYSE • VERGLEICH • BEWERTUNG

Im Folgenden haben wir einige Markennamen von Kopfhörern aufgelistet. Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: **1 = kenne ich sehr gut**, **7 = kenne ich überhaupt nicht**

Skull Candy

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Philips

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

DSS Sound

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Thompson

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 10 (2 of 2)

Head&Ears

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 11 (1of 2)

nmw **WISSEN** ANALYSE • VERGLEICH • BEWERTUNG

(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: **1 = kenne ich sehr gut**, **7 = kenne ich überhaupt nicht**

Synfonica

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Coloud

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Bose

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

HPS

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 11 (2 of 2)

Sennheiser

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 12 (1 of 2)

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(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: **1 = kenne ich sehr gut, 7 = kenne ich überhaupt nicht**

co.caine

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Sony

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

AKG

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Surround

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 12 (2 of 2)

Bassa

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 13 (1 of 2)

rwth AACHEN UNIVERSITÄT FÜR INGENIEURWISSENSCHAFTEN

(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: **1 = kenne ich sehr gut, 7 = kenne ich überhaupt nicht**

Panasonic

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

beyerdynamic

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Pioneer

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Loudspeaker

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

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SoundattakZ

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

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rwth AACHEN UNIVERSITÄT FÜR INGENIEURWISSENSCHAFTEN

(fortgesetzt) Wie gut kennen Sie diese Kopfhörermarken?

Bitte klicken Sie die zutreffenden Antworten an: **1 = kenne ich sehr gut, 7 = kenne ich überhaupt nicht**

Creative

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Koss

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Soundmachine

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Monster Beats

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

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Total's

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 15 (1/2)

Die letzten Fragen dieser Studie setzen sich mit Werbung im Allgemeinen auseinander. Sie beziehen sich nicht auf die zuvor gezeigte Anzeige.

Inwieweit stimmen Sie den folgenden Aussagen über Werbung im Allgemeinen zu?

Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu**, **7 = stimme ganz und gar nicht zu**

Werbung ist eine nützliche Informationsquelle für örtliche (Sonder-)Verkäufe.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Im Allgemeinen ist Werbung irreführend.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung ist oftmals unterhaltsam und lustig.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

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Werbung ist notwendig.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung überredet Menschen Sachen zu kaufen, die sie nicht kaufen sollten.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 16 (1 of 2)

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über Werbung im Allgemeinen zu?

Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu**, **7 = stimme ganz und gar nicht zu**

Manchmal habe ich Freude daran, darüber nachzudenken was ich in der Werbung gesehen, gehört oder gelesen habe.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung sagt mir, welche Marken die Eigenschaften besitzen, nach denen ich suche.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung macht aus uns eine materialistische Gesellschaft, die nur daran interessiert ist, Dinge zu kaufen und zu besitzen.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 16 (2 of 2)

Werbung sorgt dafür, dass Menschen unerschwängliche Produkte kaufen, nur um damit anzugeben.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung fördert unerwünschte Werte in unserer Gesellschaft.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 17 (1 of 2)

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über Werbung im Allgemeinen zu?

Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu**, **7 = stimme ganz und gar nicht zu**

Werbung hilft uns dabei, unseren Lebensstandard zu erhöhen.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung teilt mir mit, was Menschen die einen ähnlichen Lebensstil führen wie ich, kaufen und verwenden.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Aus der Werbung lerne ich viel über Trends und was ich kaufen sollte, um Andere zu beeindrucken.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 17 (2 of 2)

Werbung führt zu besseren Produkten für die Allgemeinheit.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Der größte Teil der Werbung ist eine Belohnung für die Intelligenz des durchschnittlichen Konsumenten.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 18 (1 of 2)

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über Werbung im Allgemeinen zu?
Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu, 7 = stimme ganz und gar nicht zu**

Ich habe grundsätzlich keine gute Meinung über Werbung.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Wegen der Werbung kaufen Menschen viele Dinge, die sie gar nicht brauchen.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Einige Produkte / Dienstleistungen, die in der Werbung beworben werden, sind schlecht für unsere Gesellschaft.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 18 (2 of 2)

Im Allgemeinen fordert Werbung den Wettbewerb, wovon die Konsumenten profitieren.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Heutzutage gibt es viel zu viel Sex in der Werbung.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 19 (1 of 2)

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über Werbung im Allgemeinen zu?
Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu, 7 = stimme ganz und gar nicht zu**

Im Allgemeinen zeigt Werbung das wahre Bild des beworbenen Produkts.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung hilft mir dabei zu erkennen, welches Produkt widerspiegelt bzw. nicht widerspiegelt, was für eine Art Mensch ich bin.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Im Allgemeinen führt Werbung zu niedrigeren Preisen.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 19 (2 of 2)

Manchmal ist Werbung unterhaltsamer als andere Medieninhalte.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Im Allgemeinen hilft Werbung der Wirtschaft unseres Staates.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Page 20 (1 of 2)

(fortgesetzt) Inwieweit stimmen Sie den folgenden Aussagen über Werbung im Allgemeinen zu?
Bitte klicken Sie die zutreffenden Antworten an: **1 = stimme voll und ganz zu, 7 = stimme ganz und gar nicht zu**

Werbung lässt Menschen in einer Phantasiewelt leben.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Werbung hilft mir dabei, mich über Produkte und Dienstleistungen, die auf dem Markt angeboten werden, auf dem Laufenden zu bleiben.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Alles in allem, halte ich Werbung für eine gute Sache.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Page 20 (2 of 2)

Die meiste Werbung verzerrt die Werte der Jugend.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Zum Großteil verschwendet Werbung ökonomische Ressourcen.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ weiß nicht

Weiter

Annex LXIV: Translation Main Study Landing / Login Page Stationary and Mobile Internet

German Landing / Login Page	English Translation
Bitte geben Sie das achtstellige Passwort ein, das Ihnen zusammen mit dem Link zur MOBIsstudie zugeschickt wurde und drücken Sie „Weiter“. Beachten Sie dabei die Groß- und Kleinschreibung. Passwort:	Please enter your eight digit password which has been sent to you along with the link to the MOBIsstudie and press “continue”. At this, please pay attention to case sensitivity. Password:
German Login Failure	English Translation
Sie haben nicht das richtige Passwort eingegeben. Bitte überprüfen Sie Ihre Eingaben. Beachten Sie dabei auch die Groß- und Kleinschreibung. Passwort:	You did not enter the correct password. Please check your entry. At this, please also pay attention to case sensitivity. Password:

Annex LXV: Translation Main Study Dead End Page Stationary Internet

German Dead End Page Stationary Internet	English Translation
Bitte öffnen Sie den Link zur <i>MOBIstudie</i> auf Ihrem Handy bzw. Smartphone.	Please access the link to the <i>MOBIstudie</i> on your mobile phone or smartphone.
Sie versuchen mit einem PC, Laptop oder Tablet an der Studie teilzunehmen. Die <i>MOBIstudie</i> wurde aber nur für das mobile Internet auf Handys bzw. Smartphones konzipiert. Eine Teilnahme ist deshalb nur auf diesen Geräten möglich.	You are attempting to participate in the study on a PC, laptop or tablet. However, the <i>MOBIstudie</i> has been designed for the mobile internet on mobile phones or smartphones only. Therefore, participation is only possible on these devices.
Sollten Sie die Seite von einem Handy bzw. Smartphone aus aufrufen und diese Nachricht fälschlicherweise erhalten haben, kontaktieren Sie uns bitte unter der untenstehenden <u>E-Mail-Adresse</u>.	In case you access this page from a mobile phone or smartphone and wrongly received this message please contact us using the <u>e-mail address</u> stated below.

Annex LXVI: Translation Main Study Dead End Page Mobile Internet

German Dead End Page Stationary Internet	English Translation
Bitte öffnen Sie den Link zur <i>MOBIstudie</i> auf Ihrem PC bzw. Laptop.	Please access the link to the <i>MOBIstudie</i> on your PC or laptop.
Sie versuchen mit einem PC, Laptop oder Tablet an der Studie teilzunehmen. Die <i>MOBIstudie</i> wurde aber nur für das stationäre Internet auf PCs bzw. Laptops konzipiert. Eine Teilnahme ist deshalb nur auf diesen Geräten möglich.	You are attempting to participate in the study on a PC, laptop or tablet. However, the <i>MOBIstudie</i> has been designed for the stationary internet on PCs or laptops only. Therefore, participation is only possible on these devices.
Sollten Sie die Seite von einem PC bzw. Laptop aus aufrufen und diese Nachricht fälschlicherweise erhalten haben, kontaktieren Sie uns bitte unter der untenstehenden <u>E-Mail-Adresse</u>.	In case you access this page from a PC or laptop and wrongly received this message please contact us using the <u>e-mail address</u> stated below.

Annex LXVII: Translation Main Study Questionnaire Page 1

German Main Study Questionnaire Page 1	English Translation
Sehr geehrte Damen und Herren, Sie haben sich im Sommer dieses Jahres zu unserer MOBISTudie angemeldet und im Rahmen des Anmeldeverfahrens bereits erste Fragen beantwortet. Hierfür danke ich Ihnen erneut recht herzlich! Soeben haben Sie auch den Link aufgerufen und sich zum Online-Fragebogen, der den Kern der MOBISTudie darstellt, einge- loggt. Die Studie setzt sich mit dem Thema „Audio-Kopfhörer“ auseinander. Das Bild, zu dem wir Sie heute befragen möchten, wird auf der nachfolgenden Seite in Ihrem Browser dargestellt. Eine Datei müssen Sie dafür nicht herunterladen. Die Teilnahme an der Studie ist freiwillig und dauert ca. 5-10 Minuten. Nach Beendigung der Studie erhalten Sie online Einblick in die Forschungsergebnisse und Ihre Kontaktdaten werden wieder gelöscht. Bitte klicken Sie jetzt auf den „Weiter“-Button, um mit der Studie zu beginnen. Ich danke Ihnen für die Unterstützung des Promotionsvorhabens meiner Doktoranden und freue mich auf Ihre Teilnahme an der MOBISTudie. Mit freundlichen Grüßen Univ.-Prof. Dr. (em.) Hartwig Steffenhagen	Dear Sir or Madam, You signed up for our MOBISTudie in the summer of this year and already answered first questions in the course of the registration procedures. Again, I would like to say a big thank you for this! You have accessed the link to the online questionnaire now, which constitutes the core of the MOBISTudie. The study deals with the topic „audio headphones“. The image, about which we would like to survey you today, will be displayed on the subsequent pages in your browser. You do not have to download it for this purpose. Participation in this study is voluntary and last approx. 5-10 Minutes. Upon completion of the study you will receive insight into the research findings online and your contact data will be deleted. Please click on the “continue”-button now in order to start with the study. I thank you for your support of the dissertation of my doctoral students. I am looking forward to your participation in the MOBISTudie. Sincerely yours, Univ.-Prof. Dr. (em.) Hartwig Steffenhagen

Annex LXVIII: Translation Main Study Questionnaire Page 2

German Main Study Questionnaire Page 2	English Translation
Bitte gucken Sie sich zunächst das nachfolgende Bild gut an, bevor Sie die ersten drei Fragen dazu beantworten	At first, please take a good look at the following image , before you answer the first three questions on this topic.
Klicken Sie bitte auf „Weiter“, wenn Sie das Bild betrachtet haben und mit dem Beantworten der Fragen beginnen wollen.	Please click „continue“, when you are done viewing the image and want to start answering the questions .

Annex LXIX: Translation Main Study Questionnaire Open Questions I1 to I3 Page 3

German Main Study Questionnaire Page 3	English Translation
Was fällt Ihnen spontan zu der <u>Situation</u> auf dem Bild ein? Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.	What comes spontaneously into your mind regarding the <u>situation</u> pictured? Please click into the empty text field and fill in your answer.
Was fällt Ihnen spontan zu der <u>Frau</u> auf dem Bild ein? Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.	What comes spontaneously into your mind regarding the <u>woman</u> pictured? Please click into the empty text field and fill in your answer.
Was fällt Ihnen spontan zu dem <u>Kopfhörer</u> auf dem Bild ein? Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.	What comes spontaneously into your mind regarding the <u>headphones</u> pictured? Please click into the empty text field and fill in your answer.

Annex LXX: Translation Main Study Questionnaire Page 4

German Main Study Questionnaire Page 4	English Translation
Stellen Sie sich jetzt bitte einmal vor, die fiktive Kopfhörermarke [you] verwendet das zuvor gezeigte Bild, als ganzseitige Werbeanzeige im Rahmen einer Zeitschriftenkampagne. Diese sei im Folgenden dargestellt. Stellen Sie sich bitte vor, die Kopfhörermarke [you] gäbe es wirklich. Bitte gucken Sie sich das Bild gut an, bevor Sie dazu die Fragen auf der nächsten Seite beantworten. Klicken Sie bitte auf „Weiter“, wenn Sie die fiktive Werbeanzeige betrachtet haben und mit der Beantwortung der Fragen beginnen wollen.	Now, please imagine that a fictitious head-phone brand [you] uses the image previously shown as a full-page advertisement in the course of a advertizing campaign in magazines. This is shown in the following. Please imagine that the fictitious headphone brand [you] actually exists. Please take a good look at the image now, before you answer the questions on the subsequent page. Please click on „continue“ in case you have already viewed the fictitious advertisement and want to start answering the questions.

Annex LXXI: Translation Main Study Questionnaire Informational and Transformational Ad Content J1 and J2 Pages 5 to 9

German Main Study Questionnaire Page 5 to 9	English Translation
Inwieweit stimmen Sie den folgenden <u>Aussagen über die Werbeanzeige</u> zu? Bitte klicken Sie die zutreffenden Antworten an: 1 = stimme voll und ganz zu, 7 = stimme ganz und gar nicht zu	<u>To what extent do you agree to the following statements regarding the advertisement?</u> Please click on the applicable answers: 1 = completely agree, 7 = completely disagree

Annex LXXII: Translation of Puto and Wells' (1984) Informational and Transformational Ad Content Scale J1 and J2

German Translation	English Original Item	Construct
Ich habe aus der Werbeanzeige etwas gelernt, das ich über die Marke [you] vorher noch nicht wusste.	I learned something from this commercial that I didn't know before about (this brand).	informational
Ich würde gerne das, was in der Werbeanzeige gezeigt wird, selbst erleben.	I would like to have an experience like the one shown in the commercial.	transformational
Die Werbeanzeige hat mich nicht unmittelbar angesprochen.	The commercial did not seem to be speaking directly to me.	transformational
Es gibt nichts Außergewöhnliches an der Marke [you], das sie von anderen Marken unterscheidet.	There is nothing special about (this brand) that makes it different from the others.	informational
Als ich die Werbeanzeige sah, habe ich mir überlegt, wie die Marke [you] für mich nützlich sein könnte.	While I watched this commercial, I thought how this brand might be useful to me.	transformational
Die Werbeanzeige hat mir nicht aufgezeigt, worauf ich achten soll, wenn ich Kopfhörer kaufe.	The commercial did not teach me what to look for when buying (this product).	informational
Meiner Meinung nach war die Werbeanzeige sehr aussagekräftig.	This commercial was meaningful to me.	transformational
Meiner Meinung nach war die Werbeanzeige nicht informativ.	This commercial was very uninformative.	informational
Die Marke [you] passt gut zu meinem Lebensstil.	(This brand) fits my lifestyle very well.	transformational
Ich habe einen guten Bezug zu dieser Werbeanzeige.	I could really relate to this commercial.	transformational
Ich würde mich beim Verwenden der Marke [you] wohlfühlen.	Using (this brand) makes me feel good about myself.	transformational

Der Hersteller der Marke [you] könnte die Behauptungen aus der Werbeanzeige gewiss nachweisen, wenn er das machen müsste.	If they had to, the company could provide evidence to support the claims made in this commercial.	informational
Es ist schwer, dafür einen besonderen Grund zu nennen, aber irgendwie ist die Marke [you] nichts für mich.	It's hard to give a specific reason, but somehow (this brand) is not really for me.	transformational
Die Werbeanzeige hat meine Aufmerksamkeit nicht wirklich erregt.	This commercial did not really hold my attention.	transformational
Die Werbeanzeige hat mich an einige wichtige Fakten über Kopfhörer erinnert, die ich vorher bereits wusste.	This commercial reminded me of some important facts about (this brand) which I already knew.	informational
Wenn ich meinen Lebensstil ändern könnte, würde ich nicht so leben wollen wie Menschen, die die Marke [you] verwenden.	If I could change my lifestyle, I would make it less like the people who use (this brand).	transformational
Wenn ich an die Marke [you] denke, denke ich an diese Werbeanzeige.	When I think of (this brand), I think of this commercial.	transformational
Ich fühle mich so, als wäre ich genau in derselben Situation, wie in der Werbeanzeige.	I felt as though I were right there in the commercial, experiencing the same thing.	transformational
Jetzt kann ich die Marke [you] anhand von Kriterien, die mir wichtig sind, mit anderen Konkurrenzmarken präzise vergleichen.	I can now accurately compare (this brand) with other competing brands on matters that are important to me.	informational
Die Werbeanzeige hat mich nicht an Erfahrungen oder Gefühle aus meinem eigenen Leben erinnert.	This commercial did not remind me of any experiences or feelings I've had in my own life.	transformational
Bevor ich die Werbeanzeige gesehen habe, war ich nicht so fest davon überzeugt, die Marke [you] zu verwenden, wie ich es jetzt bin.	I would have less confidence in using (this brand) now than before I saw this commercial.	informational
Das ist die Art von Werbeanzeige, die einem ständig durch den Kopf geht, nachdem man sie gesehen hat.	It is the kind of commercial that keeps running through your head after you've seen it.	transformational
Es ist schwer das in Worten zu fassen, aber diese Werbeanzeige hinterlässt bei mir ein gutes Gefühl, dass ich die Marke [you] in Zukunft verwenden werde.	It's hard to put into words, but this commercial leaves me with a good feeling about using (this brand).	transformational

Annex LXXIII: Translation Main Study Questionnaire Recognition Test of Brand Names of Headphones K1 and K2 Pages 10 to 14

German Main Study Questionnaire Page 10 to 14	English Translation
Im Folgenden haben wir einige <u>Markennamen von Kopfhörern</u> aufgelistet. Wie gut <u>kennen</u> Sie diese Kopfhörermarken? Bitte klicken Sie die zutreffenden Antworten an: 1 = kenne ich sehr gut, 7 = kenne ich überhaupt nicht	In the following we listed several <u>brand names of headphones</u>. How well do you <u>know</u> these headphone brands? Please click on the applicable answers: 1 = know it very well, 7 = don't know it at all

Real brand names used: Thompson, Philips, Skull Candy, Sony, co:caine, AKG, Koss, Monster Beats, Creative, Pioneer, Panasonic, beyerdynamic, Coloud, Sennheiser, Bose; bogus names used: DSS Sound, Head&Ears, Surrounders, Bassa, Soundmachine, Tonal's, SoundattakZ, Louder!, Symfonica, HPS.

Annex LXXIV: Translation Main Study Questionnaire Public Opinion toward Advertising Scale L1 to L10 Pages 15 to 20

German Main Study Questionnaire Page 15 to 20	English Translation
Die letzten Fragen dieser Studie setzen sich mit Werbung im Allgemeinen auseinander. Sie beziehen sich nicht auf die zuvor gezeigte Anzeige.	The last questions of this study deal with the topic of advertizing in general. They do not refer to the advertisement previously shown.
Inwieweit stimmen Sie den folgenden <u>Aussagen über Werbung im Allgemeinen</u> zu? Bitte klicken Sie die zutreffenden Antworten an: 1 = stimme voll und ganz zu, 7 = stimme ganz und gar nicht zu	To what extent do you agree to the following <u>statements regarding advertising in general</u>? Please click on the applicable answers: 1 = completely agree, 7 = completely disagree

Annex LXXV: Translation of Pollay und Mittal's (1993) Public Opinion toward Advertising Scale L1 to L10

German Translation	English Original Item	Construct
Werbung ist notwendig.	Advertising is essential.	B-G item, supplanted
Werbung ist eine nützliche Informationsquelle für örtliche (Sonder-)Verkäufe.	Advertising is a valuable source of information about local sales.	information
Im Allgemeinen ist Werbung irreführend.	In general, advertising is misleading.	falsity/no sense
Werbung ist oftmals unterhaltsam und lustig.	Quite often advertising is amusing and entertaining.	hedonic/pleasure
Werbung überredet Menschen Sachen zu kaufen, die sie nicht kaufen sollten.	Advertising persuades people to buy things they should not buy.	B-G item, supplanted
Der größte Teil der Werbung ist eine Beleidigung für die Intelligenz des durchschnittlichen Konsumenten.	Most advertising insults the intelligence of the average consumer.	falsity/no sense (B-G item)
Aus der Werbung lerne ich viel über Trends und was ich kaufen sollte, um Andere zu beeindrucken.	From advertising I learn about fashions and about what to buy to impress others.	social role and image
Werbung hilft uns dabei, unseren Lebensstandard zu erhöhen.	Advertising helps raise our standard of living.	B-G item, distal antecedent
Werbung führt zu besseren Produkten für die Allgemeinheit.	Advertising results in better products for the public.	B-G item, distal antecedent
Werbung teilt mir mit, was Menschen die einen ähnlichen Lebensstil führen wie ich, kaufen und verwenden.	Advertising tells me what people with lifestyles similar to mine are buying and using.	social role and image
Werbung macht aus uns eine materialistische Gesellschaft, die nur dran interessiert ist, Dinge zu kaufen und zu besitzen.	Advertising is making us a materialistic society, overly interested in buying and owning things.	materialism
Werbung sagt mir, welche Marken die Eigenschaften besitzen, nach denen ich suche.	Advertising tells me which brands have the features I am looking for.	information
Werbung fördert unerwünschte Werte in unserer Gesellschaft.	Advertising promotes undesirable values in our society.	value corruption
Manchmal habe ich Freude daran, darüber nachzudenken was ich in der Werbung gesehen, gehört oder gelesen habe.	Sometimes I take pleasure in thinking about what I saw or heard or read in advertisements.	hedonic/pleasure
Werbung sorgt dafür, dass Menschen unerschwingliche Produkte kaufen, nur um damit anzugeben.	Advertising makes people buy unaffordable products just to show off.	materialism

Im Allgemeinen führt Werbung zu niedrigeren Preisen.	In general, advertising results in lower prices.	B-G item, distal antecedent
Werbung hilft mir dabei zu erkennen, welches Produkt widerspiegelt bzw. nicht widerspiegelt, was für eine Art Mensch ich bin.	Advertising helps me know which products will or will not reflect the sort of person I am.	social role and image
Im Allgemeinen zeigt Werbung das wahre Bild des beworbenen Produkts.	In general, advertisements present a true picture of the product advertised.	falsity/no sense B-G item
Manchmal ist Werbung unterhaltsamer als andere Medieninhalte.	Sometimes advertisements are even more enjoyable than other media contents.	hedonic/pleasure
Im Allgemeinen hilft Werbung der Wirtschaft unseres Staates.	In general, advertising helps our nation's economy.	good for the economy
Die meiste Werbung verzerrt die Werte der Jugend.	Most advertising distorts the values of our youth.	value corruption
Werbung hilft mir dabei, über Produkte und Dienstleistungen, die auf dem Markt angeboten werden, auf dem Laufenden zu bleiben.	Advertising helps me keep up to date about products/services available in the marketplace.	information
Zum Großteil verschwendet Werbung ökonomische Ressourcen.	Mostly, advertising is wasteful of economic resources.	good for the economy
Alles in allem, halte ich Werbung für eine gute Sache.	Overall, I consider advertising a good thing.	global attitude
Werbung lässt Menschen in einer Phantasiewelt leben.	Advertising makes people live in a world of fantasy.	materialism
Heutzutage gibt es viel zu viel Sex in der Werbung.	There is too much sex in advertising today.	additional item, distal antecedent
Wegen der Werbung kaufen Menschen viele Dinge, die sie gar nicht brauchen.	Because of advertising, people buy a lot of things they do not really need.	materialism
Ich habe grundsätzlich keine gute Meinung über Werbung.	My general opinion of advertising is unfavorable.	global attitude
Im Allgemeinen fördert Werbung den Wettbewerb, wovon die Konsumenten profitieren.	In general, advertising promotes competition, which benefits the consumer.	good for the economy
Einige Produkte / Dienstleistungen, die in der Werbung beworben werden, sind schlecht für unsere Gesellschaft.	Some products/services promoted in advertising are bad for our society.	global attitude, additional item, distal antecedent

**Annex LXXVI: Translation Main Study Questionnaire Open Ended Suspicion Probe
Page 21**

German Main Study Questionnaire Page 21	English Translation
Welchen <u>wissenschaftlichen Zweck</u> bzw. welche <u>wissenschaftliche Fragestellung</u> verfolgt die <u>MOBIstudie</u> Ihrer Meinung nach?	Which <u>scientific purpose</u> or which <u>scientific question</u> does the MOBIstudie pursue in your opinion?
Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Antwort ein.	Please click into the empty text field and fill in your answer.
Falls Sie den Zweck bzw. die Fragestellung der MOBIstudie nicht kennen, schreiben Sie bitte „weiß nicht“ in das Feld.	In case you do not know the purpose or question that the MOBIstudie pursues please type in “don’t know” in to the text field.

Annex LXXVII: Translation Main Study Questionnaire Willingness to Participate in Another Study Page 22

German Main Study Questionnaire Page 22	English Translation
Sie sind am Ende der Studie angelangt. An dieser Stelle bitten wir Sie, uns bei einer weiteren Studie zu unterstützen.	You have reached the end of the study. At this point we kindly ask you for your support in a further study.
J##### R####, externe Doktorandin des Lehrstuhls, führt dieses Jahr für ihre Doktorarbeit eine etwa 10-minütige Online-Studie zum Verhalten von Stromkunden durch. Die Studie ist nicht kommerziell und dient einem rein wissenschaftlichen Zweck. Bitte geben Sie Ihre E-Mail-Adresse in das vorgesehene Feld ein, wenn Sie an der Studie teilnehmen möchten. Sie werden dann per E-Mail eingeladen. Alle E-Mail-Adressen werden im Anschluss an die Studie gelöscht und nicht an Dritte weitergegeben. Ihre Teilnahme bleibt anonym.	J##### R####, external doctoral candidate at our chair, is going to conduct a 10-minute-long online study about the behavior of electricity rate payers. The study is not commercial and follows a purely scientific purpose. Please enter your e-mail address into the designated text field, in case you want to participate in the study. In this case you will be invited by e-mail. All e-mail addresses will be deleted subsequent to the study and not handed on to third parties. Your participation remains anonymously.
Als „Dankeschön“ verlosen wir unter den Teilnehmern einen attraktiven Preis!	As a “thank you” we are going to raffle attractive prizes among all participants!
Klicken Sie bitte in das Feld und tragen Sie Ihre <u>E-Mail-Adresse</u> ein, wenn Sie an der Studie von J##### R#### teilnehmen wollen. Lassen Sie das Feld leer, wenn Sie nicht teilnehmen wollen. Drücken Sie im Anschluss den „Weiter“-Button um auf die nächste Seite zu gelangen.	Please click into the empty text field and fill in your e-mail address in case you want to participate in J##### R####’s study. Leave the field empty in case you do not want to participate. Subsequently press the “continue”-button to go to the next page.

Annex LXXVIII: Translation Main Study Questionnaire Recommendation Form Page 22

German Main Study Questionnaire Page 23	English Translation
Vielen Dank für die Beantwortung unserer Fragen. Empfehlen Sie die <i>MOBIstudie</i> jetzt an Ihre Bekannten, Freunde und Verwandten weiter!	Thank you for answering our questions. Now, recommend the <i>MOBIstudie</i> to your acquaintances, friends and relatives!
Tragen Sie die E-Mail-Adresse Ihrer Bekannten, Freunde und Verwandten ein und klicken Sie auf „Weiter“, um unsere Forschung zu unterstützen und die <i>MOBIstudie</i> weiterzuempfehlen. Im Anschluss versenden wir von unserem E-Mail-Account aus in Ihrem Namen eine kurze Einladungs-E-Mail. Ihr Name und Ihre E-Mail-Adresse werden nicht zusammen mit den Befragungsdaten gespeichert und nach dem Versenden der Einladungen aus der Datenbank gelöscht.	Enter the e-mail address of your acquaintances, friends and relatives and press “continue” in order to support our research by recommending the <i>MOBIstudie</i>. Subsequently, we will send a short invitational e-mail from our e-mail account in behalf of you. Your name and your e-mail address will not be saved together with survey data and deleted from the database upon sending of invitations.
Wenn Sie die <i>MOBIstudie</i> nicht weiterempfehlen möchten, klicken Sie einfach auf „Weiter“.	In case you do not want to recommend the <i>MOBIstudie</i> simply click „continue“.
Ihr Name:	Your name:
Ihre E-Mail Adresse:	Your e-mail address:
Die E-Mail-Adresse der <u>1.Person</u>, an die Sie unsere Studie weiterempfehlen möchten:	E-mail address of the 1st person to whom you would like recommend our study to:
usw.	etc.

Annex LXXIX: Translation Main Study Questionnaire Page 24

German Main Study Questionnaire Page 24	English Translation
Gibt es darüber hinaus noch etwas, was Sie dem MOBIstudie-Projektteam mitteilen möchten? Bitte klicken Sie in das leere Textfeld und tragen Sie Ihre Mitteilung ein. Lassen Sie das Textfeld leer und klicken Sie den „Weiter“-Button, wenn Sie uns nichts mitteilen möchten.	Is there anything else you would like to tell the project team responsible for the MOBIstudie? Please click into the empty text field and fill in your message. Leave the text field empty and click the “continue”-button in case you do not want to tell us anything.

Annex LXXX: Translation Main Study Questionnaire Page 25

German Main Study Questionnaire Page 25	English Translation
Vielen Dank, Ihre Nachricht wurde übermittelt. Ich danke Ihnen für die Teilnahme an der MOBIstudie! Sobald die Studie ausgewertet ist, erhalten alle Teilnehmer online Einblick in die Forschungsergebnisse. Sie können das Browser-Fenster jetzt schließen.	Thank you. Your message has been sent. I would like to thank you for your participation in the MOBIstudie! All participants will receive insight into the results of this research as soon as the study has been evaluated. You may close the browser window now.

Annex LXXXI: Multiple Binary Logistic Regression Total Model #1

	-2LL=5,632.294 -2LR- χ^2 =540.418 Nagelkerke-Pseudo-R ² =,143				
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
mode _{sur}	.209	.065	10.287	.001***	1.232
mode _{inv}	-.370	.065	32.103	.000***	.691
pp _s	.388	.039	98.640	.000***	1.475
pp _m	.223	.020	128.570	.000***	1.250
ip _e	.099	.025	16.198	.000***	1.104
ip _s	-.174	.032	29.294	.000***	.840
iu _s	-.034	.035	.942	.332	.966
iu _m	.000	.027	.000	.997	1.000
eu _s	.017	.030	.341	.559	1.018
eu _m	-.011	.025	.185	.667	.989
ii	-.009	.021	.177	.674	.991
it	.058	.022	6.967	.008***	1.060
age _{ms}	-.140	.069	4.054	.044**	.869
gen	-.585	.069	72.679	.000***	.557
sou	-.476	.099	23.129	.000***	.622
DVA ₁	-.540	.163	10.981	.001***	.583
DVA ₂	-.946	.464	4.158	.041**	.388
const.	-.136	.116	1.388	.239	.873

Dependent variable: PAR; N=5,124.

Annex LXXXII: Multiple Binary Logistic Regression Analysis for Total Models #2 to #5

models #2 to #5	-2LL=5,546.841 -2LR- χ^2 =625.871 Nagelkerke-Pseudo-R ² =.164				
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
expgr _x	see table below				
pp _s	.397	.039	101.098	.000***	1.487
pp _m	.232	.020	135.478	.000***	1.261
ip _e	.098	.025	15.487	.000***	1.103
ip _s	-.184	.032	32.119	.000***	.832
iu _s	-.030	.036	.701	.403	.971
iu _m	-.004	.027	.019	.890	.996
eu _s	.012	.030	.162	.688	1.012
eu _m	-.012	.026	.213	.645	.988
ii	-.005	.021	.065	.799	.995
it	.057	.022	6.476	.011**	1.058
age _{ms}	-.148	.070	4.433	.035**	.863
gen	-.573	.069	68.670	.000***	.564
sou	-.471	.100	22.371	.000***	.624
DVA ₁	-.573	.164	12.170	.000***	.564
DVA ₂	-1.020	.469	4.733	.030**	.361
const.	see table below				

Dependent variable: PAR; 1 ≤ x ≤ 4; N=5,124.

<i>model number</i>	<i>reference group</i>	<i>comparison group</i>			
		<i>expgr₂</i>	<i>expgr₃</i>	<i>expgr₄</i>	<i>const.</i>
#2	expgr ₁	B=.787 SE=.092 Wald=73.685 p=.000*** OR=2.196	B=.258 SE=.094 Wald=7.433 p=.006 OR=1.294	B=-.172 SE=.098 Wald=3.090 p=.079* OR=.842	B=-.456 SE=.123 Wald=13.793 p=.000*** OR=.634
#3	expgr ₂	/	B=-.529 SE=.089 Wald=35.431 p=.000*** OR=.589	B=-.959 SE=.093 Wald=106.098 p=.000*** OR=.383	B=.331 SE=.118 Wald=7.825 p=.005*** OR=1.392
#4	expgr ₃	/	/	B=-.430 SE=.096 Wald=20.195 p=.000*** OR=.651	B=-.198 SE=.121 Wald=2.696 p=.101 OR=.820
#5	expgr ₄	/	/	/	B=-.628 SE=.123 Wald=26.079 p=.000*** OR=.534

Annex LXXXIII: Multiple Binary Logistic Regression Total Model #6

-2LL=5,309.100 -2LR- χ^2 =863.612 Nagelkerke-Peudo-R ² =.221					
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
expgr ₁	.184	.100	3.359	.067*	1.202
expgr ₂	.997	.096	108.796	.000***	2.709
expgr ₃	.452	.098	21.157	.000***	1.571
ea ₁	.053	.041	1.635	.201	1.054
ea ₂	.372	.042	76.583	.000***	1.450
ea ₃	.047	.028	2.779	.095*	1.048
ea ₄	-.280	.021	175.705	.000***	.756
pp _s	.436	.041	113.367	.000***	1.546
pp _m	.256	.021	147.949	.000***	1.292
ip _e	.104	.026	16.301	.000***	1.110
ip _s	-.196	.034	34.061	.000***	.822
iu _s	-.037	.037	1.000	.317	.964
iu _m	-.011	.028	.151	.697	.989
eu _s	-.019	.032	.348	.555	.981
eu _m	.006	.028	.046	.830	1.006
ii	.002	.022	.009	.924	1.002
it	.068	.023	8.998	.003***	1.071
age _{ms}	-.118	.072	2.674	.102	.889
gen	-.592	.072	67.819	.000***	.553
sou	-.471	.103	21.101	.000***	.624
DVA ₁	-.815	.172	22.500	.000***	.443
DVA ₂	-1.344	.481	7.810	.005***	.261
const.	-.692	.127	29.860	.000***	.500

Dependent variable: PAR; N=5,124.

Annex LXXXIV: Multiple Binary Logistic Regression Total Model #7

-2LL=5,300.769 -2LR- χ^2 =871.943 Nagelkerke-Pseudo-R ² =.223					
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
expgr ₂	.797	.095	70.941	.000***	2.219
expgr ₃	.277	.097	8.091	.004***	1.319
expgr ₄	-.191	.101	3.573	.059**	.826
ea ₂	.351	.040	78.759	.000***	1.421
ea ₃	.075	.026	8.343	.004***	1.078
ea ₄	-.268	.023	138.784	.000***	.765
expgr ₂ · ea ₂	.187	.069	7.457	.006***	1.206
expgr ₃ · ea ₃	-.037	.048	.587	.444	.964
expgr ₄ · ea ₄	-.037	.043	.730	.393	.964
pp _s	.433	.041	111.660	.000***	1.541
pp _m	.258	.021	149.745	.000***	1.295
ip _e	.106	.026	16.882	.000**	1.112
ip _s	-.198	.034	34.935	.000***	.820
iu _s	-.039	.037	1.133	.287	.962
iu _m	-.012	.028	.173	.678	.988
eu _s	-.026	.031	.673	.412	.975
eu _m	.017	.027	.421	.516	1.017
ii	.003	.022	.018	.893	1.003
it	.068	.023	8.869	.003***	1.070
age _{ms}	-.123	.072	2.902	.088*	.885
gen	-.600	.072	69.536	.000***	.549
sou	-.472	.103	21.149	.000***	.624
DVA ₁	-.860	.171	25.294	.000***	.423
DVA ₂	-1.358	.482	7.941	.005***	.257
const.	-.495	.126	15.324	.000***	.610

Dependent variable: PAR; N=5,124.

Annex LXXXV: Multiple Binary Logistic Regression Total Model #8

	-2LL=5,339.895 -2LR- χ^2 =832.817 Nagelkerke-Pseudo-R ² =.214				
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
expgr ₁	-.917	.098	87.244	.000***	.400
expgr ₃	-.517	.091	32.542	.000***	.597
expgr ₄	-.991	.095	108.931	.000***	.371
ea ₁	.175	.036	23.698	.000***	1.192
ea ₃	-.013	.029	.191	.662	.987
ea ₄	-.245	.023	117.492	.000***	.782
expgr ₁ · ea ₁	.420	.063	44.876	.000***	1.522
expgr ₃ · ea ₃	.021	.048	.191	.662	1.021
expgr ₄ · ea ₄	.001	.043	.001	.975	1.001
pp _s	.445	.041	119.769	.000***	1.560
pp _m	.250	.021	141.862	.000***	1.284
ip _e	.117	.026	20.836	.000***	1.125
ip _s	-.200	.034	35.490	.000***	.819
iu _s	-.034	.036	.857	.354	.967
iu _m	-.003	.028	.016	.900	.997
eu _s	.047	.031	2.275	.132	1.048
eu _m	-.063	.027	5.433	.020**	.939
ii	-.006	.022	.083	.773	.994
it	.068	.023	8.963	.003***	1.070
age _{ms}	-.122	.072	2.924	.087*	.885
gen	-.552	.071	59.643	.000***	.576
sou	-.470	.102	21.165	.000***	.625
DVA ₁	-.536	.168	10.115	.001***	.585
DVA ₂	-1.200	.475	6.371	.012**	.301
const.	.277	.121	5.222	.022**	1.319

Dependent variable: PAR; N=5,124.

Annex LXXXVI: Multiple Binary Logistic Regression Total Model #9

	-2LL= 5,244.400 -2LR- χ^2 = 928.312 Nagelkerke-Pseudo-R ² = .237				
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
expgr ₁	-.400	.102	15.534	.000***	.670
expgr ₂	.509	.092	30.832	.000***	1.664
expgr ₄	-.466	.098	22.515	.000***	.628
ea ₁	.001	.036	.000	.985	1.001
ea ₂	.283	.045	39.574	.000***	1.326
ea ₄	-.294	.024	156.585	.000***	.745
expgr ₁ · ea ₁	.460	.063	53.764	.000***	1.583
expgr ₂ · ea ₂	.282	.070	16.380	.000***	1.325
expgr ₄ · ea ₄	.024	.043	.302	.582	1.024
pp _s	.441	.041	114.393	.000***	1.554
pp _m	.270	.021	161.661	.000***	1.310
ip _e	.111	.026	18.269	.000***	1.117
ip _s	-.207	.034	37.272	.000***	.813
iu _s	-.041	.037	1.255	.263	.960
iu _m	-.002	.028	.007	.932	.998
eu _s	-.015	.032	.213	.644	.985
eu _m	-.004	.028	.023	.880	.996
ii	-.001	.022	.002	.963	.999
it	.072	.023	9.972	.002***	1.075
age _{ms}	-.108	.072	2.234	.135	.897
gen	-.608	.072	70.502	.000***	.545
sou	-.480	.103	21.632	.000***	.619
DVA ₁	-.869	.175	24.618	.000***	.419
DVA ₂	-1.323	.477	7.699	.006***	.266
const.	-.202	.125	2.619	.106	.817

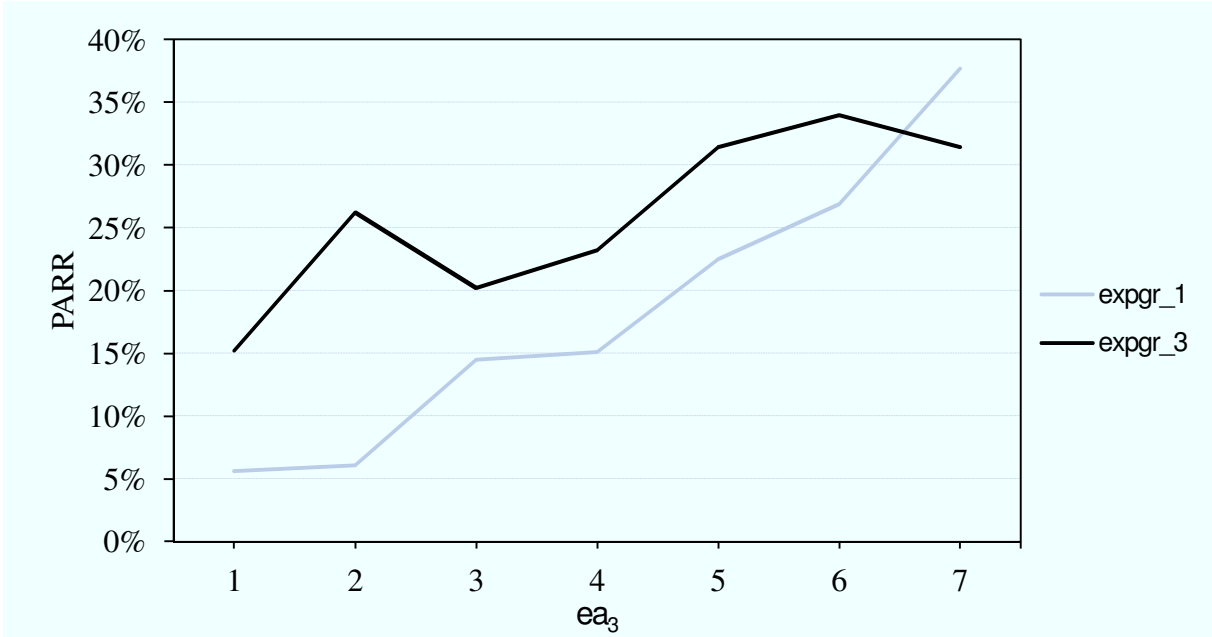
Dependent variable: PAR; N=5,124.

Annex LXXXVII: Multiple Binary Logistic Regression Total Model #10

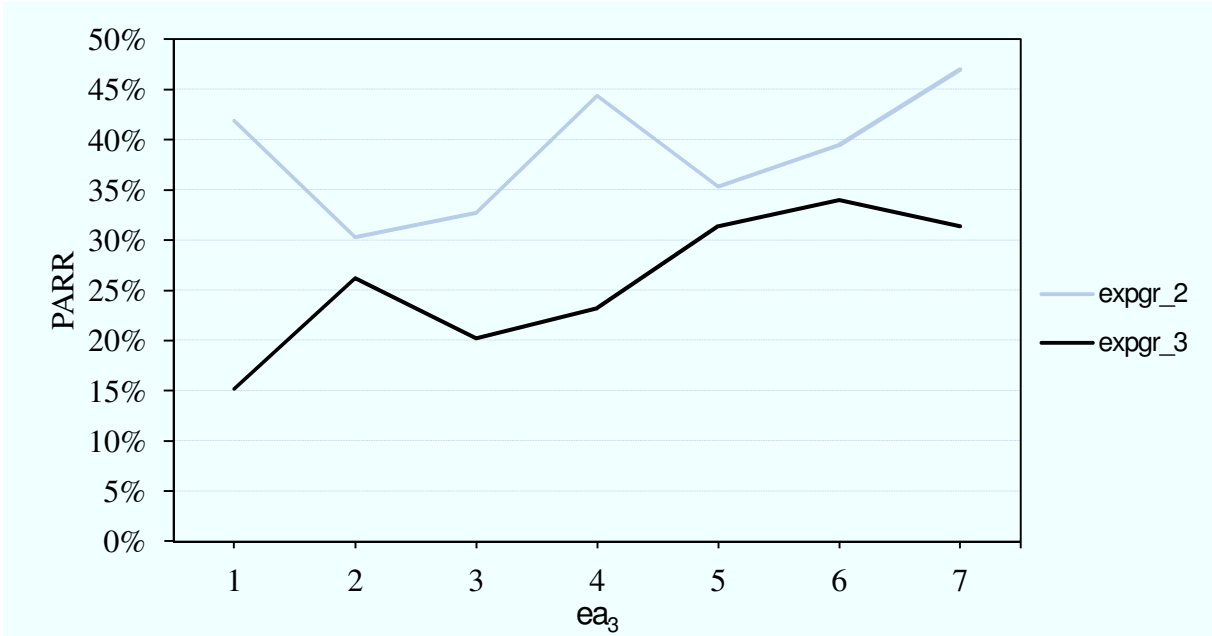
	-2LL=5,436.928 -2LR- χ^2 =735.784 Nagelkerke-Pseudo-R ² = .191				
<i>variable label</i>	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>p</i>	<i>OR</i>
expgr ₁	.044	.103	.185	.667	1.045
expgr ₂	.928	.094	98.288	.000***	2.530
expgr ₃	.411	.096	18.265	.000***	1.508
ea ₁	-.154	.041	13.710	.000***	.858
ea ₂	.174	.044	15.446	.000***	1.190
ea ₃	.041	.030	1.892	.169	1.042
expgr ₁ · ea ₁	.419	.061	47.416	.000***	1.520
expgr ₂ · ea ₂	.260	.068	14.714	.000***	1.297
expgr ₃ · ea ₃	.029	.048	.366	.545	1.029
pp _s	.386	.040	93.174	.000***	1.471
pp _m	.231	.021	125.589	.000***	1.260
ip _e	.083	.025	10.599	.001***	1.086
ip _s	-.201	.033	37.078	.000***	.818
iu _s	-.029	.036	.666	.415	.971
iu _m	-.006	.028	.042	.838	.994
eu _s	-.025	.031	.630	.427	.976
eu _m	.017	.027	.371	.542	1.017
ii	-.010	.021	.208	.648	.990
it	.057	.022	6.422	.011**	1.059
age _{ms}	-.131	.071	3.389	.066*	.878
gen	-.569	.071	64.422	.000***	.566
sou	-.479	.101	22.618	.000***	.619
DVA ₁	-.743	.171	18.930	.000***	.476
DVA ₂	-1.146	.472	5.897	.015**	.318
const.	-.601	.124	23.488	.000***	.548

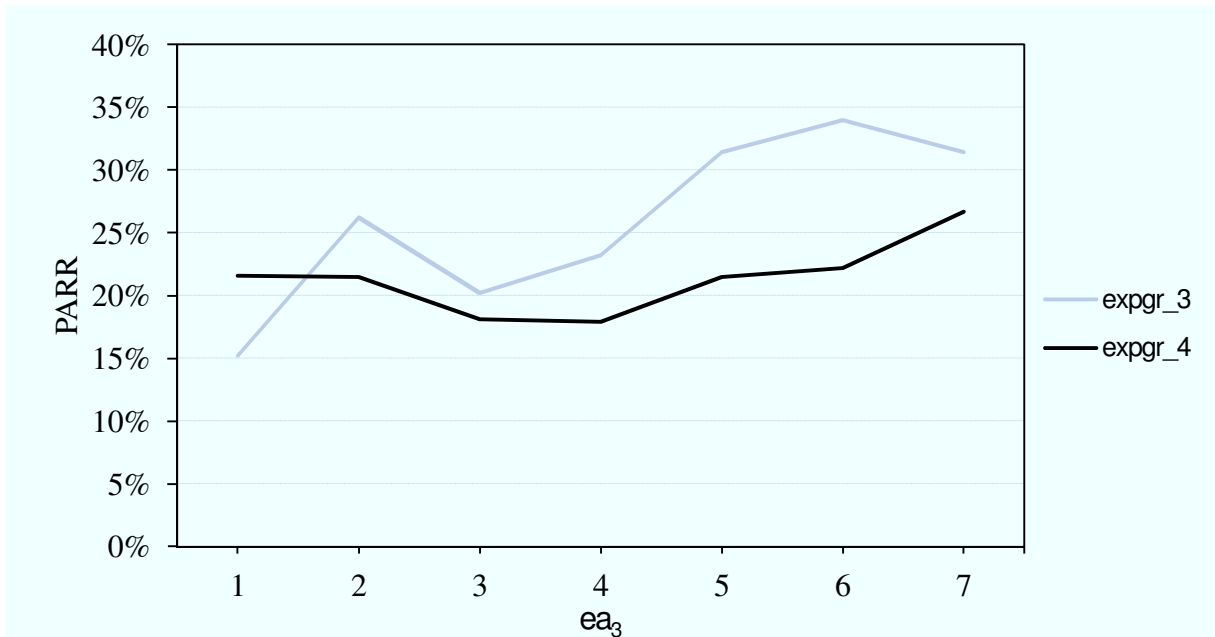
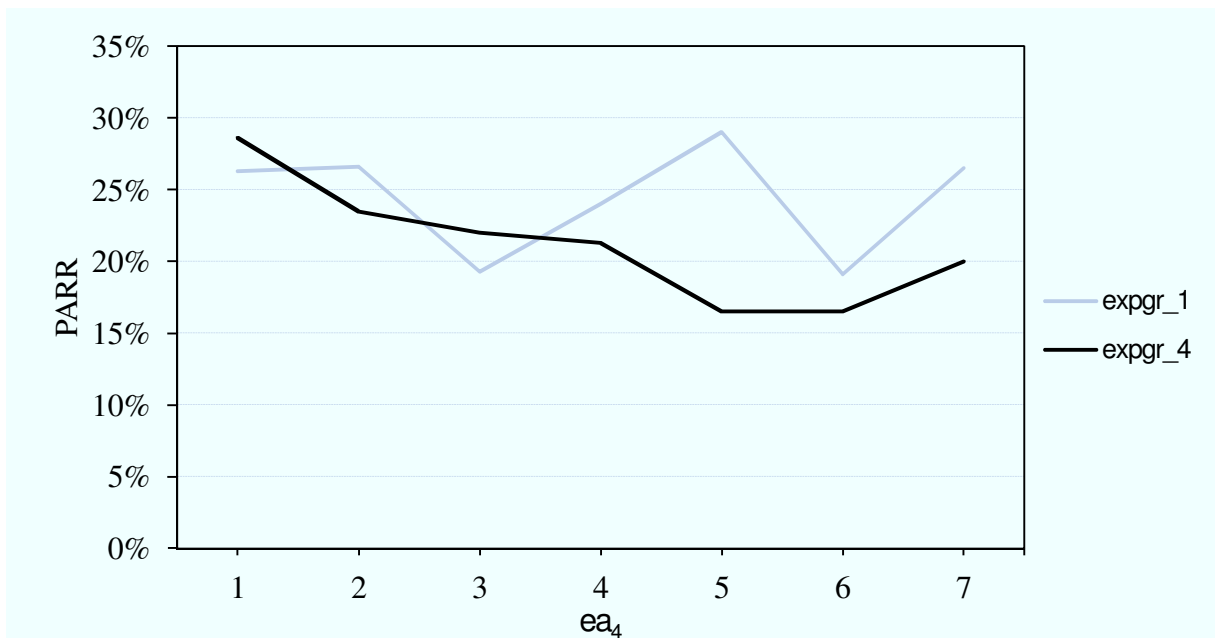
Dependent variable: PAR; N=5,124.

Annex LXXXVIII : Interaction Term $\text{expgr}_3 \cdot \text{ea}_3$ for Reference Group expgr_1

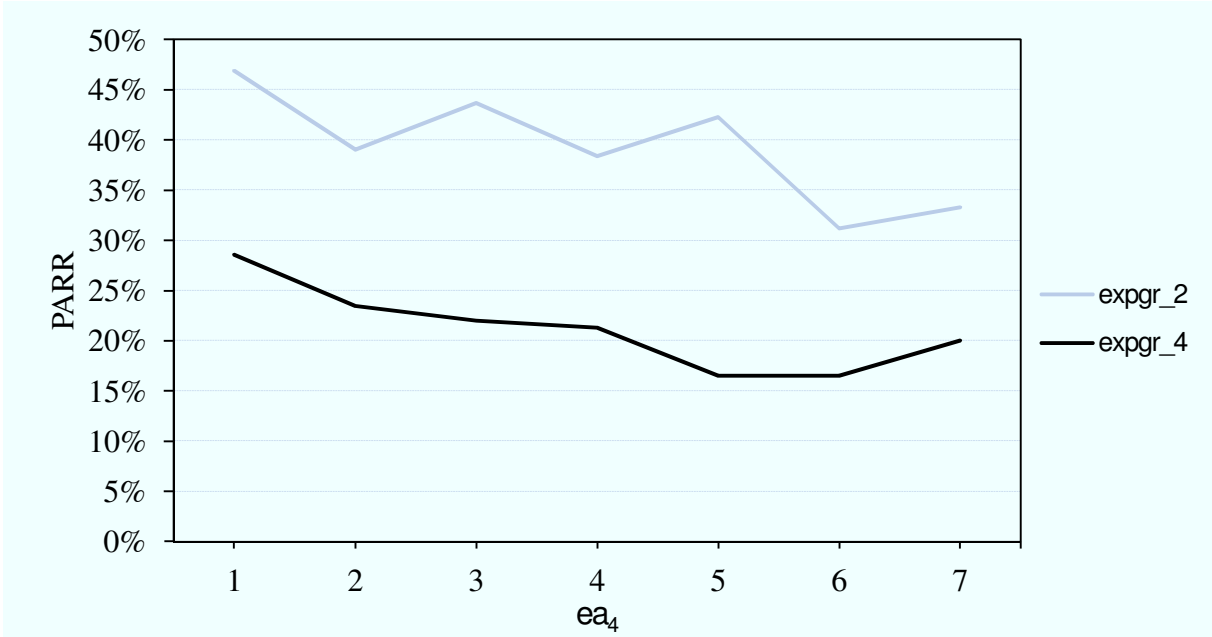


Annex LXXXIX : Interaction Term $\text{expgr}_3 \cdot \text{ea}_3$ for Reference Group expgr_2

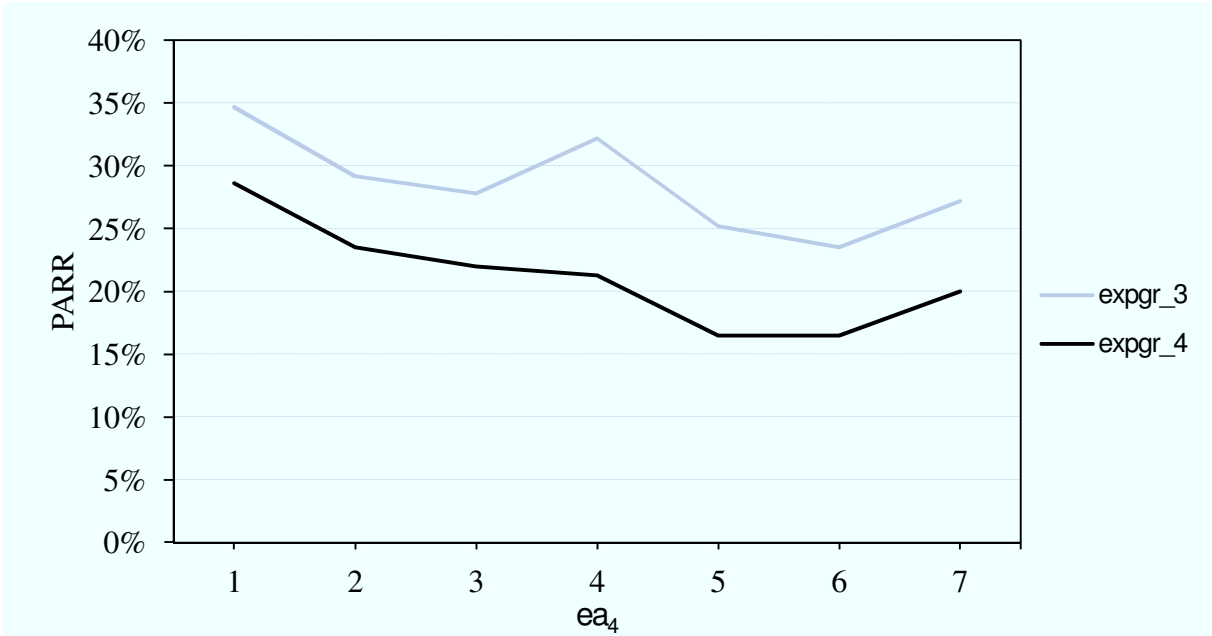


Annex XC: Interaction Term $\text{expgr}_3 \cdot \text{ea}_3$ for Reference Group expgr_4 **Annex XCI: Interaction Term $\text{expgr}_4 \cdot \text{ea}_4$ for Reference Group expgr_1** 

Annex XCII: Interaction Term $\text{expgr}_4 \cdot \text{ea}_4$ for Reference Group expgr_2



Annex XCIII: Interaction Term $\text{expgr}_4 \cdot \text{ea}_4$ for Reference Group expgr_3



**Annex XCIV: Evaluation Results of Metric Variables Measured in Main Study
Stationary Web Survey vs. Mobile Web Survey**

var	stationary web survey	mobile web survey	Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1- β
iac ₁	$\mu=4.60$ $\sigma=2.085$ N=774	$\mu=4.44$ $\sigma=2.202$ N=643	6.935	.009***	1.380	1,338	.074	.168	.283
iac ₂	$\mu=4.69$ $\sigma=1.758$ N=755	$\mu=4.75$ $\sigma=1.843$ N=652	2.847	.092*	-.592	1,354	-.032	.554	.092
iac ₃	$\mu=3.41$ $\sigma=2.029$ N=776	$\mu=3.28$ $\sigma=2.014$ N=664	.306	.580	1.209	1,438	.064	.227	.227
iac ₄	$\mu=3.71$ $\sigma=1.815$ N=788	$\mu=3.59$ $\sigma=1.911$ N=678	3.122	.077*	1.245	1,407	.065	.213	.236
iac ₅	$\mu=3.28$ $\sigma=1.707$ N=678	$\mu=3.42$ $\sigma=1.702$ N=600	.004	.948	-1.509	1,276	-.085	.132	.329
iac ₆	$\mu=3.63$ $\sigma=2.064$ N=761	$\mu=3.98$ $\sigma=2.096$ N=662	.077	.782	-3.176	1,421	-.168	.002***	.885
iac ₇	$\mu=2.66$ $\sigma=1.669$ N=781	$\mu=2.93$ $\sigma=1.843$ N=665	6.285	.012**	-2.868	1,353	-.152	.004***	.821
iac ₈	$\mu=2.97$ $\sigma=1.791$ N=716	$\mu=3.18$ $\sigma=1.868$ N=619	2.044	.153	-2.035	1,333	-.112	.042**	.532
tac ₁	$\mu=4.00$ $\sigma=1.984$ N=781	$\mu=3.94$ $\sigma=1.967$ N=669	.151	.698	.544	1,448	.029	.587	.085
tac ₂	$\mu=3.81$ $\sigma=1.926$ N=792	$\mu=3.88$ $\sigma=1.902$ N=679	.313	.576	-.668	1,469	-.035	.504	.103
tac ₃	$\mu=3.52$ $\sigma=1.997$ N=784	$\mu=3.6$ $\sigma=2.062$ N=677	1.616	.204	-.783	1,459	-.041	.434	.122
tac ₄	$\mu=3.73$ $\sigma=1.730$ N=789	$\mu=3.75$ $\sigma=1.803$ N=683	2.893	.089*	-.208	1,421	-.011	.836	.055
tac ₅	$\mu=3.75$ $\sigma=1.872$ N=735	$\mu=3.78$ $\sigma=1.817$ N=634	1.441	.230	-.250	1,367	-.014	.803	.058
tac ₆	$\mu=3.87$ $\sigma=1.768$ N=762	$\mu=4.02$ $\sigma=1.751$ N=652	1.060	.303	-1.571	1,412	-.084	.117	.350
tac ₇	$\mu=4.18$ $\sigma=1.602$ N=591	$\mu=4.24$ $\sigma=1.652$ N=507	.257	.612	-.643	1,096	-.039	.521	.099
tac ₈	$\mu=3.70$ $\sigma=1.939$ N=721	$\mu=3.87$ $\sigma=1.959$ N=639	.046	.830	-1.577	1,358	-.086	.115	.353

tac ₉	$\mu=3.71$ $\sigma=1.929$ N=785	$\mu=3.64$ $\sigma=1.879$ N=680	1.365	.243	.752	1,463	.039	.452	.115
tac ₁₀	$\mu=2.86$ $\sigma=1.847$ N=628	$\mu=3.13$ $\sigma=1.967$ N=531	3.646	.056*	-2.414	1,099	-.143	.016**	.679
tac ₁₁	$\mu=4.96$ $\sigma=1.815$ N=765	$\mu=5.19$ $\sigma=1.722$ N=653	1.934	.165	-2.472	1,416	-.131	.014**	.690
tac ₁₂	$\mu=3.26$ $\sigma=1.956$ N=781	$\mu=3.28$ $\sigma=1.957$ N=672	.101	.750	-.174	1,451	-.009	.862	.053
tac ₁₃	$\mu=4.31$ $\sigma=2.162$ N=792	$\mu=4.49$ $\sigma=2.067$ N=678	5.984	.015**	-1.640	1,450	-.085	.101	.368
tac ₁₄	$\mu=2.57$ $\sigma=1.633$ N=787	$\mu=2.77$ $\sigma=1.714$ N=677	1.314	.252	-2.207	1,462	-.116	.027**	.599
tac ₁₅	$\mu=3.14$ $\sigma=1.737$ N=777	$\mu=3.28$ $\sigma=1.790$ N=674	2.078	.150	-1.465	1,449	-.077	.143	.310
real ₁	$\mu=5.95$ $\sigma=1.270$ N=800	$\mu=5.99$ $\sigma=1.238$ N=685	.008	.930	-.612	1,483	-.032	.541	.094
real ₂	$\mu=2.32$ $\sigma=1.994$ N=789	$\mu=2.42$ $\sigma=2.104$ N=680	3.509	.061*	-.902	1,409	-.047	.367	.146
real ₃	$\mu=3.98$ $\sigma=2.025$ N=790	$\mu=3.94$ $\sigma=1.949$ N=674	5.214	.023**	.410	1,441	.021	.682	.069
real ₄	$\mu=6.20$ $\sigma=1.223$ N=797	$\mu=6.23$ $\sigma=1.132$ N=684	.245	.621	-.532	1,479	-.028	.595	.084
real ₅	$\mu=1.33$ $\sigma=1.040$ N=782	$\mu=1.37$ $\sigma=1.173$ N=675	2.468	.116	-.771	1,455	-.040	.441	.118
real ₆	$\mu=2.67$ $\sigma=2.438$ N=787	$\mu=2.72$ $\sigma=2.430$ N=677	.024	.877	-.419	1,462	-.022	.675	.070
real ₇	$\mu=5.12$ $\sigma=2.416$ N=794	$\mu=5.48$ $\sigma=2.190$ N=681	22.748	.000***	-2.989	1,468	-.155	.003***	.843
real ₈	$\mu=1.26$ $\sigma=.944$ N=783	$\mu=1.27$ $\sigma=.973$ N=670	.017	.896	-.136	1,451	-.007	.892	.052
real ₉	$\mu=5.23$ $\sigma=2.163$ N=796	$\mu=5.44$ $\sigma=1.955$ N=676	11.570	.001***	-1.960	1,464	-.102	.050*	.496
real ₁₀	$\mu=3.60$ $\sigma=2.581$ N=792	$\mu=3.64$ $\sigma=2.454$ N=678	15.617	.000***	-.269	1,452	-.014	.788	.058
real ₁₁	$\mu=1.66$ $\sigma=1.643$ N=793	$\mu=1.76$ $\sigma=1.744$ N=678	4.101	.043**	-1.219	1,403	-.064	.223	.231
real ₁₂	$\mu=2.20$ $\sigma=2.045$ N=793	$\mu=2.32$ $\sigma=2.119$ N=680	3.107	.078*	-1.040	1,420	-.055	.298	.183

real ₁₃	$\mu=5.75$ $\sigma=1.500$ N=796	$\mu=5.78$ $\sigma=1.418$ N=681	.914	.339	-.315	1,475	-.016	.753	.061
real ₁₄	$\mu=4.63$ $\sigma=2.279$ N=791	$\mu=4.82$ $\sigma=2.073$ N=676	22.826	.000***	-1.695	1,459	-.088	.090*	.389
real ₁₅	$\mu=1.88$ $\sigma=1.879$ N=784	$\mu=2.04$ $\sigma=2.012$ N=671	8.255	.004***	-1.639	1,384	-.087	.101	.380
fake ₁	$\mu=1.69$ $\sigma=1.388$ N=787	$\mu=1.71$ $\sigma=1.416$ N=675	.387	.534	-.363	1,460	-.019	.717	.065
fake ₂	$\mu=1.63$ $\sigma=1.305$ N=780	$\mu=1.66$ $\sigma=1.362$ N=673	.552	.458	-.371	1,451	-.020	.711	.067
fake ₃	$\mu=1.57$ $\sigma=1.385$ N=785	$\mu=1.58$ $\sigma=1.360$ N=676	.003	.954	-.201	1,459	-.011	.841	.055
fake ₄	$\mu=1.24$ $\sigma=.858$ N=787	$\mu=1.23$ $\sigma=.904$ N=675	.153	.696	.237	1,460	.012	.812	.056
fake ₅	$\mu=1.49$ $\sigma=1.279$ N=786	$\mu=1.52$ $\sigma=1.282$ N=671	.242	.622	-.488	1,455	-.026	.626	.078
fake ₆	$\mu=1.46$ $\sigma=1.240$ N=780	$\mu=1.52$ $\sigma=1.257$ N=667	1.949	.163	-.967	1,445	-.051	.334	.162
fake ₇	$\mu=1.53$ $\sigma=1.294$ N=793	$\mu=1.53$ $\sigma=1.31$ N=679	.002	.968	-.085	1,470	-.004	.932	.051
fake ₈	$\mu=1.19$ $\sigma=.727$ N=789	$\mu=1.22$ $\sigma=.886$ N=681	2.393	.122	-.767	1,468	-.040	.443	.119
fake ₉	$\mu=1.32$ $\sigma=.998$ N=783	$\mu=1.25$ $\sigma=.931$ N=674	7.466	.006***	1.544	1,446	.081	.123	.338
fake ₁₀	$\mu=1.23$ $\sigma=.841$ N=784	$\mu=1.26$ $\sigma=.934$ N=673	1.463	.227	-.645	1,455	-.034	.519	.099
pota _{ga1}	$\mu=4.25$ $\sigma=1.633$ N=797	$\mu=4.36$ $\sigma=1.525$ N=676	3.660	.056*	-1.323	1,457	-.069	.186	.261
pota _{ga2}	$\mu=3.81$ $\sigma=1.866$ N=790	$\mu=3.87$ $\sigma=1.751$ N=679	6.456	.011**	-.594	1,456	-.031	.553	.091
pota _{in1}	$\mu=5.06$ $\sigma=1.636$ N=787	$\mu=4.92$ $\sigma=1.690$ N=676	1.548	.214	1.649	1,461	.086	.099*	.374
pota _{in2}	$\mu=4.82$ $\sigma=1.566$ N=799	$\mu=4.89$ $\sigma=1.477$ N=676	4.435	.035**	-.920	1,456	-.048	.357	.151
pota _{in3}	$\mu=3.55$ $\sigma=1.614$ N=791	$\mu=3.66$ $\sigma=1.617$ N=674	.014	.906	-1.270	1,463	-.067	.204	.248
pota _{fns1}	$\mu=4.34$ $\sigma=1.654$ N=795	$\mu=4.34$ $\sigma=1.586$ N=677	1.824	.177	.016	1,470	.001	.987	.050

$\text{pota}_{\text{fns2}}$	$\mu=4.55$ $\sigma=1.693$ $N=766$	$\mu=4.50$ $\sigma=1.715$ $N=667$	.171	.680	.587	1,431	.031	.557	.090
$\text{pota}_{\text{fns3}}$	$\mu=2.27$ $\sigma=1.244$ $N=791$	$\mu=2.31$ $\sigma=1.286$ $N=677$	1.006	.316	-.615	1,466	-.032	.539	.094
pota_{hp1}	$\mu=4.94$ $\sigma=1.486$ $N=801$	$\mu=4.78$ $\sigma=1.405$ $N=683$	.995	.319	2.044	1,482	.106	.041**	.530
pota_{hp2}	$\mu=4.04$ $\sigma=1.843$ $N=789$	$\mu=3.92$ $\sigma=1.859$ $N=662$	.233	.629	1.138	1,449	.060	.255	.206
pota_{hp3}	$\mu=4.28$ $\sigma=1.927$ $N=791$	$\mu=4.27$ $\sigma=1.802$ $N=672$	7.308	.007***	.098	1,448	.005	.922	.051
$\text{pota}_{\text{sri1}}$	$\mu=3.22$ $\sigma=1.876$ $N=775$	$\mu=3.29$ $\sigma=1.903$ $N=665$	.097	.756	-.749	1,438	-.040	.454	.118
$\text{pota}_{\text{sri2}}$	$\mu=3.32$ $\sigma=1.712$ $N=769$	$\mu=3.30$ $\sigma=1.725$ $N=667$	.003	.954	.282	1,434	.015	.778	.059
$\text{pota}_{\text{sri3}}$	$\mu=2.43$ $\sigma=1.586$ $N=752$	$\mu=2.50$ $\sigma=1.637$ $N=627$	.630	.428	-.822	1,377	-.044	.411	.128
pota_{ma1}	$\mu=4.61$ $\sigma=1.640$ $N=784$	$\mu=4.71$ $\sigma=1.619$ $N=672$	.494	.482	-1.176	1,454	-.062	.240	.218
pota_{ma2}	$\mu=5.05$ $\sigma=1.523$ $N=788$	$\mu=5.03$ $\sigma=1.558$ $N=662$	.014	.905	.293	1,448	.015	.769	.059
pota_{ma3}	$\mu=4.40$ $\sigma=1.707$ $N=782$	$\mu=4.26$ $\sigma=1.727$ $N=649$	.219	.640	1.563	1,429	.083	.118	.346
pota_{ma4}	$\mu=5.61$ $\sigma=1.322$ $N=794$	$\mu=5.62$ $\sigma=1.312$ $N=678$	.027	.871	-.245	1,470	-.013	.807	.057
pota_{vc1}	$\mu=4.44$ $\sigma=1.665$ $N=744$	$\mu=4.53$ $\sigma=1.635$ $N=630$	.274	.601	-1.037	1,372	-.056	.300	.179
pota_{vc2}	$\mu=4.62$ $\sigma=1.701$ $N=763$	$\mu=4.73$ $\sigma=1.603$ $N=635$	3.140	.077*	-1.251	1,375	-.067	.211	.238
$\text{pota}_{\text{avc1}}$	$\mu=3.64$ $\sigma=1.934$ $N=773$	$\mu=3.60$ $\sigma=1.862$ $N=656$	1.943	.164	.452	1,427	.024	.651	.074
$\text{pota}_{\text{avc2}}$	$\mu=5.03$ $\sigma=1.641$ $N=750$	$\mu=5.00$ $\sigma=1.580$ $N=646$	.462	.497	.385	1,394	.021	.700	.068
$\text{pota}_{\text{gfe1}}$	$\mu=4.92$ $\sigma=1.519$ $N=736$	$\mu=4.91$ $\sigma=1.472$ $N=619$	.273	.602	.199	1,353	.011	.842	.055
$\text{pota}_{\text{gfe2}}$	$\mu=4.14$ $\sigma=1.710$ $N=737$	$\mu=4.05$ $\sigma=1.628$ $N=616$	3.833	.050*	.971	1,328	.053	.332	.163
$\text{pota}_{\text{gfe3}}$	$\mu=4.70$ $\sigma=1.566$ $N=773$	$\mu=4.70$ $\sigma=1.525$ $N=660$	.713	.398	.017	1,431	.001	.987	.050

pota _{agfe1}	$\mu=2.69$ $\sigma=1.579$ N=765	$\mu=2.81$ $\sigma=1.641$ N=652	1.259	.262	-1.431	1,415	-.076	.153	.297
pota _{agfe2}	$\mu=2.76$ $\sigma=1.489$ N=749	$\mu=2.95$ $\sigma=1.586$ N=648	4.358	.037**	-2.303	1,337	-.124	.021**	.637
pota _{agfe3}	$\mu=2.74$ $\sigma=1.568$ N=728	$\mu=2.62$ $\sigma=1.442$ N=614	3.752	.053*	1.480	1,330	.081	.139	.315

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex XCV: Evaluation Results of Metric Variables Measured in Main Study E-Mail Invitations vs. SMS Invitations

var	e-mail invitations	SMS invitations	Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1- β
iac ₁	$\mu=4,55$ $\sigma=2,124$ N=785	$\mu=4,49$ $\sigma=2,161$ N=632	.608	.436	.545	1,415	.029	.586	.084
iac ₂	$\mu=4,74$ $\sigma=1,788$ N=773	$\mu=4,69$ $\sigma=1,811$ N=634	1.700	.192	.480	1,405	.026	.631	.077
iac ₃	$\mu=3,43$ $\sigma=2,014$ N=805	$\mu=3,26$ $\sigma=2,030$ N=635	.005	.943	1.602	1,438	.085	.109	.360
iac ₄	$\mu=3,65$ $\sigma=1,839$ N=816	$\mu=3,67$ $\sigma=1,887$ N=650	1.892	.169	-.255	1,464	-.013	.799	.057
iac ₅	$\mu=3,39$ $\sigma=1,706$ N=701	$\mu=3,29$ $\sigma=1,706$ N=577	.002	.969	1.028	1,276	.058	.304	.178
iac ₆	$\mu=3,63$ $\sigma=2,049$ N=789	$\mu=3,99$ $\sigma=2,116$ N=634	.466	.495	-3.192	1,421	-.170	.001***	.890
iac ₇	$\mu=2,75$ $\sigma=1,718$ N=810	$\mu=2,83$ $\sigma=1,803$ N=636	2.972	.085*	-.890	1,332	-.047	.374	.144
iac ₈	$\mu=3,05$ $\sigma=1,808$ N=742	$\mu=3,08$ $\sigma=1,857$ N=593	.926	.336	-.315	1,333	-.017	.753	.061
tac ₁	$\mu=4,03$ $\sigma=1,942$ N=805	$\mu=3,91$ $\sigma=2,017$ N=645	4.968	.026**	1.172	1,356	.062	.242	.216
tac ₂	$\mu=3,76$ $\sigma=1,895$ N=818	$\mu=3,94$ $\sigma=1,936$ N=653	.930	.335	-1.792	1,469	-.094	.073*	.433
tac ₃	$\mu=3,52$ $\sigma=2,017$ N=812	$\mu=3,60$ $\sigma=2,040$ N=649	.505	.477	-.749	1,459	-.039	.454	.115
tac ₄	$\mu=3,69$ $\sigma=1,766$ N=821	$\mu=3,80$ $\sigma=1,760$ N=651	.012	.914	-1.238	1,470	-.065	.216	.236
tac ₅	$\mu=3,78$ $\sigma=1,845$ N=766	$\mu=3,74$ $\sigma=1,849$ N=603	.074	.786	.379	1,367	.021	.705	.067
tac ₆	$\mu=3,91$ $\sigma=1,737$ N=791	$\mu=3,98$ $\sigma=1,791$ N=623	.754	.385	-.673	1,412	-.036	.501	.103
tac ₇	$\mu=4,16$ $\sigma=1,621$ N=611	$\mu=4,260$ $\sigma=1,630$ N=487	.032	.858	-1.025	1,096	-.062	.305	.175

tac ₈	$\mu=3,80$ $\sigma=1,944$ N=754	$\mu=3,76$ $\sigma=1,957$ N=606	.152	.697	.326	1,358	.018	.744	.063
tac ₉	$\mu=3,63$ $\sigma=1,925$ N=814	$\mu=3,74$ $\sigma=1,882$ N=651	.883	.347	-1.057	1,463	-.056	.291	.186
tac ₁₀	$\mu=3,05$ $\sigma=1,903$ N=649	$\mu=2,91$ $\sigma=1,911$ N=510	.015	.902	1.240	1,157	.073	.215	.234
tac ₁₁	$\mu=4,95$ $\sigma=1,815$ N=785	$\mu=5,21$ $\sigma=1,717$ N=633	2.590	.108	-2.792	1,416	-.149	.005***	.796
tac ₁₂	$\mu=3,31$ $\sigma=1,974$ N=813	$\mu=3,21$ $\sigma=1,932$ N=640	1.319	.251	.973	1,451	.051	.331	.161
tac ₁₃	$\mu=4,36$ $\sigma=2,107$ N=819	$\mu=4,42$ $\sigma=2,137$ N=651	.307	.579	-.512	1,468	-.027	.609	.081
tac ₁₄	$\mu=2,67$ $\sigma=1,704$ N=812	$\mu=2,65$ $\sigma=1,636$ N=652	2.632	.105	.223	1,462	.012	.823	.056
tac ₁₅	$\mu=3,23$ $\sigma=1,761$ N=804	$\mu=3,17$ $\sigma=1,765$ N=647	.001	.971	.672	1,449	.036	.502	.105
real ₁	$\mu=5,89$ $\sigma=1,303$ N=828	$\mu=6,07$ $\sigma=1,185$ N=657	6.058	.014**	-2.780	1,456	-.143	.006***	.781
real ₂	$\mu=2,33$ $\sigma=1,991$ N=823	$\mu=2,41$ $\sigma=2,114$ N=646	4.967	.026**	-.787	1,344	-.042	.431	.126
real ₃	$\mu=3,94$ $\sigma=1,982$ N=815	$\mu=4,00$ $\sigma=2,001$ N=649	.004	.951	-.545	1,462	-.029	.586	.085
real ₄	$\mu=6,15$ $\sigma=1,221$ N=827	$\mu=6,30$ $\sigma=1,126$ N=654	1.721	.190	-2.371	1,479	-.124	.018**	.658
real ₅	$\mu=1,34$ $\sigma=1,110$ N=816	$\mu=1,36$ $\sigma=1,096$ N=641	.183	.669	-.290	1,455	-.015	.772	.059
real ₆	$\mu=2,59$ $\sigma=2,375$ N=817	$\mu=2,81$ $\sigma=2,503$ N=647	1.483	.001***	-1.725	1,352	-.091	.085*	.408
real ₇	$\mu=5,20$ $\sigma=2,347$ N=821	$\mu=5,38$ $\sigma=2,285$ N=654	2.860	.091*	-1.453	1,416	-.076	.147	.305
real ₈	$\mu=1,23$ $\sigma=0,920$ N=813	$\mu=1,31$ $\sigma=1,002$ N=640	7.679	.006***	-1.608	1,314	-.086	.108	.370

real ₉	$\mu=5,26$ $\sigma=2,087$ N=819	$\mu=5,40$ $\sigma=2,052$ N=653	.526	.469	-1.302	1,470	-.068	.193	.254
real ₁₀	$\mu=3,55$ $\sigma=2,530$ N=819	$\mu=3,71$ $\sigma=2,511$ N=651	.453	.501	-1.242	1,468	-.065	.214	.236
real ₁₁	$\mu=1,66$ $\sigma=1,654$ N=822	$\mu=1,76$ $\sigma=1,735$ N=649	3.078	.080*	-1.113	1,359	-.059	.266	.202
real ₁₂	$\mu=2,17$ $\sigma=2,032$ N=822	$\mu=2,37$ $\sigma=2,134$ N=651	6.944	.009***	-1.857	1,363	-.098	.064*	.463
real ₁₃	$\mu=5,7$ $\sigma=1,458$ N=822	$\mu=5,84$ $\sigma=1,465$ N=655	.807	.369	-1.780	1,475	-.093	.075*	.427
real ₁₄	$\mu=4,62$ $\sigma=2,201$ N=815	$\mu=4,83$ $\sigma=2,167$ N=652	.931	.335	-1.838	1,465	-.096	.066*	.447
real ₁₅	$\mu=1,88$ $\sigma=1,872$ N=811	$\mu=2,05$ $\sigma=2,025$ N=644	8.873	.003***	-1.658	1,327	-.088	.098*	.385
fake ₁	$\mu=1,69$ $\sigma=1,417$ N=815	$\mu=1,71$ $\sigma=1,382$ N=647	.005	.942	-.236	1,460	-.012	.814	.056
fake ₂	$\mu=1,62$ $\sigma=1,318$ N=809	$\mu=1,68$ $\sigma=1,347$ N=644	1.364	.243	-.874	1,451	-.046	.382	.140
fake ₃	$\mu=1,59$ $\sigma=1,429$ N=819	$\mu=1,55$ $\sigma=1,300$ N=642	2.159	.142	.623	1,459	.033	.533	.096
fake ₄	$\mu=1,23$ $\sigma=0,900$ N=817	$\mu=1,24$ $\sigma=0,852$ N=645	.186	.666	-.300	1,460	-.016	.765	.061
fake ₅	$\mu=1,51$ $\sigma=1,328$ N=812	$\mu=1,49$ $\sigma=1,218$ N=645	.861	.354	.208	1,455	.011	.835	.055
fake ₆	$\mu=1,47$ $\sigma=1,243$ N=804	$\mu=1,5$ $\sigma=1,255$ N=643	.351	.554	-.445	1,445	-.024	.656	.074
fake ₇	$\mu=1,46$ $\sigma=1,228$ N=821	$\mu=1,61$ $\sigma=1,384$ N=651	13.488	.000***	-2.149	1,310	-.114	.032**	.584
fake ₈	$\mu=1,21$ $\sigma=0,859$ N=823	$\mu=1,19$ $\sigma=0,730$ N=647	1.310	.253	.548	1,468	.029	.584	.086
fake ₉	$\mu=1,31$ $\sigma=1,011$ N=812	$\mu=1,27$ $\sigma=0,912$ N=645	2.144	.143	.813	1,455	.043	.416	.129
fake ₁₀	$\mu=1,26$ $\sigma=0,958$ N=815	$\mu=1,22$ $\sigma=0,783$ N=642	2.821	.093*	.773	1,453	.040	.440	.118

pota _{ga1}	$\mu=4,23$ $\sigma=1,594$ N=820	$\mu=4,39$ $\sigma=1,570$ N=653	.226	.634	-1.883	1,471	-.099	.060*	.471
pota _{ga2}	$\mu=3,89$ $\sigma=1,809$ N=818	$\mu=3,77$ $\sigma=1,818$ N=651	.157	.692	1.190	1,467	.063	.234	.224
pota _{in1}	$\mu=5,04$ $\sigma=1,560$ N=817	$\mu=4,94$ $\sigma=1,783$ N=646	15.354	.000***	1.134	1,289	.061	.257	.212
pota _{in2}	$\mu=4,80$ $\sigma=1,533$ N=820	$\mu=4,92$ $\sigma=1,515$ N=655	.799	.372	-1.498	1,473	-.078	.134	.319
pota _{in3}	$\mu=3,54$ $\sigma=1,600$ N=817	$\mu=3,67$ $\sigma=1,634$ N=648	.304	.581	-1.490	1,463	-.078	.136	.317
pota _{fns1}	$\mu=4,31$ $\sigma=1,657$ N=822	$\mu=4,38$ $\sigma=1,577$ N=650	2.623	.106	-.830	1,470	-.044	.407	.133
pota _{fns2}	$\mu=4,5$ $\sigma=1,708$ N=799	$\mu=4,56$ $\sigma=1,698$ N=634	.336	.562	-.578	1,431	-.031	.563	.090
pota _{fns3}	$\mu=2,30$ $\sigma=1,261$ N=823	$\mu=2,27$ $\sigma=1,268$ N=645	.114	.736	.582	1,466	.031	.561	.091
pota _{hp1}	$\mu=4,89$ $\sigma=1,421$ N=826	$\mu=4,84$ $\sigma=1,488$ N=658	1.940	.164	.728	1,482	.038	.467	.112
pota _{hp2}	$\mu=3,90$ $\sigma=1,880$ N=808	$\mu=4,09$ $\sigma=1,809$ N=643	4.149	.042**	-1.974	1,398	-.104	.049**	.503
pota _{hp3}	$\mu=4,25$ $\sigma=1,847$ N=818	$\mu=4,32$ $\sigma=1,899$ N=645	.891	.345	-.732	1,461	-.039	.464	.115
pota _{sri1}	$\mu=3,22$ $\sigma=1,875$ N=808	$\mu=3,28$ $\sigma=1,907$ N=632	.718	.397	-.590	1,438	-.031	.555	.090
pota _{sri2}	$\mu=3,29$ $\sigma=1,685$ N=797	$\mu=3,33$ $\sigma=1,758$ N=639	1.687	.194	-.449	1,434	-.024	.653	.074
pota _{sri3}	$\mu=2,48$ $\sigma=1,579$ N=766	$\mu=2,45$ $\sigma=1,647$ N=613	2.030	.154	.338	1,377	.018	.735	.063
pota _{ma1}	$\mu=4,63$ $\sigma=1,651$ N=810	$\mu=4,69$ $\sigma=1,606$ N=646	1.840	.175	-.699	1,454	-.037	.484	.108
pota _{ma2}	$\mu=5,02$ $\sigma=1,545$ N=810	$\mu=5,06$ $\sigma=1,531$ N=640	.116	.734	-.525	1,448	-.028	.600	.083
pota _{ma3}	$\mu=4,36$ $\sigma=1,717$ N=800	$\mu=4,31$ $\sigma=1,718$ N=631	.032	.857	.540	1,429	.029	.589	.085

pota _{ma4}	$\mu=5,63$ $\sigma=1,281$ N=820	$\mu=5,59$ $\sigma=1,361$ N=652	1.702	.192	.552	1,470	.029	.581	.086
pota _{vc1}	$\mu=4,44$ $\sigma=1,639$ N=762	$\mu=4,54$ $\sigma=1,666$ N=612	.020	.888	-1.031	1,372	-.056	.303	.178
pota _{vc2}	$\mu=4,68$ $\sigma=1,647$ N=782	$\mu=4,66$ $\sigma=1,672$ N=616	.864	.353	.158	1,396	.009	.874	.053
pota _{avc1}	$\mu=3,65$ $\sigma=1,912$ N=800	$\mu=3,58$ $\sigma=1,888$ N=629	.240	.624	.741	1,427	.039	.459	.113
pota _{avc2}	$\mu=4,99$ $\sigma=1,634$ N=778	$\mu=5,05$ $\sigma=1,586$ N=618	.389	.533	-.666	1,394	-.036	.506	.102
pota _{gfe1}	$\mu=4,87$ $\sigma=1,471$ N=763	$\mu=4,97$ $\sigma=1,529$ N=592	.008	.927	-1.143	1,353	-.063	.253	.210
pota _{gfe2}	$\mu=4,12$ $\sigma=1,639$ N=760	$\mu=4,07$ $\sigma=1,717$ N=593	2.557	.110	.570	1,351	.031	.569	.087
pota _{gfe3}	$\mu=4,68$ $\sigma=1,512$ N=804	$\mu=4,72$ $\sigma=1,592$ N=629	1.528	.217	-.453	1,431	-.024	.650	.074
pota _{agfe1}	$\mu=2,71$ $\sigma=1,576$ N=790	$\mu=2,80$ $\sigma=1,649$ N=627	2.993	.084*	-1.054	1,315	-.057	.292	.187
pota _{agfe2}	$\mu=2,81$ $\sigma=1,498$ N=777	$\mu=2,90$ $\sigma=1,585$ N=620	2.429	.119	-1.081	1,395	-.058	.280	.190
pota _{agfe3}	$\mu=2,70$ $\sigma=1,526$ N=749	$\mu=2,67$ $\sigma=1,495$ N=593	.339	.561	.334	1,340	.018	.738	.062

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex XCVI: Evaluation Results of Metric Variables Measured in Main Study expgr₁ vs. expgr₂

var	expgr ₁	expgr ₂	Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1-β
iac ₁	μ=4.61 σ=2.252 N=291	μ=4.52 σ=2.046 N=494	8.244	.004***	.547	562	.041	.585	.086
iac ₂	μ=4.72 σ=1.843 N=292	μ=4.75 σ=1.755 N=481	1.372	.242	-.195	771	-.014	.846	.054
iac ₃	μ=3.40 σ=2.000 N=302	μ=3.45 σ=2.024 N=503	.041	.840	-.304	803	-.022	.761	.061
iac ₄	μ=3.68 σ=1.919 N=307	μ=3.62 σ=1.791 N=509	2.115	.146	.461	814	.033	.645	.074
iac ₅	μ=3.42 σ=1.691 N=274	μ=3.37 σ=1.717 N=427	.095	.758	.348	699	.027	.728	.064
iac ₆	μ=3.93 σ=2.078 N=299	μ=3.46 σ=2.013 N=490	.148	.700	3.138	787	.229	.002***	.876
iac ₇	μ=2.96 σ=1.851 N=307	μ=2.62 σ=1.621 N=503	4.624	.032**	2.651	582	.197	.008***	.775
iac ₈	μ=3.20 σ=1.878 N=283	μ=2.96 σ=1.759 N=459	3.846	.050*	1.695	567	.130	.091*	.404
tac ₁	μ=3.99 σ=1.948 N=306	μ=4.05 σ=1.940 N=499	.002	.963	-.453	803	-.033	.651	.074
tac ₂	μ=3.79 σ=1.875 N=307	μ=3.75 σ=1.909 N=511	.587	.444	.288	816	.021	.774	.060
tac ₃	μ=3.59 σ=2.082 N=307	μ=3.48 σ=1.977 N=505	1.645	.200	.720	810	.052	.472	.111
tac ₄	μ=3.77 σ=1.841 N=311	μ=3.63 σ=1.718 N=510	2.931	.087*	1.111	620	.081	.267	.203
tac ₅	μ=3.85 σ=1.824 N=289	μ=3.74 σ=1.858 N=477	.435	.510	.839	764	.063	.402	.135
tac ₆	μ=4.10 σ=1.715 N=299	μ=3.80 σ=1.742 N=492	.348	.555	2.358	789	.172	.019**	.649

tac ₇	$\mu=4.25$ $\sigma=1.669$ N=233	$\mu=4.11$ $\sigma=1.591$ N=378	1.799	.180	1.072	609	.089	.284	.187
tac ₈	$\mu=3.83$ $\sigma=1.941$ N=291	$\mu=3.78$ $\sigma=1.948$ N=463	.017	.897	.386	752	.029	.699	.067
tac ₉	$\mu=3.68$ $\sigma=1.924$ N=309	$\mu=3.60$ $\sigma=1.927$ N=505	.236	.627	.521	812	.038	.603	.082
tac ₁₀	$\mu=3.31$ $\sigma=1.977$ N=250	$\mu=2.88$ $\sigma=1.839$ N=399	2.406	.121	2.771	647	.222	.006***	.785
tac ₁₁	$\mu=5.09$ $\sigma=1.791$ N=293	$\mu=4.86$ $\sigma=1.825$ N=492	.387	.534	1.707	783	.126	.088*	.400
tac ₁₂	$\mu=3.39$ $\sigma=2.027$ N=307	$\mu=3.26$ $\sigma=1.942$ N=506	3.498	.062*	.865	624	.063	.388	.140
tac ₁₃	$\mu=4.46$ $\sigma=2.044$ N=309	$\mu=4.31$ $\sigma=2.144$ N=510	4.204	.041**	1.024	674	.073	.306	.173
tac ₁₄	$\mu=2.76$ $\sigma=1.744$ N=306	$\mu=2.61$ $\sigma=1.678$ N=506	.322	.570	1.190	810	.086	.234	.220
tac ₁₅	$\mu=3.40$ $\sigma=1.807$ N=304	$\mu=3.13$ $\sigma=1.726$ N=500	2.449	.118	2.165	802	.157	.031**	.578
real ₁	$\mu=5.93$ $\sigma=1.312$ N=312	$\mu=5.86$ $\sigma=1.299$ N=516	.287	.592	.731	826	.052	.465	.112
real ₂	$\mu=2.45$ $\sigma=2.118$ N=312	$\mu=2.25$ $\sigma=1.907$ N=511	7.499	.006***	1.361	605	.100	.174	.285
real ₃	$\mu=3.95$ $\sigma=1.937$ N=305	$\mu=3.93$ $\sigma=2.011$ N=510	2.220	.137	.122	813	.009	.903	.052
real ₄	$\mu=6.18$ $\sigma=1.192$ N=312	$\mu=6.13$ $\sigma=1.238$ N=515	.028	.867	.564	825	.040	.573	.086
real ₅	$\mu=1.35$ $\sigma=1.157$ N=309	$\mu=1.34$ $\sigma=1.081$ N=507	.167	.683	.218	814	.016	.828	.056
real ₆	$\mu=2.74$ $\sigma=2.424$ N=308	$\mu=2.50$ $\sigma=2.343$ N=509	2.360	.125	1.354	815	.098	.176	.273
real ₇	$\mu=5.47$ $\sigma=2.179$ N=310	$\mu=5.04$ $\sigma=2.431$ N=511	14.377	.000***	2.641	707	.185	.008***	.728
real ₈	$\mu=1.22$ $\sigma=.955$ N=307	$\mu=1.23$ $\sigma=.899$ N=506	.129	.720	-.176	811	-.013	.861	.054

real ₉	$\mu=5.48$ $\sigma=1.881$ N=307	$\mu=5.13$ $\sigma=2.194$ N=512	15.163	.000***	2.370	721	.164	.018**	.621
real ₁₀	$\mu=3.63$ $\sigma=2.451$ N=309	$\mu=3.50$ $\sigma=2.578$ N=510	7.976	.005***	.738	676	.053	.461	.114
real ₁₁	$\mu=1.79$ $\sigma=1.801$ N=311	$\mu=1.58$ $\sigma=1.554$ N=511	9.177	.003***	1.688	582	.126	.092*	.417
real ₁₂	$\mu=2.29$ $\sigma=2.120$ N=311	$\mu=2.09$ $\sigma=1.975$ N=511	6.410	.012**	1.293	619	.095	.196	.261
real ₁₃	$\mu=5.77$ $\sigma=1.342$ N=310	$\mu=5.66$ $\sigma=1.524$ N=512	4.283	.039**	1.140	716	.080	.254	.199
real ₁₄	$\mu=4.83$ $\sigma=2.030$ N=305	$\mu=4.50$ $\sigma=2.290$ N=510	2.764	.000***	2.136	700	.150	.033**	.544
real ₁₅	$\mu=2.00$ $\sigma=1.981$ N=305	$\mu=1.80$ $\sigma=1.801$ N=506	6.140	.013**	1.461	594	.108	.145	.319
fake ₁	$\mu=1.75$ $\sigma=1.473$ N=308	$\mu=1.66$ $\sigma=1.382$ N=507	1.244	.265	.910	813	.066	.363	.149
fake ₂	$\mu=1.60$ $\sigma=1.351$ N=309	$\mu=1.62$ $\sigma=1.298$ N=500	.004	.953	-.231	807	-.017	.817	.056
fake ₃	$\mu=1.65$ $\sigma=1.504$ N=311	$\mu=1.56$ $\sigma=1.381$ N=508	2.413	.121	.829	817	.060	.407	.132
fake ₄	$\mu=1.25$ $\sigma=1.001$ N=308	$\mu=1.21$ $\sigma=.834$ N=509	1.376	.241	.582	815	.042	.561	.089
fake ₅	$\mu=1.50$ $\sigma=1.333$ N=305	$\mu=1.51$ $\sigma=1.327$ N=507	.256	.613	-.171	810	-.012	.865	.053
fake ₆	$\mu=1.49$ $\sigma=1.262$ N=302	$\mu=1.46$ $\sigma=1.232$ N=502	.391	.532	.389	802	.028	.698	.067
fake ₇	$\mu=1.49$ $\sigma=1.313$ N=309	$\mu=1.45$ $\sigma=1.174$ N=512	1.158	.282	.527	819	.038	.599	.082
fake ₈	$\mu=1.25$ $\sigma=1.019$ N=312	$\mu=1.18$ $\sigma=.745$ N=511	4.944	.026**	1.042	513	.081	.298	.203
fake ₉	$\mu=1.30$ $\sigma=1.086$ N=307	$\mu=1.31$ $\sigma=.963$ N=505	.001	.972	-.082	810	-.006	.935	.051
fake ₁₀	$\mu=1.33$ $\sigma=1.132$ N=309	$\mu=1.21$ $\sigma=.833$ N=506	1.993	.001***	1.598	511	.124	.111	.404

pota _{ga1}	$\mu=4.30$ $\sigma=1.526$ N=308	$\mu=4.19$ $\sigma=1.634$ N=512	2.120	.146	.945	818	.068	.345	.156
pota _{ga2}	$\mu=3.92$ $\sigma=1.727$ N=311	$\mu=3.87$ $\sigma=1.859$ N=507	5.239	.022**	.445	693	.031	.657	.071
pota _{in1}	$\mu=4.97$ $\sigma=1.570$ N=309	$\mu=5.08$ $\sigma=1.554$ N=508	.000	.998	-.993	815	-.072	.321	.169
pota _{in2}	$\mu=4.85$ $\sigma=1.457$ N=306	$\mu=4.76$ $\sigma=1.577$ N=514	4.006	.046**	.784	682	.055	.433	.118
pota _{in3}	$\mu=3.62$ $\sigma=1.577$ N=306	$\mu=3.50$ $\sigma=1.614$ N=511	.586	.444	1.009	815	.073	.313	.172
pota _{fns1}	$\mu=4.26$ $\sigma=1.630$ N=311	$\mu=4.34$ $\sigma=1.675$ N=511	.214	.644	-.639	820	-.046	.523	.098
pota _{fns2}	$\mu=4.47$ $\sigma=1.745$ N=305	$\mu=4.52$ $\sigma=1.686$ N=494	.728	.394	-.419	797	-.031	.675	.071
pota _{fns3}	$\mu=2.38$ $\sigma=1.343$ N=310	$\mu=2.26$ $\sigma=1.207$ N=513	6.395	.012**	1.326	598	.098	.185	.275
pota _{hp1}	$\mu=4.85$ $\sigma=1.344$ N=310	$\mu=4.92$ $\sigma=1.466$ N=516	3.433	.064*	-.735	695	-.052	.463	.112
pota _{hp2}	$\mu=3.90$ $\sigma=1.941$ N=299	$\mu=3.90$ $\sigma=1.845$ N=509	1.651	.199	.038	806	.003	.970	.050
pota _{hp3}	$\mu=4.24$ $\sigma=1.771$ N=306	$\mu=4.25$ $\sigma=1.893$ N=512	4.374	.037**	-.047	676	-.003	.962	.050
pota _{sri1}	$\mu=3.24$ $\sigma=1.869$ N=306	$\mu=3.22$ $\sigma=1.880$ N=502	.170	.680	.172	806	.012	.863	.053
pota _{sri2}	$\mu=3.35$ $\sigma=1.702$ N=303	$\mu=3.26$ $\sigma=1.676$ N=494	.055	.814	.754	795	.055	.451	.117
pota _{sri3}	$\mu=2.55$ $\sigma=1.633$ N=284	$\mu=2.43$ $\sigma=1.546$ N=482	.716	.398	.979	764	.073	.328	.164
pota _{ma1}	$\mu=4.67$ $\sigma=1.690$ N=307	$\mu=4.61$ $\sigma=1.627$ N=503	.545	.460	.507	808	.037	.612	.080
pota _{ma2}	$\mu=5.02$ $\sigma=1.602$ N=302	$\mu=5.02$ $\sigma=1.512$ N=508	.262	.609	-.045	808	-.003	.964	.050
pota _{ma3}	$\mu=4.22$ $\sigma=1.744$ N=299	$\mu=4.44$ $\sigma=1.698$ N=501	.454	.501	-1.732	798	-.126	.084*	.406

pota _{ma4}	$\mu=5.59$ $\sigma=1.308$ N=310	$\mu=5.65$ $\sigma=1.266$ N=510	.936	.334	-.665	818	-.048	.506	.102
pota _{vc1}	$\mu=4.51$ $\sigma=1.598$ N=286	$\mu=4.41$ $\sigma=1.664$ N=476	.806	.370	.828	760	.062	.408	.131
pota _{vc2}	$\mu=4.74$ $\sigma=1.538$ N=294	$\mu=4.64$ $\sigma=1.710$ N=488	5.403	.020**	.833	669	.060	.405	.128
pota _{avc1}	$\mu=3.67$ $\sigma=1.838$ N=304	$\mu=3.65$ $\sigma=1.958$ N=496	3.537	.060*	.165	672	.012	.869	.053
pota _{avc2}	$\mu=4.96$ $\sigma=1.609$ N=297	$\mu=5.01$ $\sigma=1.650$ N=481	.002	.967	-.393	776	-.029	.694	.068
pota _{gfe1}	$\mu=4.85$ $\sigma=1.451$ N=289	$\mu=4.89$ $\sigma=1.485$ N=474	.092	.762	-.336	761	-.025	.737	.063
pota _{gfe2}	$\mu=4.09$ $\sigma=1.592$ N=290	$\mu=4.14$ $\sigma=1.668$ N=470	1.247	.264	-.352	758	-.026	.725	.064
pota _{gfe3}	$\mu=4.67$ $\sigma=1.441$ N=306	$\mu=4.69$ $\sigma=1.556$ N=498	3.074	.080*	-.144	683	-.010	.885	.052
pota _{agfe1}	$\mu=2.75$ $\sigma=1.587$ N=297	$\mu=2.68$ $\sigma=1.571$ N=493	.064	.800	.663	788	.049	.508	.102
pota _{agfe2}	$\mu=2.89$ $\sigma=1.549$ N=298	$\mu=2.75$ $\sigma=1.465$ N=479	1.947	.163	1.277	775	.094	.202	.247
pota _{agfe3}	$\mu=2.60$ $\sigma=1.466$ N=280	$\mu=2.75$ $\sigma=1.560$ N=469	.439	.508	-1.375	747	-.104	.170	.280

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex XCVII: Evaluation Results of Metric Variables Measured in Main Study expgr₁ vs. expgr₃

var	expgr ₁	expgr ₃	Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1-β
iac ₁	μ=4.61 σ=2.252 N=291	μ=4.30 σ=2.153 N=352	1.321	.251	1.779	641	.141	.076*	.427
iac ₂	μ=4.72 σ=1.843 N=292	μ=4.77 σ=1.845 N=360	.303	.582	-.323	650	-.025	.747	.062
iac ₃	μ=3.40 σ=2.000 N=302	μ=3.19 σ=2.022 N=362	.072	.788	1.375	662	.107	.170	.278
iac ₄	μ=3.68 σ=1.919 N=307	μ=3.51 σ=1.904 N=371	.079	.778	1.148	676	.089	.251	.210
iac ₅	μ=3.42 σ=1.691 N=274	μ=3.42 σ=1.715 N=326	.065	.798	-.052	598	-.004	.959	.050
iac ₆	μ=3.93 σ=2.078 N=299	μ=4.02 σ=2.113 N=363	.174	.677	-.601	660	-.047	.548	.092
iac ₇	μ=2.96 σ=1.851 N=307	μ=2.90 σ=1.839 N=358	.203	.653	.386	663	.030	.699	.067
iac ₈	μ=3.20 σ=1.878 N=283	μ=3.16 σ=1.861 N=336	.339	.560	.266	617	.021	.790	.058
tac ₁	μ=3.99 σ=1.948 N=306	μ=3.91 σ=1.985 N=363	.871	.351	.549	667	.043	.583	.086
tac ₂	μ=3.79 σ=1.875 N=307	μ=3.95 σ=1.924 N=372	1.096	.296	-1.136	677	-.088	.256	.207
tac ₃	μ=3.59 σ=2.082 N=307	μ=3.61 σ=2.048 N=370	.012	.913	-.171	675	-.013	.865	.053
tac ₄	μ=3.77 σ=1.841 N=311	μ=3.72 σ=1.773 N=372	.466	.495	.374	681	.029	.709	.066
tac ₅	μ=3.85 σ=1.824 N=289	μ=3.71 σ=1.811 N=345	.000	.985	.953	632	.076	.341	.158
tac ₆	μ=4.10 σ=1.715 N=299	μ=3.95 σ=1.780 N=353	.245	.620	1.059	650	.083	.290	.184
tac ₇	μ=4.25 σ=1.669 N=233	μ=4.23 σ=1.641 N=274	1.093	.296	.133	505	.012	.894	.052

tac ₈	$\mu=3.83$ $\sigma=1.941$ N=291	$\mu=3.90$ $\sigma=1.976$ N=348	.193	.661	-.454	637	-.036	.650	.074
tac ₉	$\mu=3.68$ $\sigma=1.924$ N=309	$\mu=3.61$ $\sigma=1.843$ N=371	.521	.471	.483	678	.037	.629	.077
tac ₁₀	$\mu=3.31$ $\sigma=1.977$ N=250	$\mu=2.98$ $\sigma=1.949$ N=281	.106	.745	1.930	529	.167	.054*	.483
tac ₁₁	$\mu=5.09$ $\sigma=1.791$ N=293	$\mu=5.28$ $\sigma=1.662$ N=360	2.222	.137	-1.350	651	-.106	.177	.270
tac ₁₂	$\mu=3.39$ $\sigma=2.027$ N=307	$\mu=3.18$ $\sigma=1.894$ N=365	6.326	.012**	1.357	633	.106	.175	.277
tac ₁₃	$\mu=4.46$ $\sigma=2.044$ N=309	$\mu=4.51$ $\sigma=2.088$ N=369	.621	.431	-.313	676	-.024	.754	.061
tac ₁₄	$\mu=2.76$ $\sigma=1.744$ N=306	$\mu=2.77$ $\sigma=1.691$ N=371	.568	.451	-.051	675	-.004	.959	.050
tac ₁₅	$\mu=3.4$ $\sigma=1.807$ N=304	$\mu=3.17$ $\sigma=1.772$ N=370	.524	.469	1.674	672	.129	.095*	.384
real ₁	$\mu=5.93$ $\sigma=1.312$ N=312	$\mu=6.04$ $\sigma=1.171$ N=373	4.025	.045**	-1.121	630	-.087	.263	.205
real ₂	$\mu=2.45$ $\sigma=2.118$ N=312	$\mu=2.39$ $\sigma=2.094$ N=368	.111	.739	.391	678	.030	.696	.068
real ₃	$\mu=3.95$ $\sigma=1.937$ N=305	$\mu=3.93$ $\sigma=1.962$ N=369	.007	.933	.105	672	.008	.916	.051
real ₄	$\mu=6.18$ $\sigma=1.192$ N=312	$\mu=6.27$ $\sigma=1.079$ N=372	.685	.408	-1.090	682	-.084	.276	.194
real ₅	$\mu=1.35$ $\sigma=1.157$ N=309	$\mu=1.39$ $\sigma=1.188$ N=366	.638	.425	-.419	673	-.032	.676	.070
real ₆	$\mu=2.74$ $\sigma=2.424$ N=308	$\mu=2.70$ $\sigma=2.439$ N=369	.145	.704	.173	675	.013	.863	.053
real ₇	$\mu=5.47$ $\sigma=2.179$ N=310	$\mu=5.48$ $\sigma=2.202$ N=371	.005	.946	-.017	679	-.001	.986	.050
real ₈	$\mu=1.22$ $\sigma=.955$ N=307	$\mu=1.31$ $\sigma=.988$ N=363	3.823	.051*	-1.157	656	-.089	.248	.209

real ₉	$\mu=5.48$ $\sigma=1.881$ N=307	$\mu=5.41$ $\sigma=2.017$ N=369	2.637	.105	.457	674	.035	.648	.074
real ₁₀	$\mu=3.63$ $\sigma=2.451$ N=309	$\mu=3.65$ $\sigma=2.46$ N=369	.025	.874	-.088	676	-.007	.930	.051
real ₁₁	$\mu=1.79$ $\sigma=1.801$ N=311	$\mu=1.74$ $\sigma=1.696$ N=367	.618	.432	.371	676	.029	.711	.066
real ₁₂	$\mu=2.29$ $\sigma=2.120$ N=311	$\mu=2.34$ $\sigma=2.120$ N=369	.001	.981	-.355	678	-.027	.722	.064
real ₁₃	$\mu=5.77$ $\sigma=1.342$ N=310	$\mu=5.78$ $\sigma=1.480$ N=371	1.311	.253	-.019	679	-.001	.985	.050
real ₁₄	$\mu=4.83$ $\sigma=2.030$ N=305	$\mu=4.81$ $\sigma=2.109$ N=371	1.451	.229	.097	674	.007	.923	.051
real ₁₅	$\mu=2.00$ $\sigma=1.981$ N=305	$\mu=2.08$ $\sigma=2.039$ N=366	.997	.318	-.469	669	-.036	.639	.075
fake ₁	$\mu=1.75$ $\sigma=1.473$ N=308	$\mu=1.68$ $\sigma=1.368$ N=367	.546	.460	.603	673	.047	.546	.093
fake ₂	$\mu=1.60$ $\sigma=1.351$ N=309	$\mu=1.70$ $\sigma=1.371$ N=364	1.324	.250	-.962	671	-.074	.336	.159
fake ₃	$\mu=1.65$ $\sigma=1.504$ N=311	$\mu=1.53$ $\sigma=1.224$ N=365	6.553	.011**	1.128	597	.088	.260	.207
fake ₄	$\mu=1.25$ $\sigma=1.001$ N=308	$\mu=1.21$ $\sigma=.814$ N=367	1.608	.205	.614	673	.047	.539	.093
fake ₅	$\mu=1.50$ $\sigma=1.333$ N=305	$\mu=1.54$ $\sigma=1.240$ N=366	.124	.725	-.401	669	-.031	.689	.068
fake ₆	$\mu=1.49$ $\sigma=1.262$ N=302	$\mu=1.54$ $\sigma=1.254$ N=365	.323	.570	-.474	665	-.037	.636	.076
fake ₇	$\mu=1.49$ $\sigma=1.313$ N=309	$\mu=1.56$ $\sigma=1.308$ N=370	.923	.337	-.723	677	-.056	.470	.112
fake ₈	$\mu=1.25$ $\sigma=1.019$ N=312	$\mu=1.19$ $\sigma=.756$ N=369	3.754	.053*	.948	564	.075	.343	.164
fake ₉	$\mu=1.30$ $\sigma=1.086$ N=307	$\mu=1.20$ $\sigma=.776$ N=367	7.713	.006***	1.405	541	.112	.161	.304
fake ₁₀	$\mu=1.33$ $\sigma=1.132$ N=309	$\mu=1.20$ $\sigma=.722$ N=364	14.302	.000***	1.809	506	.145	.071*	.465

pota _{ga1}	$\mu=4.30$ $\sigma=1.526$ N=308	$\mu=4.41$ $\sigma=1.525$ N=368	.003	.954	-.943	674	-.073	.346	.157
pota _{ga2}	$\mu=3.92$ $\sigma=1.727$ N=311	$\mu=3.82$ $\sigma=1.772$ N=368	.981	.322	.757	677	.058	.449	.117
pota _{in1}	$\mu=4.97$ $\sigma=1.570$ N=309	$\mu=4.87$ $\sigma=1.787$ N=367	8.826	.003***	.745	673	.057	.456	.114
pota _{in2}	$\mu=4.85$ $\sigma=1.457$ N=306	$\mu=4.92$ $\sigma=1.495$ N=370	.062	.804	-.630	674	-.049	.529	.097
pota _{in3}	$\mu=3.62$ $\sigma=1.577$ N=306	$\mu=3.69$ $\sigma=1.651$ N=368	1.227	.268	-.602	672	-.047	.548	.093
pota _{fns1}	$\mu=4.26$ $\sigma=1.630$ N=311	$\mu=4.40$ $\sigma=1.546$ N=366	1.840	.175	-1.177	675	-.091	.239	.218
pota _{fns2}	$\mu=4.47$ $\sigma=1.745$ N=305	$\mu=4.52$ $\sigma=1.691$ N=362	.887	.347	-.375	665	-.029	.708	.066
pota _{fns3}	$\mu=2.38$ $\sigma=1.343$ N=310	$\mu=2.25$ $\sigma=1.235$ N=367	3.375	.067*	1.329	635	.103	.184	.266
pota _{hp1}	$\mu=4.85$ $\sigma=1.344$ N=310	$\mu=4.73$ $\sigma=1.453$ N=373	4.099	.043**	1.057	673	.081	.291	.183
pota _{hp2}	$\mu=3.90$ $\sigma=1.941$ N=299	$\mu=3.94$ $\sigma=1.791$ N=363	4.969	.026**	-.267	614	-.021	.789	.058
pota _{hp3}	$\mu=4.24$ $\sigma=1.771$ N=306	$\mu=4.30$ $\sigma=1.830$ N=366	.843	.359	-.401	670	-.031	.689	.068
pota _{sri1}	$\mu=3.24$ $\sigma=1.869$ N=306	$\mu=3.33$ $\sigma=1.933$ N=359	1.200	.274	-.646	663	-.050	.518	.098
pota _{sri2}	$\mu=3.35$ $\sigma=1.702$ N=303	$\mu=3.25$ $\sigma=1.745$ N=364	.252	.616	.724	665	.056	.470	.111
pota _{sri3}	$\mu=2.55$ $\sigma=1.633$ N=284	$\mu=2.46$ $\sigma=1.641$ N=343	.168	.682	.653	625	.052	.514	.099
pota _{ma1}	$\mu=4.67$ $\sigma=1.690$ N=307	$\mu=4.75$ $\sigma=1.559$ N=365	3.993	.046**	-.631	630	-.049	.528	.097
pota _{ma2}	$\mu=5.02$ $\sigma=1.602$ N=302	$\mu=5.03$ $\sigma=1.522$ N=360	.412	.521	-.138	660	-.011	.890	.052
pota _{ma3}	$\mu=4.22$ $\sigma=1.744$ N=299	$\mu=4.29$ $\sigma=1.715$ N=350	.141	.708	-.495	647	-.039	.621	.078

pota _{ma4}	$\mu=5.59$ $\sigma=1.308$ N=310	$\mu=5.65$ $\sigma=1.316$ N=368	.020	.888	-.553	676	-.043	.581	.086
pota _{vc1}	$\mu=4.51$ $\sigma=1.598$ N=286	$\mu=4.56$ $\sigma=1.667$ N=344	.442	.506	-.391	628	-.031	.696	.067
pota _{vc2}	$\mu=4.74$ $\sigma=1.538$ N=294	$\mu=4.72$ $\sigma=1.659$ N=341	3.487	.062*	.108	630	.009	.914	.051
pota _{avc1}	$\mu=3.67$ $\sigma=1.838$ N=304	$\mu=3.53$ $\sigma=1.884$ N=352	.568	.451	.917	654	.072	.360	.151
pota _{avc2}	$\mu=4.96$ $\sigma=1.609$ N=297	$\mu=5.03$ $\sigma=1.556$ N=349	.517	.472	-.549	644	-.043	.583	.085
pota _{gfe1}	$\mu=4.85$ $\sigma=1.451$ N=289	$\mu=4.95$ $\sigma=1.490$ N=330	.000	.994	-.871	617	-.070	.384	.140
pota _{gfe2}	$\mu=4.09$ $\sigma=1.592$ N=290	$\mu=4.01$ $\sigma=1.661$ N=326	.425	.515	.638	614	.052	.524	.099
pota _{gfe3}	$\mu=4.67$ $\sigma=1.441$ N=306	$\mu=4.72$ $\sigma=1.596$ N=354	3.884	.049**	-.399	657	-.031	.690	.068
pota _{agfe1}	$\mu=2.75$ $\sigma=1.587$ N=297	$\mu=2.86$ $\sigma=1.686$ N=355	1.922	.166	-.835	650	-.066	.404	.134
pota _{agfe2}	$\mu=2.89$ $\sigma=1.549$ N=298	$\mu=2.99$ $\sigma=1.618$ N=350	.590	.443	-.813	646	-.064	.417	.128
pota _{agfe3}	$\mu=2.60$ $\sigma=1.466$ N=280	$\mu=2.63$ $\sigma=1.424$ N=334	.906	.342	-.328	612	-.027	.743	.063

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex XCVIII: Evaluation Results of Metric Variables Measured in Main Study $expgr_1$ vs. $expgr_4$

var	$expgr_1$	$expgr_4$	Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1- β
iac ₁	$\mu=4.61$ $\sigma=2.252$ N=291	$\mu=4.73$ $\sigma=2.149$ N=280	2.676	.102	-.672	569	-.056	.502	.102
iac ₂	$\mu=4.72$ $\sigma=1.843$ N=292	$\mu=4.59$ $\sigma=1.763$ N=274	.166	.684	.865	564	.073	.387	.139
iac ₃	$\mu=3.40$ $\sigma=2.000$ N=302	$\mu=3.35$ $\sigma=2.040$ N=273	.290	.590	.291	573	.024	.771	.059
iac ₄	$\mu=3.68$ $\sigma=1.919$ N=307	$\mu=3.88$ $\sigma=1.848$ N=279	.295	.587	-1.245	584	-.103	.214	.237
iac ₅	$\mu=3.42$ $\sigma=1.691$ N=274	$\mu=3.12$ $\sigma=1.682$ N=251	.071	.790	2.039	523	.178	.042**	.529
iac ₆	$\mu=3.93$ $\sigma=2.078$ N=299	$\mu=3.94$ $\sigma=2.121$ N=271	.676	.411	-.083	568	-.007	.934	.051
iac ₇	$\mu=2.96$ $\sigma=1.851$ N=307	$\mu=2.74$ $\sigma=1.754$ N=278	.178	.673	1.473	583	.122	.141	.313
iac ₈	$\mu=3.20$ $\sigma=1.878$ N=283	$\mu=2.99$ $\sigma=1.851$ N=257	.105	.746	1.304	538	.112	.193	.254
tac ₁	$\mu=3.99$ $\sigma=1.948$ N=306	$\mu=3.91$ $\sigma=2.061$ N=282	4.778	.029**	.497	575	.041	.619	.079
tac ₂	$\mu=3.79$ $\sigma=1.875$ N=307	$\mu=3.93$ $\sigma=1.954$ N=281	1.235	.267	-.888	586	-.073	.375	.143
tac ₃	$\mu=3.59$ $\sigma=2.082$ N=307	$\mu=3.58$ $\sigma=2.034$ N=279	.156	.693	.012	584	.001	.990	.050
tac ₄	$\mu=3.77$ $\sigma=1.841$ N=311	$\mu=3.90$ $\sigma=1.741$ N=279	2.331	.127	-.867	588	-.072	.386	.141
tac ₅	$\mu=3.85$ $\sigma=1.824$ N=289	$\mu=3.78$ $\sigma=1.901$ N=258	1.570	.211	.453	545	.039	.651	.074
tac ₆	$\mu=4.10$ $\sigma=1.715$ N=299	$\mu=4.01$ $\sigma=1.809$ N=270	1.851	.174	.629	567	.053	.530	.097

tac ₇	$\mu=4.25$ $\sigma=1.669$ N=233	$\mu=4.31$ $\sigma=1.618$ N=213	.287	.592	-.333	444	-.032	.739	.063
tac ₈	$\mu=3.83$ $\sigma=1.941$ N=291	$\mu=3.57$ $\sigma=1.920$ N=258	.006	.938	1.562	547	.133	.119	.342
tac ₉	$\mu=3.68$ $\sigma=1.924$ N=309	$\mu=3.91$ $\sigma=1.922$ N=280	.007	.932	-1.477	587	-.122	.140	.315
tac ₁₀	$\mu=3.31$ $\sigma=1.977$ N=250	$\mu=2.82$ $\sigma=1.863$ N=229	1.759	.185	2.768	477	.251	.006***	.782
tac ₁₁	$\mu=5.09$ $\sigma=1.791$ N=293	$\mu=5.13$ $\sigma=1.786$ N=273	.007	.934	-.264	564	-.022	.792	.058
tac ₁₂	$\mu=3.39$ $\sigma=2.027$ N=307	$\mu=3.25$ $\sigma=1.985$ N=275	.872	.351	.842	580	.070	.400	.134
tac ₁₃	$\mu=4.46$ $\sigma=2.044$ N=309	$\mu=4.30$ $\sigma=2.198$ N=282	5.171	.023**	.883	574	.073	.378	.143
tac ₁₄	$\mu=2.76$ $\sigma=1.744$ N=306	$\mu=2.49$ $\sigma=1.549$ N=281	5.129	.024**	1.962	584	.161	.050*	.494
tac ₁₅	$\mu=3.4$ $\sigma=1.807$ N=304	$\mu=3.17$ $\sigma=1.759$ N=277	.744	.389	1.609	579	.133	.108	.359
real ₁	$\mu=5.93$ $\sigma=1.312$ N=312	$\mu=6.11$ $\sigma=1.203$ N=284	3.764	.053*	-1.713	594	-.140	.087*	.399
real ₂	$\mu=2.45$ $\sigma=2.118$ N=312	$\mu=2.45$ $\sigma=2.143$ N=278	.152	.697	.033	588	.003	.973	.050
real ₃	$\mu=3.95$ $\sigma=1.937$ N=305	$\mu=4.08$ $\sigma=2.052$ N=280	4.317	.038**	-.773	571	-.064	.440	.121
real ₄	$\mu=6.18$ $\sigma=1.192$ N=312	$\mu=6.32$ $\sigma=1.187$ N=282	.590	.443	-1.465	592	-.120	.143	.308
real ₅	$\mu=1.35$ $\sigma=1.157$ N=309	$\mu=1.32$ $\sigma=.962$ N=275	.921	.338	.410	582	.034	.682	.069
real ₆	$\mu=2.74$ $\sigma=2.424$ N=308	$\mu=2.96$ $\sigma=2.582$ N=278	5.891	.016**	-1.077	568	-.089	.282	.189
real ₇	$\mu=5.47$ $\sigma=2.179$ N=310	$\mu=5.25$ $\sigma=2.388$ N=283	5.760	.017**	1.167	572	.096	.244	.214
real ₈	$\mu=1.22$ $\sigma=.955$ N=307	$\mu=1.31$ $\sigma=1.021$ N=277	4.022	.045**	-1.128	566	-.094	.260	.205

real ₉	$\mu=5.48$ $\sigma=1.881$ N=307	$\mu=5.40$ $\sigma=2.100$ N=284	4.035	.045**	.472	569	.039	.637	.076
real ₁₀	$\mu=3.63$ $\sigma=2.451$ N=309	$\mu=3.80$ $\sigma=2.579$ N=282	5.562	.019**	-.804	577	-.066	.422	.126
real ₁₁	$\mu=1.79$ $\sigma=1.801$ N=311	$\mu=1.79$ $\sigma=1.787$ N=282	.013	.911	.026	591	.002	.980	.050
real ₁₂	$\mu=2.29$ $\sigma=2.120$ N=311	$\mu=2.40$ $\sigma=2.156$ N=282	.492	.483	-.672	591	-.055	.502	.102
real ₁₃	$\mu=5.77$ $\sigma=1.342$ N=310	$\mu=5.92$ $\sigma=1.443$ N=284	.070	.791	-1.268	592	-.104	.205	.244
real ₁₄	$\mu=4.83$ $\sigma=2.030$ N=305	$\mu=4.86$ $\sigma=2.244$ N=281	7.969	.005***	-.179	565	-.015	.858	.054
real ₁₅	$\mu=2.00$ $\sigma=1.981$ N=305	$\mu=2.01$ $\sigma=2.010$ N=278	.017	.897	-.045	581	-.004	.964	.050
fake ₁	$\mu=1.75$ $\sigma=1.473$ N=308	$\mu=1.74$ $\sigma=1.401$ N=280	.157	.692	.060	586	.005	.952	.050
fake ₂	$\mu=1.60$ $\sigma=1.351$ N=309	$\mu=1.64$ $\sigma=1.317$ N=280	.113	.737	-.371	587	-.031	.710	.066
fake ₃	$\mu=1.65$ $\sigma=1.504$ N=311	$\mu=1.58$ $\sigma=1.396$ N=277	1.096	.296	.572	586	.047	.568	.088
fake ₄	$\mu=1.25$ $\sigma=1.001$ N=308	$\mu=1.28$ $\sigma=.900$ N=278	.419	.518	-.433	584	-.036	.665	.072
fake ₅	$\mu=1.50$ $\sigma=1.333$ N=305	$\mu=1.44$ $\sigma=1.188$ N=279	1.359	.244	.582	582	.048	.561	.089
fake ₆	$\mu=1.49$ $\sigma=1.262$ N=302	$\mu=1.45$ $\sigma=1.256$ N=278	.424	.515	.418	578	.035	.676	.070
fake ₇	$\mu=1.49$ $\sigma=1.313$ N=309	$\mu=1.67$ $\sigma=1.478$ N=281	7.335	.007***	-1.563	563	-.129	.119	.346
fake ₈	$\mu=1.25$ $\sigma=1.019$ N=312	$\mu=1.19$ $\sigma=.696$ N=278	3.476	.063*	.929	552	.075	.353	.148
fake ₉	$\mu=1.30$ $\sigma=1.086$ N=307	$\mu=1.35$ $\sigma=1.060$ N=278	.914	.340	-.558	583	-.046	.577	.086
fake ₁₀	$\mu=1.33$ $\sigma=1.132$ N=309	$\mu=1.26$ $\sigma=.856$ N=278	3.507	.062*	.907	569	.074	.365	.145

pota_{ga1}	$\mu=4.30$ $\sigma=1.526$ $N=308$	$\mu=4.36$ $\sigma=1.629$ $N=285$	1.268	.261	-.459	591	-.038	.646	.075
pota_{ga2}	$\mu=3.92$ $\sigma=1.727$ $N=311$	$\mu=3.71$ $\sigma=1.877$ $N=283$	4.863	.028**	1.408	574	.116	.160	.291
pota_{in1}	$\mu=4.97$ $\sigma=1.570$ $N=309$	$\mu=5.03$ $\sigma=1.778$ $N=279$	4.102	.043**	-.390	558	-.032	.697	.067
pota_{in2}	$\mu=4.85$ $\sigma=1.457$ $N=306$	$\mu=4.91$ $\sigma=1.542$ $N=285$	.844	.358	-.479	589	-.039	.632	.076
pota_{in3}	$\mu=3.62$ $\sigma=1.577$ $N=306$	$\mu=3.64$ $\sigma=1.613$ $N=280$	.225	.636	-.191	584	-.016	.848	.054
$\text{pota}_{\text{fns1}}$	$\mu=4.26$ $\sigma=1.630$ $N=311$	$\mu=4.35$ $\sigma=1.619$ $N=284$	.015	.903	-.634	593	-.052	.526	.097
$\text{pota}_{\text{fns2}}$	$\mu=4.47$ $\sigma=1.745$ $N=305$	$\mu=4.60$ $\sigma=1.709$ $N=272$	.613	.434	-.908	575	-.076	.364	.149
$\text{pota}_{\text{fns3}}$	$\mu=2.38$ $\sigma=1.343$ $N=310$	$\mu=2.29$ $\sigma=1.312$ $N=278$	.094	.760	.846	586	.070	.398	.135
pota_{hp1}	$\mu=4.85$ $\sigma=1.344$ $N=310$	$\mu=4.97$ $\sigma=1.524$ $N=285$	2.881	.090	-1.072	568	-.088	.284	.188
pota_{hp2}	$\mu=3.90$ $\sigma=1.941$ $N=299$	$\mu=4.29$ $\sigma=1.817$ $N=280$	3.822	.051*	-2.451	577	-.202	.015**	.679
pota_{hp3}	$\mu=4.24$ $\sigma=1.771$ $N=306$	$\mu=4.34$ $\sigma=1.988$ $N=279$	8.074	.005***	-.654	559	-.054	.513	.100
$\text{pota}_{\text{sri1}}$	$\mu=3.24$ $\sigma=1.869$ $N=306$	$\mu=3.22$ $\sigma=1.873$ $N=273$	.154	.695	.144	577	.012	.885	.052
$\text{pota}_{\text{sri2}}$	$\mu=3.35$ $\sigma=1.702$ $N=303$	$\mu=3.44$ $\sigma=1.773$ $N=275$	1.015	.314	-.623	576	-.052	.533	.096
$\text{pota}_{\text{sri3}}$	$\mu=2.55$ $\sigma=1.633$ $N=284$	$\mu=2.43$ $\sigma=1.656$ $N=270$	.320	.572	.883	552	.075	.378	.143
pota_{ma1}	$\mu=4.67$ $\sigma=1.690$ $N=307$	$\mu=4.62$ $\sigma=1.665$ $N=281$	.213	.645	.374	586	.031	.709	.066
pota_{ma2}	$\mu=5.02$ $\sigma=1.602$ $N=302$	$\mu=5.10$ $\sigma=1.544$ $N=280$	.117	.733	-.639	580	-.053	.523	.098
pota_{ma3}	$\mu=4.22$ $\sigma=1.744$ $N=299$	$\mu=4.33$ $\sigma=1.724$ $N=281$	.126	.722	-.766	578	-.064	.444	.120

pota _{ma4}	$\mu=5.59$ $\sigma=1.308$ N=310	$\mu=5.52$ $\sigma=1.415$ N=284	.701	.403	.648	592	.053	.517	.099
pota _{vc1}	$\mu=4.51$ $\sigma=1.598$ N=286	$\mu=4.51$ $\sigma=1.668$ N=268	.237	.627	-.003	552	.000	.997	.050
pota _{vc2}	$\mu=4.74$ $\sigma=1.538$ N=294	$\mu=4.59$ $\sigma=1.688$ N=275	4.215	.041**	1.125	553	.095	.261	.204
pota _{avc1}	$\mu=3.67$ $\sigma=1.838$ N=304	$\mu=3.64$ $\sigma=1.894$ N=277	.456	.500	.209	579	.017	.834	.055
pota _{avc2}	$\mu=4.96$ $\sigma=1.609$ N=297	$\mu=5.07$ $\sigma=1.626$ N=269	.012	.914	-.818	564	-.069	.414	.130
pota _{gfe1}	$\mu=4.85$ $\sigma=1.451$ N=289	$\mu=4.98$ $\sigma=1.580$ N=262	.218	.641	-1.034	549	-.088	.302	.178
pota _{gfe2}	$\mu=4.09$ $\sigma=1.592$ N=290	$\mu=4.14$ $\sigma=1.783$ N=267	7.774	.005***	-.316	535	-.027	.752	.062
pota _{gfe3}	$\mu=4.67$ $\sigma=1.441$ N=306	$\mu=4.72$ $\sigma=1.589$ N=275	2.488	.115	-.372	579	-.031	.710	.066
pota _{agfe1}	$\mu=2.75$ $\sigma=1.587$ N=297	$\mu=2.71$ $\sigma=1.598$ N=272	.191	.663	.307	567	.026	.759	.061
pota _{agfe2}	$\mu=2.89$ $\sigma=1.549$ N=298	$\mu=2.77$ $\sigma=1.533$ N=270	.172	.679	.972	566	.082	.331	.164
pota _{agfe3}	$\mu=2.60$ $\sigma=1.466$ N=280	$\mu=2.71$ $\sigma=1.584$ N=259	1.329	.249	-.868	537	-.075	.386	.140

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex XCIX: Evaluation Results of Metric Variables Measured in Main Study expgr₂ vs. expgr₃

var	expgr ₂	expgr ₃	Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
			F	p	T	df	d	P	1-β
iac ₁	μ=4.52 σ=2.046 N=494	μ=4.30 σ=2.153 N=352	3.085	.079*	1.509	732	.106	.132	.329
iac ₂	μ=4.75 σ=1.755 N=481	μ=4.77 σ=1.845 N=360	3.663	.056*	-.167	752	-.012	.868	.053
iac ₃	μ=3.45 σ=2.024 N=503	μ=3.19 σ=2.022 N=362	.260	.610	1.866	863	.128	.062*	.458
iac ₄	μ=3.62 σ=1.791 N=509	μ=3.51 σ=1.904 N=371	3.686	.055*	.852	769	.059	.395	.139
iac ₅	μ=3.37 σ=1.717 N=427	μ=3.42 σ=1.715 N=326	.002	.969	-.422	751	-.031	.673	.071
iac ₆	μ=3.46 σ=2.013 N=490	μ=4.02 σ=2.113 N=363	.810	.368	-3.986	851	-.274	.000***	.977
iac ₇	μ=2.62 σ=1.621 N=503	μ=2.90 σ=1.839 N=358	8.353	.004***	-2.344	707	-.165	.019**	.664
iac ₈	μ=2.96 σ=1.759 N=459	μ=3.16 σ=1.861 N=336	1.852	.174	-1.505	793	-.108	.133	.324
tac ₁	μ=4.05 σ=1.940 N=499	μ=3.91 σ=1.985 N=363	1.012	.315	1.093	860	.075	.274	.192
tac ₂	μ=3.75 σ=1.909 N=511	μ=3.95 σ=1.924 N=372	.138	.711	-1.578	881	-.107	.115	.348
tac ₃	μ=3.48 σ=1.977 N=505	μ=3.61 σ=2.048 N=370	1.601	.206	-.963	873	-.066	.336	.161
tac ₄	μ=3.63 σ=1.718 N=510	μ=3.72 σ=1.773 N=372	1.119	.290	-.773	880	-.053	.440	.121
tac ₅	μ=3.74 σ=1.858 N=477	μ=3.71 σ=1.811 N=345	.465	.495	.176	820	.012	.861	.053
tac ₆	μ=3.80 σ=1.742 N=492	μ=3.95 σ=1.780 N=353	.001	.972	-1.255	843	-.087	.210	.238
tac ₇	μ=4.11 σ=1.591 N=378	μ=4.23 σ=1.641 N=274	.034	.855	-.978	650	-.078	.328	.166

tac ₈	$\mu=3.78$ $\sigma=1.948$ N=463	$\mu=3.90$ $\sigma=1.976$ N=348	.127	.722	-.913	809	-.065	.362	.150
tac ₉	$\mu=3.60$ $\sigma=1.927$ N=505	$\mu=3.61$ $\sigma=1.843$ N=371	1.865	.172	-.019	874	-.001	.985	.050
tac ₁₀	$\mu=2.88$ $\sigma=1.839$ N=399	$\mu=2.98$ $\sigma=1.949$ N=281	1.516	.219	-.640	678	-.050	.523	.098
tac ₁₁	$\mu=4.86$ $\sigma=1.825$ N=492	$\mu=5.28$ $\sigma=1.662$ N=360	5.582	.018**	-3.421	811	-.232	.001***	.916
tac ₁₂	$\mu=3.26$ $\sigma=1.942$ N=506	$\mu=3.18$ $\sigma=1.894$ N=365	.684	.408	.621	869	.043	.534	.096
tac ₁₃	$\mu=4.31$ $\sigma=2.144$ N=510	$\mu=4.51$ $\sigma=2.088$ N=369	1.584	.208	-1.405	877	-.096	.160	.289
tac ₁₄	$\mu=2.61$ $\sigma=1.678$ N=506	$\mu=2.77$ $\sigma=1.691$ N=371	.079	.778	-1.335	875	-.091	.182	.265
tac ₁₅	$\mu=3.13$ $\sigma=1.726$ N=500	$\mu=3.17$ $\sigma=1.772$ N=370	.695	.405	-.376	868	-.026	.707	.067
real ₁	$\mu=5.86$ $\sigma=1.299$ N=516	$\mu=6.04$ $\sigma=1.171$ N=373	2.643	.104	-2.076	887	-.141	.038**	.545
real ₂	$\mu=2.25$ $\sigma=1.907$ N=511	$\mu=2.39$ $\sigma=2.094$ N=368	6.152	.013**	-.987	745	-.069	.324	.172
real ₃	$\mu=3.93$ $\sigma=2.011$ N=510	$\mu=3.93$ $\sigma=1.962$ N=369	2.113	.146	-.012	877	-.001	.990	.050
real ₄	$\mu=6.13$ $\sigma=1.238$ N=515	$\mu=6.27$ $\sigma=1.079$ N=372	1.128	.289	-1.803	885	-.123	.072*	.439
real ₅	$\mu=1.34$ $\sigma=1.081$ N=507	$\mu=1.39$ $\sigma=1.188$ N=366	1.873	.172	-.717	871	-.049	.474	.110
real ₆	$\mu=2.50$ $\sigma=2.343$ N=509	$\mu=2.70$ $\sigma=2.439$ N=369	4.229	.040**	-1.217	774	-.084	.224	.233
real ₇	$\mu=5.04$ $\sigma=2.431$ N=511	$\mu=5.48$ $\sigma=2.202$ N=371	16.028	.000***	-2.778	838	-.186	.006***	.778
real ₈	$\mu=1.23$ $\sigma=.899$ N=506	$\mu=1.31$ $\sigma=.988$ N=363	3.706	.055*	-1.150	734	-.080	.250	.213

real ₉	$\mu=5.13$ $\sigma=2.194$ N=512	$\mu=5.41$ $\sigma=2.017$ N=369	5.292	.022**	-1.915	829	-.129	.056*	.471
real ₁₀	$\mu=3.50$ $\sigma=2.578$ N=510	$\mu=3.65$ $\sigma=2.46$ N=369	7.719	.006***	-.872	814	-.059	.383	.139
real ₁₁	$\mu=1.58$ $\sigma=1.554$ N=511	$\mu=1.74$ $\sigma=1.696$ N=367	5.471	.020**	-1.409	746	-.098	.159	.299
real ₁₂	$\mu=2.09$ $\sigma=1.975$ N=511	$\mu=2.34$ $\sigma=2.120$ N=369	7.292	.007***	-1.778	759	-.123	.076*	.436
real ₁₃	$\mu=5.66$ $\sigma=1.524$ N=512	$\mu=5.78$ $\sigma=1.480$ N=371	.749	.387	-1.150	881	-.078	.250	.208
real ₁₄	$\mu=4.50$ $\sigma=2.290$ N=510	$\mu=4.81$ $\sigma=2.109$ N=371	11.672	.001***	-2.104	832	-.141	.036**	.541
real ₁₅	$\mu=1.80$ $\sigma=1.801$ N=506	$\mu=2.08$ $\sigma=2.039$ N=366	14.239	.000***	-2.071	726	-.145	.039**	.560
fake ₁	$\mu=1.66$ $\sigma=1.382$ N=507	$\mu=1.68$ $\sigma=1.368$ N=367	.139	.709	-.288	872	-.020	.774	.060
fake ₂	$\mu=1.62$ $\sigma=1.298$ N=500	$\mu=1.70$ $\sigma=1.371$ N=364	1.641	.201	-.866	862	-.060	.387	.140
fake ₃	$\mu=1.56$ $\sigma=1.381$ N=508	$\mu=1.53$ $\sigma=1.224$ N=365	1.326	.250	.387	871	.027	.699	.068
fake ₄	$\mu=1.21$ $\sigma=.834$ N=509	$\mu=1.21$ $\sigma=.814$ N=367	.049	.825	.090	874	.006	.928	.051
fake ₅	$\mu=1.51$ $\sigma=1.327$ N=507	$\mu=1.54$ $\sigma=1.240$ N=366	.028	.868	-.265	871	-.018	.791	.058
fake ₆	$\mu=1.46$ $\sigma=1.232$ N=502	$\mu=1.54$ $\sigma=1.254$ N=365	1.728	.189	-.955	865	-.066	.340	.160
fake ₇	$\mu=1.45$ $\sigma=1.174$ N=512	$\mu=1.56$ $\sigma=1.308$ N=370	5.393	.020**	-1.398	742	-.097	.163	.295
fake ₈	$\mu=1.18$ $\sigma=.745$ N=511	$\mu=1.19$ $\sigma=.756$ N=369	.010	.920	-.059	878	-.004	.953	.050
fake ₉	$\mu=1.31$ $\sigma=.963$ N=505	$\mu=1.20$ $\sigma=.776$ N=367	11.107	.001***	1.865	861	.124	.063*	.439
fake ₁₀	$\mu=1.21$ $\sigma=.833$ N=506	$\mu=1.20$ $\sigma=.722$ N=364	.558	.455	.303	868	.021	.762	.061

pota _{ga1}	$\mu=4.19$ $\sigma=1.634$ N=512	$\mu=4.41$ $\sigma=1.525$ N=368	2.197	.139	-2.023	878	-.138	.043**	.523
pota _{ga2}	$\mu=3.87$ $\sigma=1.859$ N=507	$\mu=3.82$ $\sigma=1.772$ N=368	1.756	.185	.362	873	.025	.717	.065
pota _{in1}	$\mu=5.08$ $\sigma=1.554$ N=508	$\mu=4.87$ $\sigma=1.787$ N=367	11.664	.001***	1.794	720	.125	.073*	.445
pota _{in2}	$\mu=4.76$ $\sigma=1.577$ N=514	$\mu=4.92$ $\sigma=1.495$ N=370	3.270	.071*	-1.505	819	-.102	.133	.321
pota _{in3}	$\mu=3.50$ $\sigma=1.614$ N=511	$\mu=3.69$ $\sigma=1.651$ N=368	.214	.644	-1.723	877	-.118	.085*	.407
pota _{fns1}	$\mu=4.34$ $\sigma=1.675$ N=511	$\mu=4.40$ $\sigma=1.546$ N=366	3.910	.048**	-.618	821	-.042	.537	.094
pota _{fns2}	$\mu=4.52$ $\sigma=1.686$ N=494	$\mu=4.52$ $\sigma=1.691$ N=362	.032	.859	.019	854	.001	.985	.050
pota _{fns3}	$\mu=2.26$ $\sigma=1.207$ N=513	$\mu=2.25$ $\sigma=1.235$ N=367	.334	.563	.112	878	.008	.911	.052
pota _{hp1}	$\mu=4.92$ $\sigma=1.466$ N=516	$\mu=4.73$ $\sigma=1.453$ N=373	.068	.795	1.881	887	.128	.060*	.469
pota _{hp2}	$\mu=3.90$ $\sigma=1.845$ N=509	$\mu=3.94$ $\sigma=1.791$ N=363	1.496	.222	-.354	870	-.024	.724	.064
pota _{hp3}	$\mu=4.25$ $\sigma=1.893$ N=512	$\mu=4.30$ $\sigma=1.830$ N=366	1.357	.244	-.389	876	-.027	.697	.068
pota _{sri1}	$\mu=3.22$ $\sigma=1.880$ N=502	$\mu=3.33$ $\sigma=1.933$ N=359	.670	.413	-.906	859	-.063	.365	.149
pota _{sri2}	$\mu=3.26$ $\sigma=1.676$ N=494	$\mu=3.25$ $\sigma=1.745$ N=364	.675	.411	.037	856	.003	.971	.050
pota _{sri3}	$\mu=2.43$ $\sigma=1.546$ N=482	$\mu=2.46$ $\sigma=1.641$ N=343	1.946	.163	-.267	823	-.019	.789	.058
pota _{ma1}	$\mu=4.61$ $\sigma=1.627$ N=503	$\mu=4.75$ $\sigma=1.559$ N=365	2.288	.131	-1.277	866	-.088	.202	.248
pota _{ma2}	$\mu=5.02$ $\sigma=1.512$ N=508	$\mu=5.03$ $\sigma=1.522$ N=360	.044	.834	-.112	866	-.008	.911	.052
pota _{ma3}	$\mu=4.44$ $\sigma=1.698$ N=501	$\mu=4.29$ $\sigma=1.715$ N=350	.080	.778	1.260	849	.088	.208	.243

pota _{ma4}	$\mu=5.65$ $\sigma=1.266$ N=510	$\mu=5.65$ $\sigma=1.316$ N=368	.716	.398	.062	876	.004	.951	.050
pota _{vc1}	$\mu=4.41$ $\sigma=1.664$ N=476	$\mu=4.56$ $\sigma=1.667$ N=344	.034	.854	-1.296	818	-.092	.195	.255
pota _{vc2}	$\mu=4.64$ $\sigma=1.710$ N=488	$\mu=4.72$ $\sigma=1.659$ N=341	.163	.686	-.713	827	-.050	.476	.109
pota _{avc1}	$\mu=3.65$ $\sigma=1.958$ N=496	$\mu=3.53$ $\sigma=1.884$ N=352	1.279	.258	.827	846	.058	.409	.132
pota _{avc2}	$\mu=5.01$ $\sigma=1.650$ N=481	$\mu=5.03$ $\sigma=1.556$ N=349	.670	.413	-.186	828	-.013	.852	.054
pota _{gfe1}	$\mu=4.89$ $\sigma=1.485$ N=474	$\mu=4.95$ $\sigma=1.490$ N=330	.089	.765	-.622	802	-.045	.534	.096
pota _{gfe2}	$\mu=4.14$ $\sigma=1.668$ N=470	$\mu=4.01$ $\sigma=1.661$ N=326	.166	.684	1.058	794	.076	.291	.184
pota _{gfe3}	$\mu=4.69$ $\sigma=1.556$ N=498	$\mu=4.72$ $\sigma=1.596$ N=354	.163	.686	-.289	850	-.020	.773	.060
pota _{agfe1}	$\mu=2.68$ $\sigma=1.571$ N=493	$\mu=2.86$ $\sigma=1.686$ N=355	3.388	.066*	-1.617	730	-.114	.106	.373
pota _{agfe2}	$\mu=2.75$ $\sigma=1.465$ N=479	$\mu=2.99$ $\sigma=1.618$ N=350	5.319	.021**	-2.219	707	-.158	.027**	.612
pota _{agfe3}	$\mu=2.75$ $\sigma=1.560$ N=469	$\mu=2.63$ $\sigma=1.424$ N=334	2.861	.091*	1.131	754	.080	.258	.200

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex C: Evaluation Results of Metric Variables Measured in Main Study expgr₂ vs. expgr₄

var	expgr ₂	expgr ₄	Levene's Test of Equality of Vari- ances		independent samples t-test (two tailed)				
			F	p	T	df	d	P	1-β
iac ₁	μ=4.52 σ=2.046 N=494	μ=4.73 σ=2.149 N=280	.812	.368	-1.359	772	-.102	.174	.275
iac ₂	μ=4.75 σ=1.755 N=481	μ=4.59 σ=1.763 N=274	.550	.459	1.182	753	.089	.238	.217
iac ₃	μ=3.45 σ=2.024 N=503	μ=3.35 σ=2.040 N=273	.155	.694	.614	774	.046	.539	.094
iac ₄	μ=3.62 σ=1.791 N=509	μ=3.88 σ=1.848 N=279	.668	.414	-1.892	786	-.141	.059*	.472
iac ₅	μ=3.37 σ=1.717 N=427	μ=3.12 σ=1.682 N=251	.346	.556	1.878	676	.149	.061*	.465
iac ₆	μ=3.46 σ=2.013 N=490	μ=3.94 σ=2.121 N=271	1.812	.179	-3.114	759	-.234	.002***	.870
iac ₇	μ=2.62 σ=1.621 N=503	μ=2.74 σ=1.754 N=278	2.844	.092*	-.933	535	-.071	.351	.158
iac ₈	μ=2.96 σ=1.759 N=459	μ=2.99 σ=1.851 N=257	2.412	.121	-.182	714	-.014	.856	.054
tac ₁	μ=4.05 σ=1.940 N=499	μ=3.91 σ=2.061 N=282	5.679	.017**	.973	554	.074	.331	.168
tac ₂	μ=3.75 σ=1.909 N=511	μ=3.93 σ=1.954 N=281	.261	.610	-1.257	790	-.093	.209	.240
tac ₃	μ=3.48 σ=1.977 N=505	μ=3.58 σ=2.034 N=279	.665	.415	-.692	782	-.052	.489	.107
tac ₄	μ=3.63 σ=1.718 N=510	μ=3.90 σ=1.741 N=279	.010	.921	-2.115	787	-.157	.035**	.558
tac ₅	μ=3.74 σ=1.858 N=477	μ=3.78 σ=1.901 N=258	.568	.451	-.299	733	-.023	.765	.060
tac ₆	μ=3.80 σ=1.742 N=492	μ=4.01 σ=1.809 N=270	.905	.342	-1.545	760	-.117	.123	.339

tac ₇	$\mu=4.11$ $\sigma=1.591$ N=378	$\mu=4.31$ $\sigma=1.618$ N=213	.534	.465	-1.434	589	-.123	.152	.300
tac ₈	$\mu=3.78$ $\sigma=1.948$ N=463	$\mu=3.57$ $\sigma=1.920$ N=258	.045	.832	1.340	719	.104	.181	.267
tac ₉	$\mu=3.60$ $\sigma=1.927$ N=505	$\mu=3.91$ $\sigma=1.922$ N=280	.323	.570	-2.139	783	-.159	.033**	.568
tac ₁₀	$\mu=2.88$ $\sigma=1.839$ N=399	$\mu=2.82$ $\sigma=1.863$ N=229	.000	.997	.416	626	.035	.678	.071
tac ₁₁	$\mu=4.86$ $\sigma=1.825$ N=492	$\mu=5.13$ $\sigma=1.786$ N=273	.492	.483	-1.961	763	-.148	.050*	.500
tac ₁₂	$\mu=3.26$ $\sigma=1.942$ N=506	$\mu=3.25$ $\sigma=1.985$ N=275	.598	.440	.106	779	.008	.915	.051
tac ₁₃	$\mu=4.31$ $\sigma=2.144$ N=510	$\mu=4.30$ $\sigma=2.198$ N=282	.360	.549	.006	790	.000	.995	.050
tac ₁₄	$\mu=2.61$ $\sigma=1.678$ N=506	$\mu=2.49$ $\sigma=1.549$ N=281	4.108	.043**	1.010	618	.073	.313	.165
tac ₁₅	$\mu=3.13$ $\sigma=1.726$ N=500	$\mu=3.17$ $\sigma=1.759$ N=277	.314	.575	-.292	775	-.022	.770	.060
real ₁	$\mu=5.86$ $\sigma=1.299$ N=516	$\mu=6.11$ $\sigma=1.203$ N=284	2.549	.111	-2.618	798	-.193	.009***	.742
real ₂	$\mu=2.25$ $\sigma=1.907$ N=511	$\mu=2.45$ $\sigma=2.143$ N=278	9.624	.002***	-1.259	515	-.097	.209	.255
real ₃	$\mu=3.93$ $\sigma=2.011$ N=510	$\mu=4.08$ $\sigma=2.052$ N=280	.741	.390	-.964	788	-.072	.335	.162
real ₄	$\mu=6.13$ $\sigma=1.238$ N=515	$\mu=6.32$ $\sigma=1.187$ N=282	.960	.327	-2.130	795	-.157	.033**	.562
real ₅	$\mu=1.34$ $\sigma=1.081$ N=507	$\mu=1.32$ $\sigma=.962$ N=275	.453	.501	.243	780	.018	.808	.057
real ₆	$\mu=2.50$ $\sigma=2.343$ N=509	$\mu=2.96$ $\sigma=2.582$ N=278	16.658	.000***	-2.443	524	-.187	.015**	.707
real ₇	$\mu=5.04$ $\sigma=2.431$ N=511	$\mu=5.25$ $\sigma=2.388$ N=283	.894	.345	-1.192	792	-.088	.234	.220
real ₈	$\mu=1.23$ $\sigma=.899$ N=506	$\mu=1.31$ $\sigma=1.021$ N=277	3.999	.046**	-1.105	510	-.086	.270	.210

real ₉	$\mu=5.13$ $\sigma=2.194$ N=512	$\mu=5.40$ $\sigma=2.100$ N=284	2.274	.132	-1.658	794	-.123	.098*	.382
real ₁₀	$\mu=3.50$ $\sigma=2.578$ N=510	$\mu=3.80$ $\sigma=2.579$ N=282	.005	.942	-1.567	790	-.116	.118	.345
real ₁₁	$\mu=1.58$ $\sigma=1.554$ N=511	$\mu=1.79$ $\sigma=1.787$ N=282	7.948	.005***	-1.611	515	-.124	.108	.386
real ₁₂	$\mu=2.09$ $\sigma=1.975$ N=511	$\mu=2.40$ $\sigma=2.156$ N=282	1.429	.001***	-1.998	538	-.152	.046**	.535
real ₁₃	$\mu=5.66$ $\sigma=1.524$ N=512	$\mu=5.92$ $\sigma=1.443$ N=284	4.663	.031**	-2.394	612	-.174	.017**	.651
real ₁₄	$\mu=4.50$ $\sigma=2.290$ N=510	$\mu=4.86$ $\sigma=2.244$ N=281	1.374	.242	-2.138	789	-.159	.033**	.571
real ₁₅	$\mu=1.80$ $\sigma=1.801$ N=506	$\mu=2.01$ $\sigma=2.010$ N=278	6.417	.011**	-1.454	520	-.112	.147	.322
fake ₁	$\mu=1.66$ $\sigma=1.382$ N=507	$\mu=1.74$ $\sigma=1.401$ N=280	.437	.509	-.832	785	-.062	.406	.132
fake ₂	$\mu=1.62$ $\sigma=1.298$ N=500	$\mu=1.64$ $\sigma=1.317$ N=280	.108	.743	-.194	778	-.014	.847	.054
fake ₃	$\mu=1.56$ $\sigma=1.381$ N=508	$\mu=1.58$ $\sigma=1.396$ N=277	.116	.734	-.160	783	-.012	.873	.053
fake ₄	$\mu=1.21$ $\sigma=.834$ N=509	$\mu=1.28$ $\sigma=.900$ N=278	4.095	.043**	-1.100	533	-.084	.272	.203
fake ₅	$\mu=1.51$ $\sigma=1.327$ N=507	$\mu=1.44$ $\sigma=1.188$ N=279	3.325	.069*	.839	628	.061	.402	.129
fake ₆	$\mu=1.46$ $\sigma=1.232$ N=502	$\mu=1.45$ $\sigma=1.256$ N=278	.016	.899	.092	778	.007	.927	.051
fake ₇	$\mu=1.45$ $\sigma=1.174$ N=512	$\mu=1.67$ $\sigma=1.478$ N=281	18.369	.000***	-2.221	476	-.176	.027**	.658
fake ₈	$\mu=1.18$ $\sigma=.745$ N=511	$\mu=1.19$ $\sigma=.696$ N=278	.002	.964	-.057	787	-.004	.954	.050
fake ₉	$\mu=1.31$ $\sigma=.963$ N=505	$\mu=1.35$ $\sigma=1.060$ N=278	1.443	.230	-.585	781	-.044	.559	.091
fake ₁₀	$\mu=1.21$ $\sigma=.833$ N=506	$\mu=1.26$ $\sigma=.856$ N=278	1.445	.230	-.700	782	-.052	.484	.107

pota_{ga1}	$\mu=4.19$ $\sigma=1.634$ $N=512$	$\mu=4.36$ $\sigma=1.629$ $N=285$	.029	.866	-1.393	795	-.103	.164	.285
pota_{ga2}	$\mu=3.87$ $\sigma=1.859$ $N=507$	$\mu=3.71$ $\sigma=1.877$ $N=283$	.052	.820	1.099	788	.082	.272	.197
pota_{in1}	$\mu=5.08$ $\sigma=1.554$ $N=508$	$\mu=5.03$ $\sigma=1.778$ $N=279$	5.329	.021**	.454	511	.035	.650	.076
pota_{in2}	$\mu=4.76$ $\sigma=1.577$ $N=514$	$\mu=4.91$ $\sigma=1.542$ $N=285$	.823	.365	-1.247	797	-.092	.213	.238
pota_{in3}	$\mu=3.50$ $\sigma=1.614$ $N=511$	$\mu=3.64$ $\sigma=1.613$ $N=280$	.044	.835	-1.183	789	-.088	.237	.219
$\text{pota}_{\text{fns1}}$	$\mu=4.34$ $\sigma=1.675$ $N=511$	$\mu=4.35$ $\sigma=1.619$ $N=284$	.339	.561	-.069	793	-.005	.945	.051
$\text{pota}_{\text{fns2}}$	$\mu=4.52$ $\sigma=1.686$ $N=494$	$\mu=4.60$ $\sigma=1.709$ $N=272$	.004	.948	-.615	764	-.046	.539	.093
$\text{pota}_{\text{fns3}}$	$\mu=2.26$ $\sigma=1.207$ $N=513$	$\mu=2.29$ $\sigma=1.312$ $N=278$	4.518	.034**	-.320	529	-.024	.749	.062
pota_{hp1}	$\mu=4.92$ $\sigma=1.466$ $N=516$	$\mu=4.97$ $\sigma=1.524$ $N=285$	.021	.885	-.486	799	-.036	.627	.078
pota_{hp2}	$\mu=3.90$ $\sigma=1.845$ $N=509$	$\mu=4.29$ $\sigma=1.817$ $N=280$	1.002	.317	-2.841	787	-.210	.005***	.805
pota_{hp3}	$\mu=4.25$ $\sigma=1.893$ $N=512$	$\mu=4.34$ $\sigma=1.988$ $N=279$	1.386	.239	-.670	789	-.050	.503	.103
$\text{pota}_{\text{sri1}}$	$\mu=3.22$ $\sigma=1.880$ $N=502$	$\mu=3.22$ $\sigma=1.873$ $N=273$	.001	.973	-.007	773	-.001	.994	.050
$\text{pota}_{\text{sri2}}$	$\mu=3.26$ $\sigma=1.676$ $N=494$	$\mu=3.44$ $\sigma=1.773$ $N=275$	1.873	.171	-1.421	767	-.107	.156	.295
$\text{pota}_{\text{sri3}}$	$\mu=2.43$ $\sigma=1.546$ $N=482$	$\mu=2.43$ $\sigma=1.656$ $N=270$	2.283	.131	.064	750	.005	.949	.050
pota_{ma1}	$\mu=4.61$ $\sigma=1.627$ $N=503$	$\mu=4.62$ $\sigma=1.665$ $N=281$	.037	.848	-.073	782	-.005	.942	.051
pota_{ma2}	$\mu=5.02$ $\sigma=1.512$ $N=508$	$\mu=5.10$ $\sigma=1.544$ $N=280$	.012	.913	-.691	786	-.051	.490	.105
pota_{ma3}	$\mu=4.44$ $\sigma=1.698$ $N=501$	$\mu=4.33$ $\sigma=1.724$ $N=281$	.067	.796	.838	780	.062	.402	.132

pota _{ma4}	$\mu=5.65$ $\sigma=1.266$ N=510	$\mu=5.52$ $\sigma=1.415$ N=284	3.382	.066*	1.325	532	.101	.186	.276
pota _{vc1}	$\mu=4.41$ $\sigma=1.664$ N=476	$\mu=4.51$ $\sigma=1.668$ N=268	.102	.750	-.802	742	-.061	.423	.125
pota _{vc2}	$\mu=4.64$ $\sigma=1.710$ N=488	$\mu=4.59$ $\sigma=1.688$ N=275	.004	.952	.420	761	.032	.675	.071
pota _{avc1}	$\mu=3.65$ $\sigma=1.958$ N=496	$\mu=3.64$ $\sigma=1.894$ N=277	1.146	.285	.067	771	.005	.946	.051
pota _{avc2}	$\mu=5.01$ $\sigma=1.650$ N=481	$\mu=5.07$ $\sigma=1.626$ N=269	.024	.877	-.512	748	-.039	.609	.080
pota _{gfe1}	$\mu=4.89$ $\sigma=1.485$ N=474	$\mu=4.98$ $\sigma=1.580$ N=262	.058	.810	-.825	734	-.064	.409	.132
pota _{gfe2}	$\mu=4.14$ $\sigma=1.668$ N=470	$\mu=4.14$ $\sigma=1.783$ N=267	3.845	.050*	-.018	523	-.001	.986	.050
pota _{gfe3}	$\mu=4.69$ $\sigma=1.556$ N=498	$\mu=4.72$ $\sigma=1.589$ N=275	.006	.936	-.265	771	-.020	.791	.058
pota _{agfe1}	$\mu=2.68$ $\sigma=1.571$ N=493	$\mu=2.71$ $\sigma=1.598$ N=272	.538	.464	-.300	763	-.023	.765	.061
pota _{agfe2}	$\mu=2.75$ $\sigma=1.465$ N=479	$\mu=2.77$ $\sigma=1.533$ N=270	.768	.381	-.133	747	-.010	.894	.052
pota _{agfe3}	$\mu=2.75$ $\sigma=1.560$ N=469	$\mu=2.71$ $\sigma=1.584$ N=259	.331	.565	.365	726	.028	.715	.065

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CI: Evaluation Results of Metric Variables Measured in Main Study expgr₃ vs. expgr₄

var	expgr ₃	expgr ₄	Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
			F	p	T	df	d	P	1-β
iac ₁	μ=4.30 σ=2.153 N=352	μ=4.73 σ=2.149 N=280	.403	.526	-2.518	630	-.201	.012**	.708
iac ₂	μ=4.77 σ=1.845 N=360	μ=4.59 σ=1.763 N=274	1.029	.311	1.228	632	.098	.220	.231
iac ₃	μ=3.19 σ=2.022 N=362	μ=3.35 σ=2.040 N=273	.632	.427	-1.024	633	-.082	.306	.175
iac ₄	μ=3.51 σ=1.904 N=371	μ=3.88 σ=1.848 N=279	.766	.382	-2.439	648	-.193	.015**	.682
iac ₅	μ=3.42 σ=1.715 N=326	μ=3.12 σ=1.682 N=251	.274	.601	2.155	575	.180	.032**	.571
iac ₆	μ=4.02 σ=2.113 N=363	μ=3.94 σ=2.121 N=271	.191	.662	.493	632	.040	.622	.079
iac ₇	μ=2.90 σ=1.839 N=358	μ=2.74 σ=1.754 N=278	.848	.358	1.144	634	.091	.253	.206
iac ₈	μ=3.16 σ=1.861 N=336	μ=2.99 σ=1.851 N=257	.059	.809	1.101	591	.091	.271	.195
tac ₁	μ=3.91 σ=1.985 N=363	μ=3.91 σ=2.061 N=282	1.910	.167	-.009	643	-.001	.993	.050
tac ₂	μ=3.95 σ=1.924 N=372	μ=3.93 σ=1.954 N=281	.028	.868	.172	651	.014	.863	.054
tac ₃	μ=3.61 σ=2.048 N=370	μ=3.58 σ=2.034 N=279	.101	.750	.181	647	.014	.857	.054
tac ₄	μ=3.72 σ=1.773 N=372	μ=3.90 σ=1.741 N=279	.961	.327	-1.293	649	-.102	.197	.251
tac ₅	μ=3.71 σ=1.811 N=345	μ=3.78 σ=1.901 N=258	1.705	.192	-.434	601	-.036	.665	.072
tac ₆	μ=3.95 σ=1.780 N=353	μ=4.01 σ=1.809 N=270	.775	.379	-.364	621	-.029	.716	.065
tac ₇	μ=4.23 σ=1.641 N=274	μ=4.31 σ=1.618 N=213	.250	.618	-.480	485	-.044	.631	.077

tac ₈	$\mu=3.90$ $\sigma=1.976$ N=348	$\mu=3.57$ $\sigma=1.920$ N=258	.261	.610	2.049	604	.168	.041**	.533
tac ₉	$\mu=3.61$ $\sigma=1.843$ N=371	$\mu=3.91$ $\sigma=1.922$ N=280	.369	.544	-2.047	649	-.162	.041**	.533
tac ₁₀	$\mu=2.98$ $\sigma=1.949$ N=281	$\mu=2.82$ $\sigma=1.863$ N=229	1.094	.296	.927	508	.083	.354	.154
tac ₁₁	$\mu=5.28$ $\sigma=1.662$ N=360	$\mu=5.13$ $\sigma=1.786$ N=273	1.885	.170	1.039	631	.083	.299	.178
tac ₁₂	$\mu=3.18$ $\sigma=1.894$ N=365	$\mu=3.25$ $\sigma=1.985$ N=275	2.085	.149	-.430	638	-.034	.667	.071
tac ₁₃	$\mu=4.51$ $\sigma=2.088$ N=369	$\mu=4.30$ $\sigma=2.198$ N=282	2.607	.107	1.210	649	.096	.227	.228
tac ₁₄	$\mu=2.77$ $\sigma=1.691$ N=371	$\mu=2.49$ $\sigma=1.549$ N=281	2.568	.110	2.120	650	.167	.034**	.559
tac ₁₅	$\mu=3.17$ $\sigma=1.772$ N=370	$\mu=3.17$ $\sigma=1.759$ N=277	.037	.848	.049	645	.004	.961	.050
real ₁	$\mu=6.04$ $\sigma=1.171$ N=373	$\mu=6.11$ $\sigma=1.203$ N=284	.021	.885	-.739	655	-.058	.460	.114
real ₂	$\mu=2.39$ $\sigma=2.094$ N=368	$\mu=2.45$ $\sigma=2.143$ N=278	.531	.467	-.342	644	-.027	.733	.063
real ₃	$\mu=3.93$ $\sigma=1.962$ N=369	$\mu=4.08$ $\sigma=2.052$ N=280	4.131	.043**	-.900	586	-.072	.368	.148
real ₄	$\mu=6.27$ $\sigma=1.079$ N=372	$\mu=6.32$ $\sigma=1.187$ N=282	.007	.934	-.545	652	-.043	.586	.085
real ₅	$\mu=1.39$ $\sigma=1.188$ N=366	$\mu=1.32$ $\sigma=.962$ N=275	3.345	.068*	.875	635	.068	.382	.136
real ₆	$\mu=2.70$ $\sigma=2.439$ N=369	$\mu=2.96$ $\sigma=2.582$ N=278	4.746	.030**	-1.278	578	-.102	.202	.250
real ₇	$\mu=5.48$ $\sigma=2.202$ N=371	$\mu=5.25$ $\sigma=2.388$ N=283	6.305	.012**	1.222	580	.097	.222	.233
real ₈	$\mu=1.31$ $\sigma=.988$ N=363	$\mu=1.31$ $\sigma=1.021$ N=277	.050	.824	-.069	638	-.006	.945	.051

real ₉	$\mu=5.41$ $\sigma=2.017$ N=369	$\mu=5.40$ $\sigma=2.100$ N=284	.294	.588	.053	651	.004	.958	.050
real ₁₀	$\mu=3.65$ $\sigma=2.46$ N=369	$\mu=3.80$ $\sigma=2.579$ N=282	5.235	.022**	-.751	590	-.060	.453	.118
real ₁₁	$\mu=1.74$ $\sigma=1.696$ N=367	$\mu=1.79$ $\sigma=1.787$ N=282	.421	.517	-.335	647	-.027	.738	.063
real ₁₂	$\mu=2.34$ $\sigma=2.120$ N=369	$\mu=2.40$ $\sigma=2.156$ N=282	.498	.481	-.356	649	-.028	.722	.064
real ₁₃	$\mu=5.78$ $\sigma=1.480$ N=371	$\mu=5.92$ $\sigma=1.443$ N=284	1.661	.198	-1.237	653	-.097	.217	.233
real ₁₄	$\mu=4.81$ $\sigma=2.109$ N=371	$\mu=4.86$ $\sigma=2.244$ N=281	3.189	.075*	-.273	583	-.022	.785	.059
real ₁₅	$\mu=2.08$ $\sigma=2.039$ N=366	$\mu=2.01$ $\sigma=2.010$ N=278	.685	.408	.408	642	.032	.684	.069
fake ₁	$\mu=1.68$ $\sigma=1.368$ N=367	$\mu=1.74$ $\sigma=1.401$ N=280	.097	.756	-.537	645	-.043	.591	.084
fake ₂	$\mu=1.70$ $\sigma=1.371$ N=364	$\mu=1.64$ $\sigma=1.317$ N=280	.641	.424	.564	642	.045	.573	.087
fake ₃	$\mu=1.53$ $\sigma=1.224$ N=365	$\mu=1.58$ $\sigma=1.396$ N=277	1.853	.174	-.498	640	-.040	.619	.079
fake ₄	$\mu=1.21$ $\sigma=.814$ N=367	$\mu=1.28$ $\sigma=.900$ N=278	4.452	.035**	-1.122	563	-.090	.262	.204
fake ₅	$\mu=1.54$ $\sigma=1.240$ N=366	$\mu=1.44$ $\sigma=1.188$ N=279	2.834	.093*	1.049	611	.083	.294	.181
fake ₆	$\mu=1.54$ $\sigma=1.254$ N=365	$\mu=1.45$ $\sigma=1.256$ N=278	1.553	.213	.902	641	.072	.368	.147
fake ₇	$\mu=1.56$ $\sigma=1.308$ N=370	$\mu=1.67$ $\sigma=1.478$ N=281	4.008	.046**	-.968	561	-.078	.334	.166
fake ₈	$\mu=1.19$ $\sigma=.756$ N=369	$\mu=1.19$ $\sigma=.696$ N=278	.002	.962	-.001	645	.000	.999	.050
fake ₉	$\mu=1.20$ $\sigma=.776$ N=367	$\mu=1.35$ $\sigma=1.060$ N=278	16.243	.000***	-2.037	487	-.168	.042**	.560
fake ₁₀	$\mu=1.20$ $\sigma=.722$ N=364	$\mu=1.26$ $\sigma=.856$ N=278	3.580	.059*	-.946	538	-.077	.344	.162

pota _{ga1}	$\mu=4.41$ $\sigma=1.525$ N=368	$\mu=4.36$ $\sigma=1.629$ N=285	1.270	.260	.417	651	.033	.677	.070
pota _{ga2}	$\mu=3.82$ $\sigma=1.772$ N=368	$\mu=3.71$ $\sigma=1.877$ N=283	1.866	.172	.743	649	.059	.458	.116
pota _{in1}	$\mu=4.87$ $\sigma=1.787$ N=367	$\mu=5.03$ $\sigma=1.778$ N=279	.478	.490	-1.062	644	-.084	.289	.184
pota _{in2}	$\mu=4.92$ $\sigma=1.495$ N=370	$\mu=4.91$ $\sigma=1.542$ N=285	.494	.482	.108	653	.008	.914	.051
pota _{in3}	$\mu=3.69$ $\sigma=1.651$ N=368	$\mu=3.64$ $\sigma=1.613$ N=280	.341	.559	.386	646	.031	.699	.068
pota _{fns1}	$\mu=4.40$ $\sigma=1.546$ N=366	$\mu=4.35$ $\sigma=1.619$ N=284	1.442	.230	.475	648	.038	.635	.077
pota _{fns2}	$\mu=4.52$ $\sigma=1.691$ N=362	$\mu=4.60$ $\sigma=1.709$ N=272	.008	.929	-.593	632	-.048	.553	.092
pota _{fns3}	$\mu=2.25$ $\sigma=1.235$ N=367	$\mu=2.29$ $\sigma=1.312$ N=278	2.205	.138	-.395	643	-.031	.693	.068
pota _{hp1}	$\mu=4.73$ $\sigma=1.453$ N=373	$\mu=4.97$ $\sigma=1.524$ N=285	.006	.937	-2.056	656	-.161	.040**	.533
pota _{hp2}	$\mu=3.94$ $\sigma=1.791$ N=363	$\mu=4.29$ $\sigma=1.817$ N=280	.011	.916	-2.396	641	-.190	.017**	.665
pota _{hp3}	$\mu=4.30$ $\sigma=1.830$ N=366	$\mu=4.34$ $\sigma=1.988$ N=279	4.327	.038**	-.303	571	-.024	.762	.060
pota _{sri1}	$\mu=3.33$ $\sigma=1.933$ N=359	$\mu=3.22$ $\sigma=1.873$ N=273	.460	.498	.771	630	.062	.441	.120
pota _{sri2}	$\mu=3.25$ $\sigma=1.745$ N=364	$\mu=3.44$ $\sigma=1.773$ N=275	.301	.584	-1.334	637	-.107	.183	.267
pota _{sri3}	$\mu=2.46$ $\sigma=1.641$ N=343	$\mu=2.43$ $\sigma=1.656$ N=270	.037	.848	.281	611	.023	.779	.059
pota _{ma1}	$\mu=4.75$ $\sigma=1.559$ N=365	$\mu=4.62$ $\sigma=1.665$ N=281	2.121	.146	1.032	644	.082	.303	.178
pota _{ma2}	$\mu=5.03$ $\sigma=1.522$ N=360	$\mu=5.10$ $\sigma=1.544$ N=280	.077	.782	-.546	638	-.044	.585	.085
pota _{ma3}	$\mu=4.29$ $\sigma=1.715$ N=350	$\mu=4.33$ $\sigma=1.724$ N=281	.000	.997	-.313	629	-.025	.754	.061

pota _{ma4}	$\mu=5.65$ $\sigma=1.316$ N=368	$\mu=5.52$ $\sigma=1.415$ N=284	.982	.322	1.194	650	.094	.233	.221
pota _{vc1}	$\mu=4.56$ $\sigma=1.667$ N=344	$\mu=4.51$ $\sigma=1.668$ N=268	.019	.891	.373	610	.030	.709	.066
pota _{vc2}	$\mu=4.72$ $\sigma=1.659$ N=341	$\mu=4.59$ $\sigma=1.688$ N=275	.092	.762	1.025	614	.083	.306	.176
pota _{avc1}	$\mu=3.53$ $\sigma=1.884$ N=352	$\mu=3.64$ $\sigma=1.894$ N=277	.001	.978	-.668	627	-.054	.504	.103
pota _{avc2}	$\mu=5.03$ $\sigma=1.556$ N=349	$\mu=5.07$ $\sigma=1.626$ N=269	.330	.566	-.333	616	-.027	.739	.063
pota _{gfe1}	$\mu=4.95$ $\sigma=1.490$ N=330	$\mu=4.98$ $\sigma=1.580$ N=262	.213	.645	-.238	590	-.020	.812	.057
pota _{gfe2}	$\mu=4.01$ $\sigma=1.661$ N=326	$\mu=4.14$ $\sigma=1.783$ N=267	4.614	.032**	-.906	551	-.075	.365	.148
pota _{gfe3}	$\mu=4.72$ $\sigma=1.596$ N=354	$\mu=4.72$ $\sigma=1.589$ N=275	.071	.789	.003	627	.000	.998	.050
pota _{agfe1}	$\mu=2.86$ $\sigma=1.686$ N=355	$\mu=2.71$ $\sigma=1.598$ N=272	.862	.353	1.120	625	.090	.263	.200
pota _{agfe2}	$\mu=2.99$ $\sigma=1.618$ N=350	$\mu=2.77$ $\sigma=1.533$ N=270	1.340	.248	1.777	618	.144	.076*	.427
pota _{agfe3}	$\mu=2.63$ $\sigma=1.424$ N=334	$\mu=2.71$ $\sigma=1.584$ N=259	4.309	.038**	-.603	523	-.051	.547	.094

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CII: Evaluation Results of Reliability of Constructs Measured in Main Study

<i>scale</i>	<i>construct</i>	<i>construct description</i>	<i>items (before removal)</i>	<i>Cronbach's α</i>
Informational and Transformational Ad Content (Puto and Wells 1984, p. 641)	iac	informational ad content	6 (8)	.678
	tac	transformational ad content	10 (15)	.904
Public Opinion on Advertizing (Polay and Mittal 1993, pp. 108-13)	pota _{ga}	global attitudes	2	.780
	pota _{in}	information	2 (3)	.624
	pota _{fns}	falsity / no sense	2 (3)	.586
	pota _{hp}	hedonic / pleasure	3	.656
	pota _{sri}	social role and image	3	.691
	pota _{ma}	materialism	4	.740
	pota _{vc}	value corruption	2	.629
	pota _{avc}	antecedent value corruption	2	.222
	pota _{gfe}	good for the economy	3	.517
	pota _{agfe}	antecedent good for the economy	2 (3)	.769

Items removed before evaluation in order to improve reliability: iac₂, iac₅, tac₂, tac₈, tac₁₀, tac₁₁, tac₁₃, pota_{in1}, pota_{fns3}, pota_{gfe3}; Items reversed before evaluation: iac₃, iac₄, iac₅, tac₂, tac₉, tac₁₃, pota_{ga2}, pota_{fns3}, pota_{gfe2}; It has been suggested that Cronbach's α values should be greater than .70 in order to assume reliability of a scale (Hammond 2006, p. 198).

Annex CIII: Evaluation Results of Constructs Measured in Main Study Stationary Web Survey vs. Mobile Web Survey

var	stationary web survey	mobile web survey	Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1- β
iac	$\mu=3.52$ $\sigma=1.149$ N=637	$\mu=3.56$ $\sigma=1.251$ N=542	2.599	.107	-.676	1,177	-.040	.499	.105
tac	$\mu=3.71$ $\sigma=1.325$ N=514	$\mu=3.75$ $\sigma=1.375$ N=444	1.489	.223	-.433	956	-.028	.665	.072
pota _{ga}	$\mu=4.22$ $\sigma=1.588$ N=786	$\mu=4.26$ $\sigma=1.500$ N=670	2.196	.139	-.433	1,454	-.023	.665	.072
pota _{in}	$\mu=4.18$ $\sigma=1.321$ N=788	$\mu=4.27$ $\sigma=1.306$ N=668	.041	.839	-1.184	1,454	-.062	.237	.218
pota _{fns}	$\mu=4.46$ $\sigma=1.396$ N=759	$\mu=4.43$ $\sigma=1.377$ N=660	.013	.909	.339	1,417	.018	.734	.063
pota _{hp}	$\mu=4.41$ $\sigma=1.352$ N=779	$\mu=4.33$ $\sigma=1.296$ N=650	.868	.352	1.216	1,427	.065	.224	.231
pota _{sri}	$\mu=2.99$ $\sigma=1.358$ N=715	$\mu=3.03$ $\sigma=1.420$ N=596	1.578	.209	-.524	1,309	-.029	.601	.082
pota _{ma}	$\mu=4.93$ $\sigma=1.173$ N=755	$\mu=4.91$ $\sigma=1.172$ N=619	.010	.921	.288	1,372	.016	.774	.060
pota _{vc}	$\mu=4.54$ $\sigma=1.457$ N=715	$\mu=4.64$ $\sigma=1.391$ N=598	.929	.335	-1.282	1,311	-.071	.200	.249
pota _{avc}	$\mu=4.33$ $\sigma=1.378$ N=727	$\mu=4.28$ $\sigma=1.300$ N=627	1.811	.179	.660	1,352	.036	.509	.101
pota _{gfe}	$\mu=4.48$ $\sigma=1.108$ N=670	$\mu=4.52$ $\sigma=1.085$ N=557	.014	.905	-.554	1,225	-.032	.580	.086
pota _{agfe}	$\mu=2.72$ $\sigma=1.348$ N=730	$\mu=2.88$ $\sigma=1.441$ N=625	3.152	.076*	-2.195	1,290	-.120	.028**	.595

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CIV: Evaluation Results of Constructs Measured in Main Study E-Mail Invitation vs. SMS Invitation

var	e-mail invitation	SMS invitation	Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1- β
iac	$\mu=3.53$ $\sigma=1.177$ N=656	$\mu=3.55$ $\sigma=1.222$ N=523	1.195	.275	-.290	1,177	-.017	.772	.060
tac	$\mu=3.70$ $\sigma=1.337$ N=535	$\mu=3.76$ $\sigma=1.361$ N=423	.087	.768	-.699	956	-.045	.485	.106
pota _{ga}	$\mu=4.18$ $\sigma=1.553$ N=810	$\mu=4.31$ $\sigma=1.539$ N=646	.430	.512	-1.651	1,454	-.087	.099*	.378
pota _{in}	$\mu=4.16$ $\sigma=1.287$ N=810	$\mu=4.29$ $\sigma=1.346$ N=646	1.021	.313	-1.886	1,454	-.099	.059*	.466
pota _{fns}	$\mu=4.42$ $\sigma=1.398$ N=792	$\mu=4.48$ $\sigma=1.373$ N=627	.784	.376	-.806	1,417	-.043	.420	.127
pota _{hp}	$\mu=4.34$ $\sigma=1.313$ N=796	$\mu=4.41$ $\sigma=1.343$ N=633	.247	.619	-1.004	1,427	-.053	.316	.169
pota _{sri}	$\mu=2.99$ $\sigma=1.383$ N=727	$\mu=3.02$ $\sigma=1.392$ N=584	.135	.713	-.300	1,309	-.017	.765	.061
pota _{ma}	$\mu=4.92$ $\sigma=1.171$ N=766	$\mu=4.92$ $\sigma=1.174$ N=608	.009	.924	-.007	1,372	.000	.995	.050
pota _{vc}	$\mu=4.57$ $\sigma=1.435$ N=732	$\mu=4.61$ $\sigma=1.419$ N=581	.008	.929	-.486	1,311	-.027	.627	.077
pota _{avc}	$\mu=4.31$ $\sigma=1.368$ N=754	$\mu=4.31$ $\sigma=1.311$ N=600	.860	.354	-.086	1,352	-.005	.932	.051
pota _{gfe}	$\mu=4.47$ $\sigma=1.048$ N=697	$\mu=4.54$ $\sigma=1.158$ N=530	5.149	.023**	-1.198	1,076	-.070	.231	.228
pota _{agfe}	$\mu=2.75$ $\sigma=1.338$ N=754	$\mu=2.84$ $\sigma=1.460$ N=601	8.692	.003***	-1.141	1,232	-.063	.254	.210

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CV: Evaluation Results of Constructs Measured in Main Study expgr_1 vs. expgr_2

			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
var	expgr_1	expgr_2	F	p	T	df	d	p	1- β
iac	$\mu=3.65$ $\sigma=1.229$ N=252	$\mu=3.45$ $\sigma=1.138$ N=404	.889	.346	2.093	654	.168	.037**	.552
tac	$\mu=3.80$ $\sigma=1.355$ N=205	$\mu=3.64$ $\sigma=1.324$ N=330	.957	.329	1.422	533	.126	.156	.293
pota _{ga}	$\mu=4.20$ $\sigma=1.492$ N=307	$\mu=4.17$ $\sigma=1.591$ N=503	1.858	.173	.262	808	.019	.794	.058
pota _{in}	$\mu=4.22$ $\sigma=1.229$ N=302	$\mu=4.13$ $\sigma=1.321$ N=508	1.378	.241	.898	808	.065	.369	.145
pota _{fns}	$\mu=4.38$ $\sigma=1.415$ N=304	$\mu=4.45$ $\sigma=1.388$ N=488	.937	.333	-.680	790	-.050	.497	.105
pota _{hp}	$\mu=4.33$ $\sigma=1.271$ N=293	$\mu=4.35$ $\sigma=1.338$ N=503	.568	.451	-.232	794	-.017	.816	.056
pota _{sri}	$\mu=3.03$ $\sigma=1.433$ N=270	$\mu=2.98$ $\sigma=1.354$ N=457	1.351	.246	.478	725	.037	.633	.077
pota _{ma}	$\mu=4.88$ $\sigma=1.185$ N=286	$\mu=4.94$ $\sigma=1.163$ N=480	.268	.605	-.634	764	-.047	.526	.096
pota _{vc}	$\mu=4.63$ $\sigma=1.370$ N=276	$\mu=4.53$ $\sigma=1.473$ N=456	1.966	.161	.954	730	.073	.340	.159
pota _{avc}	$\mu=4.29$ $\sigma=1.281$ N=291	$\mu=4.32$ $\sigma=1.420$ N=463	3.403	.065*	-.327	663	-.024	.744	.062
pota _{gfe}	$\mu=4.46$ $\sigma=1.046$ N=269	$\mu=4.47$ $\sigma=1.051$ N=428	.180	.672	-.076	695	-.006	.940	.051
pota _{agfe}	$\mu=2.83$ $\sigma=1.376$ N=287	$\mu=2.71$ $\sigma=1.314$ N=467	.581	.446	1.222	752	.092	.222	.232

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CVI: Evaluation Results of Constructs Measured in Main Study $expgr_1$ vs. $expgr_3$

<i>var</i>	<i>expgr₁</i>	<i>expgr₃</i>	<i>Levene's Test of Equality of Variances</i>		<i>independent samples t-test (two tailed)</i>				
			<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>P</i>	<i>1-β</i>
iac	$\mu=3.65$ $\sigma=1.229$ N=252	$\mu=3.49$ $\sigma=1.267$ N=290	.512	.474	1.509	540	.130	.132	.325
tac	$\mu=3.80$ $\sigma=1.355$ N=205	$\mu=3.7$ $\sigma=1.392$ N=239	.001	.976	.807	442	.077	.420	.127
pota _{ga}	$\mu=4.20$ $\sigma=1.492$ N=307	$\mu=4.31$ $\sigma=1.507$ N=363	.006	.936	-.960	668	-.074	.337	.159
pota _{in}	$\mu=4.22$ $\sigma=1.229$ N=302	$\mu=4.31$ $\sigma=1.367$ N=366	2.844	.092*	-.900	661	-.069	.368	.144
pota _{ins}	$\mu=4.38$ $\sigma=1.415$ N=304	$\mu=4.48$ $\sigma=1.344$ N=356	2.738	.098*	-.958	630	-.075	.339	.160
pota _{hp}	$\mu=4.33$ $\sigma=1.271$ N=293	$\mu=4.33$ $\sigma=1.317$ N=357	.200	.655	.019	648	.002	.985	.050
pota _{sri}	$\mu=3.03$ $\sigma=1.433$ N=270	$\mu=3.03$ $\sigma=1.413$ N=326	.051	.822	-.006	594	.000	.996	.050
pota _{ma}	$\mu=4.88$ $\sigma=1.185$ N=286	$\mu=4.93$ $\sigma=1.161$ N=333	.440	.507	-.490	617	-.040	.624	.079
pota _{vc}	$\mu=4.63$ $\sigma=1.370$ N=276	$\mu=4.65$ $\sigma=1.412$ N=322	.721	.396	-.118	596	-.010	.906	.052
pota _{avc}	$\mu=4.29$ $\sigma=1.281$ N=291	$\mu=4.28$ $\sigma=1.318$ N=336	.363	.547	.055	625	.004	.956	.050
pota _{gfe}	$\mu=4.46$ $\sigma=1.046$ N=269	$\mu=4.57$ $\sigma=1.120$ N=288	2.805	.095*	-1.180	555	-.100	.238	.218
pota _{agfe}	$\mu=2.83$ $\sigma=1.376$ N=287	$\mu=2.93$ $\sigma=1.494$ N=338	3.687	.055*	-.855	619	-.068	.393	.135

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CVII: Evaluation Results of Constructs Measured in Main Study $expgr_1$ vs. $expgr_4$

var	$expgr_1$	$expgr_4$	Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1- β
iac	$\mu=3.65$ $\sigma=1.229$ N=252	$\mu=3.63$ $\sigma=1.162$ N=233	.184	.668	.228	483	.021	.819	.056
tac	$\mu=3.80$ $\sigma=1.355$ N=205	$\mu=3.84$ $\sigma=1.320$ N=184	.638	.425	-.284	387	-.029	.777	.059
pota _{ga}	$\mu=4.20$ $\sigma=1.492$ N=307	$\mu=4.32$ $\sigma=1.582$ N=283	.398	.528	-.969	588	-.080	.333	.163
pota _{in}	$\mu=4.22$ $\sigma=1.229$ N=302	$\mu=4.28$ $\sigma=1.320$ N=280	.889	.346	-.584	580	-.048	.559	.089
pota _{fns}	$\mu=4.38$ $\sigma=1.415$ N=304	$\mu=4.48$ $\sigma=1.413$ N=271	.256	.613	-.858	573	-.072	.391	.138
pota _{hp}	$\mu=4.33$ $\sigma=1.271$ N=293	$\mu=4.53$ $\sigma=1.371$ N=276	.726	.395	-1.786	567	-.149	.075*	.426
pota _{sri}	$\mu=3.03$ $\sigma=1.433$ N=270	$\mu=3.01$ $\sigma=1.368$ N=258	.496	.482	.170	526	.015	.865	.053
pota _{ma}	$\mu=4.88$ $\sigma=1.185$ N=286	$\mu=4.91$ $\sigma=1.192$ N=275	.001	.980	-.217	559	-.018	.829	.055
pota _{vc}	$\mu=4.63$ $\sigma=1.370$ N=276	$\mu=4.56$ $\sigma=1.430$ N=259	.438	.508	.629	533	.054	.530	.096
pota _{avc}	$\mu=4.29$ $\sigma=1.281$ N=291	$\mu=4.35$ $\sigma=1.302$ N=264	.083	.773	-.613	553	-.052	.540	.094
pota _{gfe}	$\mu=4.46$ $\sigma=1.046$ N=269	$\mu=4.51$ $\sigma=1.203$ N=242	3.162	.076*	-.475	481	-.042	.635	.076
pota _{agfe}	$\mu=2.83$ $\sigma=1.376$ N=287	$\mu=2.73$ $\sigma=1.410$ N=263	.738	.391	.835	548	.071	.404	.132

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CVIII: Evaluation Results of Constructs Measured in Main Study $expgr_2$ vs. $expgr_3$

<i>var</i>	<i>expgr₂</i>	<i>expgr₃</i>	<i>Levene's Test of Equality of Variances</i>		<i>independent samples t-test (two tailed)</i>				
			<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
iac	$\mu=3.45$ $\sigma=1.138$ N=404	$\mu=3.49$ $\sigma=1.267$ N=290	3.366	.067*	-.373	581	-.029	.709	.066
tac	$\mu=3.64$ $\sigma=1.324$ N=330	$\mu=3.7$ $\sigma=1.392$ N=239	1.032	.310	-.551	567	-.047	.582	.086
pota _{ga}	$\mu=4.17$ $\sigma=1.591$ N=503	$\mu=4.31$ $\sigma=1.507$ N=363	1.788	.181	-1.317	864	-.091	.188	.262
pota _{in}	$\mu=4.13$ $\sigma=1.321$ N=508	$\mu=4.31$ $\sigma=1.367$ N=366	.440	.508	-1.899	872	-.130	.058*	.474
pota _{fns}	$\mu=4.45$ $\sigma=1.388$ N=488	$\mu=4.48$ $\sigma=1.344$ N=356	.656	.418	-.356	842	-.025	.722	.065
pota _{hp}	$\mu=4.35$ $\sigma=1.338$ N=503	$\mu=4.33$ $\sigma=1.317$ N=357	.087	.768	.265	858	.018	.791	.058
pota _{sri}	$\mu=2.98$ $\sigma=1.354$ N=457	$\mu=3.03$ $\sigma=1.413$ N=326	.950	.330	-.514	781	-.037	.607	.080
pota _{ma}	$\mu=4.94$ $\sigma=1.163$ N=480	$\mu=4.93$ $\sigma=1.161$ N=333	.045	.831	.111	811	.008	.912	.051
pota _{vc}	$\mu=4.53$ $\sigma=1.473$ N=456	$\mu=4.65$ $\sigma=1.412$ N=322	.314	.575	-1.118	776	-.081	.264	.199
pota _{avc}	$\mu=4.32$ $\sigma=1.420$ N=463	$\mu=4.28$ $\sigma=1.318$ N=336	1.657	.198	.389	797	.028	.698	.068
pota _{gfe}	$\mu=4.47$ $\sigma=1.051$ N=428	$\mu=4.57$ $\sigma=1.120$ N=288	2.136	.144	-1.242	714	-.095	.215	.238
pota _{agfe}	$\mu=2.71$ $\sigma=1.314$ N=467	$\mu=2.93$ $\sigma=1.494$ N=338	9.150	.003***	-2.176	668	-.158	.030**	.599

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CIX: Evaluation Results of Constructs Measured in Main Study $expgr_2$ vs. $expgr_4$

var	$expgr_2$	$expgr_4$	Levene's Test of Equality of Variances		independent samples t-test (two tailed)				
			F	p	T	df	d	p	1- β
iac	$\mu=3.45$ $\sigma=1.138$ N=404	$\mu=3.63$ $\sigma=1.162$ N=233	.210	.647	-1.827	635	-.150	.068*	.445
tac	$\mu=3.64$ $\sigma=1.324$ N=330	$\mu=3.84$ $\sigma=1.320$ N=184	.007	.935	-1.705	512	-.157	.089*	.399
pota _{ga}	$\mu=4.17$ $\sigma=1.591$ N=503	$\mu=4.32$ $\sigma=1.582$ N=283	.356	.551	-1.289	784	-.096	.198	.252
pota _{in}	$\mu=4.13$ $\sigma=1.321$ N=508	$\mu=4.28$ $\sigma=1.320$ N=280	.011	.918	-1.482	786	-.110	.139	.315
pota _{fns}	$\mu=4.45$ $\sigma=1.388$ N=488	$\mu=4.48$ $\sigma=1.413$ N=271	.136	.712	-.302	757	-.023	.763	.061
pota _{hp}	$\mu=4.35$ $\sigma=1.338$ N=503	$\mu=4.53$ $\sigma=1.371$ N=276	.047	.828	-1.734	777	-.130	.083*	.410
pota _{sri}	$\mu=2.98$ $\sigma=1.354$ N=457	$\mu=3.01$ $\sigma=1.368$ N=258	.133	.716	-.283	713	-.022	.777	.059
pota _{ma}	$\mu=4.94$ $\sigma=1.163$ N=480	$\mu=4.91$ $\sigma=1.192$ N=275	.288	.592	.380	753	.029	.704	.067
pota _{vc}	$\mu=4.53$ $\sigma=1.473$ N=456	$\mu=4.56$ $\sigma=1.430$ N=259	.412	.521	-.250	713	-.019	.803	.057
pota _{avc}	$\mu=4.32$ $\sigma=1.420$ N=463	$\mu=4.35$ $\sigma=1.302$ N=264	2.190	.139	-.325	725	-.025	.746	.062
pota _{gfe}	$\mu=4.47$ $\sigma=1.051$ N=428	$\mu=4.51$ $\sigma=1.203$ N=242	2.686	.102	-.464	668	-.037	.643	.075
pota _{agfe}	$\mu=2.71$ $\sigma=1.314$ N=467	$\mu=2.73$ $\sigma=1.410$ N=263	3.012	.083*	-.221	512	-.017	.826	.056

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CX: Evaluation Results of Constructs Measured in Main Study $expgr_3$ vs. $expgr_4$

			<i>Levene's Test of Equality of Vari- ances</i>		<i>independent samples t-test (two tailed)</i>				
<i>var</i>	<i>expgr₃</i>	<i>expgr₄</i>	<i>F</i>	<i>p</i>	<i>T</i>	<i>df</i>	<i>d</i>	<i>p</i>	<i>1-β</i>
iac	$\mu=3.49$ $\sigma=1.267$ N=290	$\mu=3.63$ $\sigma=1.162$ N=233	1.382	.240	-1.280	521	-.113	.201	.250
tac	$\mu=3.7$ $\sigma=1.392$ N=239	$\mu=3.84$ $\sigma=1.320$ N=184	.655	.419	-1.080	421	-.106	.281	.190
pota _{ga}	$\mu=4.31$ $\sigma=1.507$ N=363	$\mu=4.32$ $\sigma=1.582$ N=283	.333	.564	-.089	644	-.007	.929	.051
pota _{in}	$\mu=4.31$ $\sigma=1.367$ N=366	$\mu=4.28$ $\sigma=1.320$ N=280	.439	.508	.269	644	.021	.788	.058
pota _{ins}	$\mu=4.48$ $\sigma=1.344$ N=356	$\mu=4.48$ $\sigma=1.413$ N=271	1.096	.295	.018	625	.001	.985	.050
pota _{hp}	$\mu=4.33$ $\sigma=1.317$ N=357	$\mu=4.53$ $\sigma=1.371$ N=276	.207	.649	-1.859	631	-.149	.063*	.459
pota _{sri}	$\mu=3.03$ $\sigma=1.413$ N=326	$\mu=3.01$ $\sigma=1.368$ N=258	.263	.608	.184	582	.015	.854	.054
pota _{ma}	$\mu=4.93$ $\sigma=1.161$ N=333	$\mu=4.91$ $\sigma=1.192$ N=275	.460	.498	.257	606	.021	.798	.058
pota _{vc}	$\mu=4.65$ $\sigma=1.412$ N=322	$\mu=4.56$ $\sigma=1.430$ N=259	.016	.899	.756	579	.063	.450	.117
pota _{avc}	$\mu=4.28$ $\sigma=1.318$ N=336	$\mu=4.35$ $\sigma=1.302$ N=264	.082	.774	-.676	598	-.056	.499	.104
pota _{gfe}	$\mu=4.57$ $\sigma=1.120$ N=288	$\mu=4.51$ $\sigma=1.203$ N=242	.091	.763	.601	528	.052	.548	.091
pota _{agfe}	$\mu=2.93$ $\sigma=1.494$ N=338	$\mu=2.73$ $\sigma=1.410$ N=263	1.051	.306	1.647	599	.135	.100	.374

Power for $\alpha=.05$ post hoc estimated for two tailed independent samples t-test with G*Power 3.1.4. Optimal sample size N=1,314 a priori estimated for $\alpha=\beta=.05$, $1-\beta=.95$, $d=.2$, $N2/N1=1.205$.

Annex CXI: Cognitive Dissonance Theory

Besides SX, Cognitive Dissonance Theory (CD) is another theory associated with SRB (*Festinger 1954; Festinger 1957; Furse and Stewart 1984; Hackler and Bourgette 1973*). According to CD, behavior of individuals which is inconsistent with their preexisting attitudes, beliefs, values, or motives will cause a cognitive dissonance. The latter is defined as an “*unpleasant drive state*” (*Furse and Steward 1984, p. 81*) of internal disharmony and discordant feelings (*Albaum, Evangelista and Medina 1998, p. 119; Furse and Steward 1984, p. 81; Helgeson, Voss and Terpening 2002, p. 306*). With regard to SRB the refusal to accept an invitation to a survey may create a cognitive dissonance in case potential respondents perceive themselves as e.g. fair (*Green 1996, p. 179*), helpful (*Albaum, Evangelista and Medina 1998, pp. 117-8*), opinion leaders, or likely to be responding to small request from others (*Furse and Steward 1984, p. 84*).

Persons experiencing cognitive dissonance will strive to reduce it. According to Furse and Steward (*1984, p. 81*) the pressure to reduce cognitive dissonance will increase with the importance of the circumstances in which it arose and the number of elements which caused it. A higher dissonance, in turn, will likely induce an increase of efforts to reduce it. For this reason CD is also referred to as a “*tension reduction model*” (*Id., p. 81*). In the context of survey nonparticipation cognitive dissonance may e.g. simply be reduced by compliance with the given survey request (*Albaum, Evangelista and Medina 1998, p. 119; Furse and Steward 1984, p. 81*). Not returning a fully completed survey, in turn, will constitute a high cognitive dissonance and will therefore seldom occur (*Helgeson, Voss and Terpening 2002, p. 306*). An alternative strategy to reduce dissonant feelings may be a – or an indefinite – delay of response (*Albaum, Evangelista and Medina 1998, pp. 117-8; Furse and Steward 1984, pp. 84-7*). In this way CD may influence both SRB as potential subjects’ behavior *whether or not* they participate in a survey as well as participants’ behavior *how* they participate in a survey.

Hackler and Bourgette (*1973, pp. 276-81*) claim that it is important for researchers to incorporate survey design factors into their surveys that, in case of nonresponse, will likely induce feelings of cognitive dissonance. For example, monetary or nonmonetary incentives paid at the reception of a survey invitation, as well as pre-notifications and reminders will cause a higher level of cognitive dissonance when potential recipients refuse to participate (*Cavusgil and Elvey-Kirk 1998, p. 1169*). In some cultures taking monetary incentives without a return may even be considered as a kind of fraud. At the same time people differ regarding their attitudes, beliefs, values, and, hence, have a different predisposition toward cognitive dissonance.

Furthermore, there are individual differences regarding the amount of dissonance tolerated by potential recipients as well as their preferred strategy to cope with it (*Aronson 1968, pp. 5-27; Furse and Steward 1984, p. 81*). The authors Albaum, Evangelista and Medina (*1998, p. 118*) even claim, that some people are entirely resistant to dissonance. Again, respondent as well as situational factors will have an impact on cognitive dissonance⁵⁴¹.

At this point, it is important to notice that CD can be integrated into SX. Cognitive dissonance may as well be interpreted as cognitive costs of nonparticipation. Compliance will disperse these mental costs and, consequently, increase net individual benefit (*Cavusgil and Elvey-Kirk 1998, p. 1169*). In line with this, Green (*1996, p. 179*) proposes that avoiding the feeling of guilt associated with nonresponse is a benefit for recipients. As a side effect of integrating CD to SX, however, other benefits and costs may become more important for SRB than costs attributed to cognitive dissonance. Hence, SX may eventually set boundaries to CD (*Groves, Cialdini and Couper 1992, p. 421*)⁵⁴².

⁵⁴¹ Q.v. Section 3.3.

⁵⁴² Q.v. Section 3.1.

Annex CXII: Self-Perception Theory

Also Self-Perception Theory (SP) may influence SRB. In compliance with SP, people derive their attitude or their motivation toward a certain behavior from the interpretation of the self-perceived causes of their behavior (*Bem 1972*). In case a certain behavior has internal causes and is not perceived as a result of external pressure, such as e.g. an incentive (*Reingen and Kernan 1977, pp. 366-7*), a positive attitude towards this behavior may develop. This new attitude, in turn, will have impact on similar behavior in the future (*Albaum, Evangelista and Medina 1998, p. 118*). That is, as people would like to be consistent with their attitudes, the likelihood of repeatedly engaging in the same behavior will increase (*Groves, Cialdini and Couper 1992, p. 482; Helgeson, Voss and Terpening 2002, p. 306*).

In the context of surveys, recipients who have previously answered a short questionnaire of just a few questions will more likely engage in an extensive survey than a control group who did not (*Hansen and Robinson 1980, p. 362*). Answering a short questionnaire the prior group will develop an attitude in which it perceives itself as e.g. helpful, opinion leaders, or caring individuals who likely engage in surveys requests (*Albaum, Evangelista and Medina 1998, p. 120; Furse and Steward 1984, p. 84*). When confronted with a long questionnaire, they will more likely behave accordingly in the future. In other words they will label themselves as “participants” (*Albaum, Evangelista and Medina 1998, p. 118*). In literature on personal interviewing this phenomenon is also known and referred to as the “*foot-in-the-door*” technique (*DeJong 1979*). However, as subjects’ may not only perceive themselves as “participants” but also “participants who conscientiously complete a questionnaire” both outcome rates as well as data quality may be affected by SP. Hence, it may influence both SRB as potential subjects’ behavior *whether or not* they participate in a survey as well as participants’ behavior *how* they participate in a survey.

Nonetheless, the reception of pre-notifications may not be interpreted in form of SP. In contrast to a request to answer a short questionnaire, the sole reception of a pre-notification message does not induce behavior (*Allen, Schewe and Wijk 1980, p. 498*), just attention. Therefore, an approach by means of CD may be a far more promising explanation in this regard.

SP is closely related to CD as both describe different explanatory approaches of deriving behavior from attitudes (*Albaum, Evangelista and Medina 1998, p. 118; Helgeson, Voss and Terpening 2002, p. 306*). Moreover, SP may be integrated into SX. All the same, acting (or not acting) in accordance to once attitudes may also be perceived as a mental benefit (or cost)

and, consequently, affect the potential recipient's net individual benefit. Moreover, just like in CD, respondents' and situational factors will likely have an impact on self-perception (*Hansen 1980, pp. 77-8*).

Annex CXIII: Combined View on Survey and Invitation Modes as Experimental Groups with Interactions

The following analysis introduces interaction effects of the anticipated ease of access variable with the four experimental groups. However, as the effect of anticipated ease of access may already be included in and, hence, inextricably linked with the interaction between survey and invitation mode – referred to as experimental groups here – multicollinearity might be present in the analyses of such interactions. Nevertheless, tests of multicollinearity conducted (q.v. Section 6.1.3.2) did not support this proposition. Therefore, the corresponding hypotheses and results were reported in this annex. First, the corresponding hypotheses H9 to H12 will be presented. Thereafter, it is suggested how such interaction effects have to be interpreted. Additionally, a sample size appropriate for evaluation will be calculated. Next the procedure of analysis will be introduced. Finally, the results of the analysis will be presented.

Hypotheses

Throughout hypotheses (H4 to H8)⁵⁴³ it has been explicitly assumed that ease of accessing influences the probability of participation of panelists in mobile and stationary web surveys. Therefore, there is a good case to assume that the ease of accessing variables serve as a moderator (*Müller 2009, pp. 237-45*) of the impact of different experimental group treatments – which are combinations of different survey and invitation modes – on participation. Consequently, for every experimental group researched the panelists' probability of participation should increase with the corresponding ease of access variable representing the access path associated with this group. Conversely, the probability of participation should show smaller, or even no increase, with all other ease of access variables, which do not correspond to the access path in this particular experimental group. These interaction effects (*Jaccard 2001*) are expressed in the following four hypotheses:

⁵⁴³ Q.v. Section 5.2.

- H9: With an increase in the ease of accessing mobile web surveys for which links were sent in an e-mail invitation, received on a stationary or mobile device, and supposed to be accessed on a mobile phone/smartphone (ea_1) the probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_1$) increases stronger than the probability of participation in any other experimental group ($expgr_2, expgr_3, expgr_4$).*
- H10: With an increase in the ease of accessing stationary web surveys for which links were sent in an e-mail invitation, received on a stationary or mobile device, and supposed to be accessed on a PC/laptop (ea_2) the probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) increases stronger than the probability of participation in any other experimental group ($expgr_1, expgr_3, expgr_4$).*
- H11: With an increase in the ease of accessing mobile web surveys for which links were sent in an SMS invitation, received on a mobile device, and supposed to be accessed on a mobile phone/smartphone (ea_3) the probability of participation of panelists invited to mobile web surveys by SMS ($expgr_3$) increases stronger than the probability of participation in any other experimental group ($expgr_1, expgr_2, expgr_4$).*
- H12: With an increase in the ease of accessing stationary web surveys for which links were sent in an SMS invitation, received on a mobile device, and supposed to be accessed on a PC/laptop (ea_4) the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$) increases stronger than the probability of participation in any other experimental group ($expgr_1, expgr_2, expgr_3$).*

Interpretation of Interaction Effects in Logistic Regressions

A given predictor may also represent an interaction between two other predictors, e.g. $X_3 = X_1X_2$ (*Id.*, p. 5). An interaction effect is existent in case a moderator variable influences the effect of a focal independent variable (FIV) on the dependent variable (*Jaccard 2001, p. 12; Müller 2009, pp. 237-45*). The following formula shows a Logistic Regression equation including an exemplary two way interaction between predictors X_1 and X_2 :

$$\text{logit}(\mu) = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_1X_2 + \dots + \beta_kX_k$$

At this, both X_1 and X_2 may either represent the FIV – which is the focal independent variable affected by the moderator – or the moderator variable itself. Before conducting an analysis a researcher will have to gauge and specify which independent variable serves as FIV and

which as moderator in accordance to the research question and its theoretical orientation (Jaccard 2001, p. 12).

In case predictor variables in Multiple Binary Logistic Regressions are involved in interaction terms the corresponding regression coefficients are conditioned on the value of the given moderator variable because the predictors are also part of the interactive product term. Consequently, the predictor variables may not be interpreted as non-conditioned main effects⁵⁴⁴ anymore (Id., pp. 20-1).

The following paragraphs will solely focus on one nominal and one metric predictor variable entering the equation as interaction term, as this type of interaction will subsequently be tested in the course of the evaluation of this study. At this, it has to be differentiated between the interpretation of an interaction between a metric FIV interacting with a nominal variable conceptualized as moderator and, vice versa, the interpretation of a nominal FIV interacting with a metric variable conceptualized as moderator.

For a metric variable involved in an interaction – either as FIV or moderator – Jaccard (2001, p. 31) suggests that “the exponent of the logistic coefficient $[\beta]$ for [...] [the metric variable involved in an interaction] is the multiplicative factor by which the predicted odds change given a 1-unit increase in [...] [the metric variable] for the reference group [...] [of the nominal variable involved in the interaction]”. Similar, for a nominal variable involved in an interaction – either as FIV or moderator – he suggests that “the exponent of the logistic coefficient $[\beta]$ for a dummy variable of [...] [a nominal variable involved in an interaction] is the ratio of the predicted odds for the group scored 1 on the [...] [nominal variable] divided by the predicted odds for the reference group on [...] [the nominal variable], conditioned on [...] [the metric variable involved in the interaction] being equal to 0.” (Id., pp. 34-5)

In turn, for the interpretation of the interaction effect between a nominal moderator variable and a metric FIV he claims that “the exponent of the logistic coefficient $[\beta]$ for [...] [the interaction term] is the ratio of the multiplicative factor by which the predicted odds change given a 1-unit increase in [...] [the metric FIV] for the group scored 1 on the [...] [nominal moderator variable] divided by the corresponding multiplicative factor for the reference group [...] [of the nominal moderator variable]” (Id., p. 33).

Vice versa, and most important in this study, for an interaction effect between a nominal FIV and a metric moderator Jaccard (2001, pp. 34-5) interprets that “the exponent of the logistic

⁵⁴⁴ Q.v. Section 6.1.2.2.

coefficient $[\beta]$ for a product term indicated the multiplicative factor by which the odds ratio comparing the predicted odds for the group scored 1 on [...] [the nominal FIV] and the predicted odds for the reference group on [...] [the nominal FIV] changes given a 1-unit increase in [the metric moderator variable]" (Id., pp. 34-5).

Further, in case more than one two-way interaction term is included in a Multiple Binary Logistic Regression model the interpretation of a particular logistic coefficient may be conducted as described above. However, the other two-way interactions and predictors not involved in the particular interaction have to be held constant (*Id.*, p. 65).

Dealing with Multiple Binary Logistic Regression models, containing one or more interaction effects, it has been suggested by Kleinbaum and Klein (2010, pp. 181-4) only to use those which comprise all lower order components of the highest order interaction term⁵⁴⁵. Such models are called Hierarchically Well-Formulated Models (HWF) (*Jaccard 2001, p. 15*). At this, it has to be tested by means of a hierarchical test of changes in model χ^2 whether the interaction term is trivial, or rather, if it improves model fit significantly (*Menard 2002, pp. 20-27*). In this context Backhaus et al. (2011, pp. 269-81) display model fit by means of Nagelkerke-Pseudo- R^2 -Statistics. In contrast to Cox and Snell- R^2 statistics the prior allows a precise content-related interpretation of model fit, as its value ranges from 0 to 1. At this, Nagelkerke- R^2 values larger than .2 are "acceptable", larger than .4 are "good", and larger than .5 are "very good" (*Id.*, p. 276). In case the improvement of model fit due to the interaction term is nontrivial – this applies when the hierarchical test of the omnibus interaction shows a statistically significant effect (*Jaccard 2001, p. 31*) – an important interaction has been detected and the equation is interpretable. Otherwise the unnecessary interaction term has to be removed from the regression equation (*Id.*, pp. 15-6). Or in other words: the model has to be "trimmed".

Sample Size Estimation

The sample size necessary to unveil interaction effects in Multiple Binary Logistic Regression Analysis has been calculated and displayed in Table Annex-1. For this purpose it has been assumed in accordance with the central limit theorem that all interaction terms approach nor-

⁵⁴⁵ For instance, in a Hierarchically Well-Formulated Model with a three-way interaction of the predictors X_1 , X_2 , and X_3 the following components have to be included: X_1 , X_2 , X_3 , $X_1 \cdot X_2$, $X_1 \cdot X_3$, $X_2 \cdot X_3$, $X_1 \cdot X_2 \cdot X_3$.

mal distribution if the relevant sample size is larger than 30 (*Gravetter and Wallnau 2009, p. 204*).

Table Annex-1: Sample Size Calculation for Main Effects in Model with Interaction

interaction	$P(Y=1 X=1)$ $H0^{546}$	μ	σ	OR	d	R^2 other X	sample size in accordance to	
							Demidenko (2007) with variance correction	Lyles, Lin and Williamson (2007) if $N < 10,000$
$\text{expgr}_1 \cdot \text{ea}_1$	32.6%	1.18	2.174	1.229	.114	.273	335	357
$\text{expgr}_2 \cdot \text{ea}_2$	27.6%	1.41	2.525	1.488	.219	.263	81	104
$\text{expgr}_4 \cdot \text{ea}_4$	32.8%	.88	1.815	.718	-.183	.273	226	250

Further input parameters: tails:=one; $\alpha=\beta=.05$; $1-\beta=.95$; X distribution:=normal; X parm $\pi=.25$; R^2 other X:= Nagelkerke's R^2 .

It is noteworthy that sample sizes required for the estimation of interaction effects were considerably smaller than those required for the estimation of main effects⁵⁴⁷. Therefore, they were neglected when determining the necessary sample size and a sample size of 5,124 – as calculated in Section 4.7 – chosen instead.

Procedure

First, in addition to model #5, four independent ease of accessing web surveys variables were introduced (ea_1 ; ea_2 ; ea_3 ; ea_4) in model #6. Secondly, the ease of accessing web surveys variables were established as a moderator of the influence of the experimental groups, as focal independent variable, and participation in web surveys as dependent variable in models #7 to #10. Consequently, four interaction terms ($\text{expgr}_1 \cdot \text{ea}_1$; $\text{expgr}_2 \cdot \text{ea}_2$; $\text{expgr}_3 \cdot \text{ea}_3$; $\text{expgr}_4 \cdot \text{ea}_4$) were added to the models. At this, every interaction term has been operationalized as the product of the nominal dummy variable representing the experimental group (expgr), as focal independent variable, and the variable which stands for the ease of accessing web surveys (ea) as its metric moderator. All models were trimmed and, subsequently, evaluated for the purpose of hypotheses testing. In addition to all variables presented in Table 6-1, ease of access-

⁵⁴⁶ See above.

⁵⁴⁷ Q.v. Section 4.7.

ing variables and interaction terms presented in Table Annex-2 were added in the models #6 to #10.

Table Annex-2: Overview of Variables Additionally Entering the Binary Logistic Regression Models #6 to #10

<i>variable label</i>	<i>variable description</i>	<i>variable type</i>	<i>level of measurement</i>
ea ₁	ease of accessing web surveys: invitation sent by e-mail, received on stationary or mobile device, link accessed on mobile phone/smartphone	independent	metric
ea ₂	ease of accessing web surveys: invitation sent by e-mail, received on stationary or mobile device, link accessed on PC/laptop	independent	metric
ea ₃	ease of accessing web surveys: invitation sent by SMS, received on mobile device, link accessed on mobile phone/smartphone	independent	metric
ea ₄	ease of accessing web surveys: invitation sent by SMS, received on mobile device, link accessed on PC/laptop	independent	metric
expgr ₁ · ea ₁	interaction between experimental group expgr ₁ with ease of accessing web surveys ea ₁	interaction	nominal FIV · metric moderator
expgr ₂ · ea ₂	interaction between experimental group expgr ₂ with ease of accessing web surveys ea ₂	interaction	nominal FIV · metric moderator
expgr ₃ · ea ₃	interaction between experimental group expgr ₃ with ease of accessing web surveys ea ₃	interaction	nominal FIV · metric moderator
expgr ₄ · ea ₄	interaction between experimental group expgr ₄ with ease of accessing web surveys ea ₄	interaction	nominal FIV · metric moderator

Analysis and Results

For the evaluation of hypotheses H9 through H12 five further Multiple Binary Logistic Regression models have been established. These models #6 to #10 imply a combined view on survey and invitation modes as experimental groups and were, hence, similar to the four models estimated previously for the purpose of evaluation of hypotheses H3 to H8 in the previous Section 6.2.3.2.2. However, in addition to four experimental group dummy variables (expgr₁; expgr₂; expgr₃; expgr₄)⁵⁴⁸, in a first step also four metric variables representing the ease of accessing web surveys (ea₁; ea₂; ea₃; ea₄)⁵⁴⁹ were entered into the sixth model. Furthermore, in a second step four interaction terms (ea₁ · expgr₁; ea₂ · expgr₂; ea₃ · expgr₃; ea₄ · expgr₄) were also added to the seventh, eighth, ninth, and tenth model. Table Annex-3 gives an overview of the variables included in models #6 to #10.

⁵⁴⁸ Q.v. Section 4.5.3.2.1.

⁵⁴⁹ Q.v. Section 4.5.3.2.3.

Table Annex-3: Variables Included in, Not Included in, and Removed from Models #6 to #10

variable	model				
	#6	#7	#8	#9	#10
expgr ₁	+	/	+	+	–
expgr ₂	+	+	/	+	+
expgr ₃	+	+	+	/	+
expgr ₄	/	+	+	+	/
ea ₁	–	/	+	–	+
ea ₂	+	+	/	+	+
ea ₃	+	+	–	/	+
ea ₄	+	+	+	+	/
expgr ₁ · ea ₁	/	/	+	+	+
expgr ₂ · ea ₂	/	+	/	+	+
expgr ₃ · ea ₃	/	–	–	/	–
expgr ₄ · ea ₄	/	–	–	–	/
iu _s	+	+	–	+	+
iu _m	–	–	–	–	–
eu _s	–	–	–	–	–
eu _m	–	–	+	–	–
ii	–	–	–	–	–
age _{ms}	+	+	–	–	+

+: variable included in model; variables pp_s, pp_m, ip_e, ip_s, it, gen, sou, DVA₁, DVA₂ were included in all five models; /: variable not included in model; –: variable removed from model.

Of the latter four models each comprised three of the four experimental group dummy variables as well as corresponding ease of access variables and interaction terms. Again, the fourth group, which did not enter the model, served as reference group. In every model a different group functioned as reference group (*Jaccard 2001, p. 23*). For all five total models' Logistic Regression coefficients, corresponding odds ratios, and significances have been estimated⁵⁵⁰.

In parallel to previously estimated models #1 to #5, all five models have subsequently been trimmed by means of the IBM SPSS 21.0 “Backward Elimination (Likelihood Ratio)” procedure (*IBM 2012b, p. 4*). All irrelevant variables which were removed from the models are presented in Table Annex-3. The results of the estimations for all five trimmed models #6 to #10 are presented in Table Annex-7 to Table Annex-11 at the end of this annex. Trimming procedures, however, showed only minor improvements on goodness-of-fit statistics. It is noteworthy that, all models are mutual re-specifications with interaction terms. Consequently,

⁵⁵⁰ Q.v. Annex LXXXIII to Annex LXXXVII.

in contrast to models #2 to #5, the results of the Multiple Binary Logistic Regression Analyses differ regarding the four experimental group variables, all other independent variables, and constants. Therefore, for every re-specification separate results are presented as none of the models results are universally valid. Moreover, separate goodness-of-fit statistics were calculated for the four models, for which an overview is given in Table Annex-4.

Table Annex-4: Goodness-of-Fit-Statistics for Trimmed Models #6 to #10

		<i>model</i>				
<i>goodness-of-fit statistic</i>		#6	#7	#8	#9	#10
Deviance	-2LL	5,311.971	5,303.170	5,345.066	5,247.386	5,438.679
	df	5,105	5,104	5,106	5,105	5,104
	p	.021**	.025**	.009***	.080*	.001***
Likelihood Ratio Test	-2LR- χ^2	860.741	869.542	827.646	925.326	734.032
	df	17	18	16	17	18
	p	.000***	.000***	.000***	.000***	.000***
Nagelkerke-Pseudo-R ²	R ²	.221	.223	.213	.236	.191
Confusion-Matrix	hit ratio	73.9%	73.8%	74.0%	74.4%	73.4%
	adj. hit ratio	72.2%	73.7%	74.0%	74.1%	72.9%
Press' Q-Test	Q	1170.752	1160.975	1180.570	1220.250	1122.279
	df	1	1	1	1	1
	p	.000***	.000***	.000***	.000***	.000***
Hosmer-Lemeshow-Test	χ^2	48.987	57.094	67.382	110.849	39.349
	df	8	8	8	8	8
	p	.000***	.000***	.000***	.000***	.000***

N=5,124

For all five models the -2LL deviance statistics (*Singer and Willett 2003, pp. 116-22*), showed significance either at $\alpha=.1$, $\alpha=.05$, or $\alpha=.01$ level, which indicates only a poor fit of all models. In contrast, all Likelihood Ratio Tests (*Greenland and Rothman 2008, pp. 229-30*) showed highly significant results ($\alpha=.01$). This means that results derived from the five models are transferable to the main population the sample was drawn from, as the included independent variables show a significant impact on the dependent variable (*Backhaus et al. 2011, pp. 268-9*). At this, there were no qualitative differences in the results of deviance as well as likelihood ratio statistics between models #2 to #5 and #6 to #10. Also, Nagelkerke-Pseudo-R² statistic showed acceptable fit ($R^2<.2$) for models #6 to #9 and, hence, indicated that an appropriate share of explained variance of the dependent variable was caused by the independent variables included in the model. The fit of the tenth model, however, was poor as it lays just

below the threshold to an acceptable fit (*Id.*, p. 276). On top of this, models #6 to #9 (R^2 from .191 to .236) showed a higher share of explained variance than models #1 to #5. For the latter Nagelkerke-Pseudo- R^2 ranged from .143 to .163 only, as these models did neither include ease of access variables nor interaction terms.

All the same, the confusion-matrixes (*Giudici and Figini 2009*, pp. 217-8) for models #6 to #10 showed improved hit ratios and, hence, higher shares of correctly classified panelists (73.4 to 74.4%; cut value=.50) in comparison to the previously tested models (71.5% and 72.5%). Likewise the adjusted hit ratios of models #7 to #10 (72.9% to 74.1%) calculated from the holdout sample ($N=3,344$) improve classifications in comparison to prior models (72.2% to 72.3%). At the same time, all of these results exceeded maximum⁵⁵¹ (71.0%) and proportional chance levels (58.8%)⁵⁵² and, hence, were better than random assignment of panelists to different classes (*Backhaus et al. 2011*, pp. 271-4). These results were confirmed by Press' Q-Tests (*Hair et al. 2010*, p. 367) as all classification results are highly significantly different from random assignment (*Backhaus et al. 2011*, pp. 267-76). Although, Hosmer-Lemeshow-Tests (*Hosmer, Lemeshow and Sturdivant 2000*, pp. 157-68) indicate poor model fit this result may again be due to the sensitivity of the χ^2 -test regarding large sample sizes (*Faul et al. 2007; Faul et al. 2009*)⁵⁵³.

In order to prevent model overfitting several irrelevant variables have been removed from models #6 to #10 by means of SPSS backwards elimination procedure (*IBM 2012b*, p. 4). These variables are also presented in Table Annex-3. At this, the variables involvement in the incentive (ii) ($.990 \leq OR \leq 1.003$; $.773 \leq p \leq .963$), frequency of internet usage on a smartphone or mobile phone (iu_m) ($.988 \leq OR \leq .998$; $.678 \leq p \leq .932$), frequency of e-mail usage on PC or laptop (eu_s) ($.975 \leq OR \leq 1.048$; $.132 \leq p \leq .644$) showed no significant impact on participation in web surveys in any of the five models. Very similarly, the frequency of e-mail usage on a smartphone or mobile phone (eu_m) ($.935 \leq OR \leq 1.017$; $.003^{***} \leq p \leq .880$) had no significant impact on participation in four of the five total models⁵⁵⁴.

Moreover, depending on the model considered, the variable representing frequency of internet usage on a PC or laptop (iu_s) showed either insignificance in one, or else significant or weakly significant, negative impact of trivial effect sizes (*Cohen 1988*, pp. 24-7; *Gray and Kinnear 2012*, p. 192) in the other four models estimated ($.943 \leq OR \leq .953$; $.034^{**} \leq p \leq .084^*$). Conse-

⁵⁵¹ Maximum chance level = $1 - PARR_t$ (*Backhaus et al. 2011*, p. 273).

⁵⁵² Proportional chance level = $PARR_t^2 + (1 - PARR_t)^2$ (*Id.*).

⁵⁵³ Q.v. Sections 6.2.3.2.1 and 6.2.3.2.2.

⁵⁵⁴ Q.v. Annex LXXXIII to Annex LXXXVII.

quently, a one unit increase in the frequency of internet usage decreases the odds of participation in web surveys by a multiplicative factor of approximately .95. Obviously, the frequency of usage of the internet and e-mail services on stationary and mobile devices does not play an important role for participation in web surveys. Quite the contrary it even reduces participation to a small extent. Furthermore, evaluation indicated mixed results for the impact of age on participation. At this, three out of five models indicated a trivial effect size (*Id.*), and showed a weakly significant, negative impact of age. But, at the same time, two models showed no significance in this relationship ($.873 \leq OR \leq .897$; $.053^* \leq p \leq .135$). For the significant models the odds of participation of panelists who are older than 24 years are about .88 times smaller than for the younger group.

In addition, for several variables a significant and most of the times even highly significant impact on participation in web surveys has been detected in all five models. The intention to participate in stationary web surveys (pp_s), for instance, showed highly significant, positive impact of a small effect size ($1.466 \leq OR \leq 1.561$; $p = .000^{***}$) (*Id.*) on actual participation. Hence, a one unit increase in intention raises the odds of participation in a stationary web survey by a multiplicative factor of approximately 1.5. All the same, the intention to participate in mobile web surveys (pp_m) had a highly significant, positive impact on participation in all five models ($1.263 \leq OR \leq 1.307$; $p = .000^{***}$). However, this effect is only trivial in size, but still relevant (*Id.*)⁵⁵⁵. Thus, in summary, a one unit increase in intention raises the odds of participation in a mobile web survey by a multiplicative factor of approximately 1.29.

Likewise, the immediacy of perception of e-mails received on stationary or mobile devices (ip_e) had a highly significant, positive impact on participation. However, it was only trivial in effect size ($1.086 \leq OR \leq 1.127$; $.000^{***} \leq p \leq .001^{***}$) (*Id.*). At this, a one unit increase in the immediacy of perception of e-mails increased the odds of participation in a web survey by a multiplicative factor of approximately 1.1. On the contrary, the immediacy of perception of SMS received on mobile devices (ip_s) showed a highly significant trivial but, surprisingly, negative impact ($.819 \leq OR \leq .823$; $p = .000^{***}$). This implies that a one unit increase in the immediacy of perception of SMS decreases the odds of participation in a web survey by a multiplicative factor of approximately .8. Hence, the impact was of similar size, but in the opposite direction in comparison to the immediacy of perception of e-mails (ip_e). As there is no apparent explanation for these effects in opposing directions at this point further future research will have to be devoted to this surprising result.

⁵⁵⁵ Q.v. Section 4.7.

Aside from that, involvement in the topic of the survey (it) was found to have significant or – in some models – even highly significant, positive, trivial size⁵⁵⁶ impact on participation in a web survey ($1.056 \leq OR \leq 1.079$; $.000*** \leq p \leq .012**$) (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192). Consequently, a one unit increase in topic involvement increases the odds of participation in a web survey by a multiplicative factor of approximately 1.06. In contrast to this result the impact of involvement in the incentive offered during recruitment phase (ii) showed no significant effect on participation. Perhaps participation was not triggered by the incentive as it has been offered only in the recruitment phase. Here, all registered panelists entered a lottery of a prize, irrespectively of whether they participated in the subsequent study or not. Moreover, panelists were not reminded of the previously offered incentive during the main study. Hence, due to the time lag between recruitment and main study it is suggested that they simply may have forgotten about the incentive.

Besides, gender ($0.548 \leq OR \leq 0.582$; $p \leq .000***$) and source ($0.621 \leq OR \leq 0.637$; $p \leq .000***$) both had a highly significant, negative impact on participation of a small effect size (*Id.*). At this, the odds of females participating in a web survey were approximately .56 times smaller than those of male panelists. Furthermore, the odds of panelists participating in a web survey recruited from the e-mail distribution lists of universities were approximately .63 times smaller than those of panelists from other recruitment sources.

Therefore, in summary, the impact of the previously discussed independent variables, as it is shown in models #1 to #5, does not show large qualitative change in case ease of accessing web surveys as well as corresponding interaction terms were added as variables to the Multiple Binary Logistic Regressions estimated in models #6 to #10. Nevertheless, adding ease of accessing variables improves model fit from previously unacceptable ($R^2 < .2$) to an acceptable level ($R^2 > .2$) and – to come straight to the point – adding interaction terms to the model does show considerable impact on model fit.

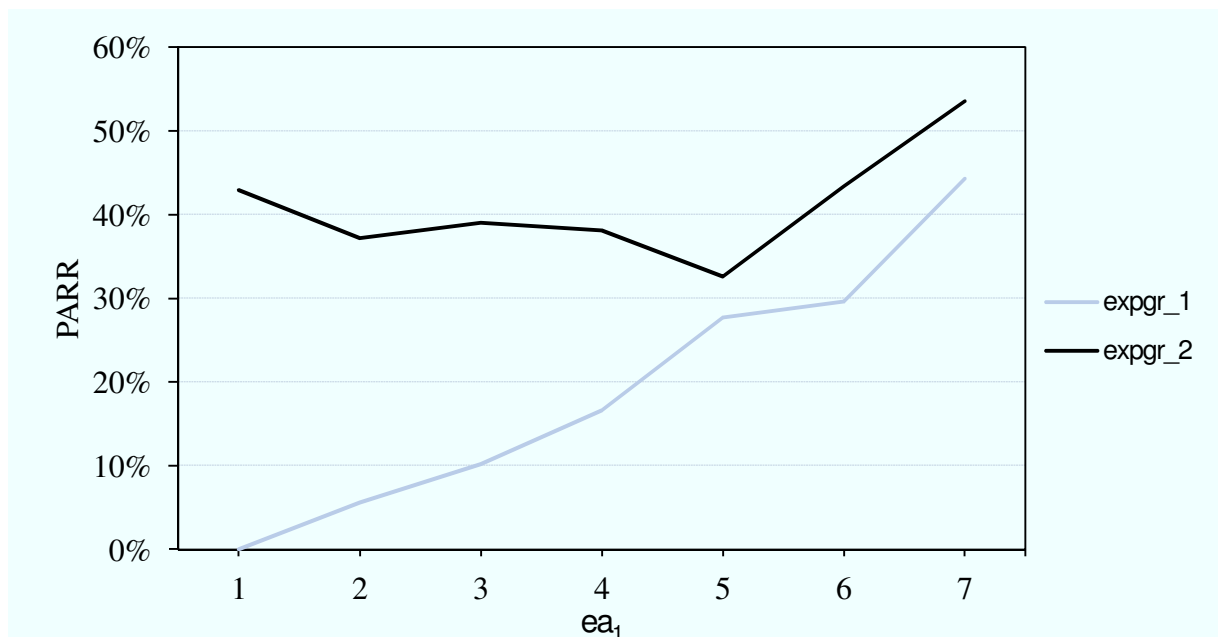
In order to evaluate hypothesis H9, furthermore, several estimations from Multiple Binary Logistic Regression models #8 to #10 had to be appropriately taken into consideration. First, the influence of ea_1 , the ease of access variable which is hypothesized to moderate the impact of group membership in $expgr_1$ on participation in a web survey (PAR), has been examined in model #8. At this, ease of access served as metric moderator variable, group membership as nominal focal independent variable (FIV), participation as dependent variable, and $expgr_2$ as reference group of the model. Here, for the examined interaction term $expgr_1 \cdot ea_1$ a highly

⁵⁵⁶ *Id.*

significant odds ratio of $OR=1.519$ ($p=.000***$) has been estimated. This ratio suggests that a one unit increase in the moderator variable ea_1 – which is the ease of accessing web surveys on a mobile phone/smartphone for which an invitation has been sent by e-mail and received on either a stationary or mobile device – raises the odds of participation of panelists invited to mobile web surveys by e-mail in $expgr_1$ 1.519 times more than it raises the odds of participation of panelists invited to a stationary web survey by e-mail in $expgr_2$.

Figure Annex-1 illustrates that an increase in ea_1 , the perceived ease of accessing mobile web surveys for which an invitation has been sent by e-mail, continuously – almost linearly – raises participation in a mobile web survey to which panelists have been invited by e-mail. At this, participation increases from 0% for low to 44% for high values of ea_1 . At the same time participation of panelists invited to a stationary web survey by e-mail in $expgr_2$, at first, tends to decrease with an increase in ea_1 values in a range between 1 and 5. However, for higher values of ea_1 it then increases. Because, independent of values of ea_1 , participation rates are always higher for $expgr_2$ than for $expgr_1$, there is no crossing between both graphs. Consequently, a so-called ordinal interaction is presented in the following figure (Hair *et al.* 2010, pp. 469-72).

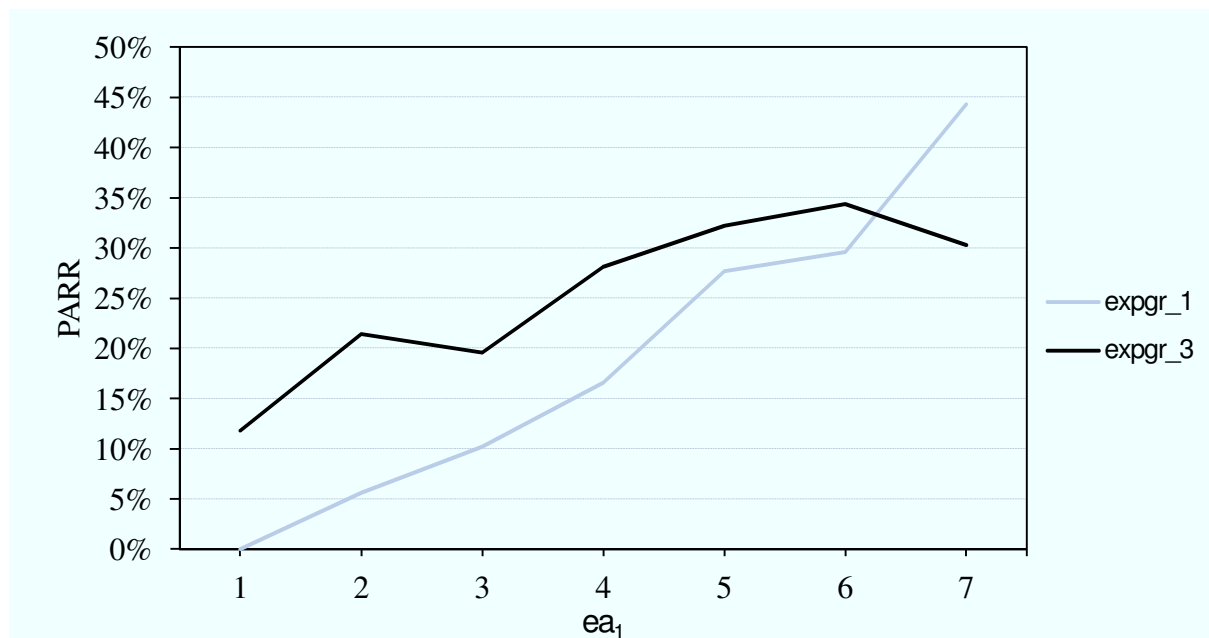
Figure Annex-1: Interaction Term $expgr_1 \cdot ea_1$ for Reference Group $expgr_2$



Second, the impact of the same variable ea_1 moderating the relation between the membership in $expgr_1$ – as nominal FIV – and participation in a web survey has also been examined within model #9. However, in this case the variable $expgr_3$ served as reference group. Here, for the interaction term $expgr_1 \cdot ea_1$ a highly significant odds ratio of $OR=1.578$ ($p=.000***$) has been estimated. This result indicates that a one unit increase in the moderator variable ea_1 raises the odds of participation of panelists invited to mobile web surveys by e-mail in $expgr_1$ 1.578 times more than it mounts up the odds of participation of panelists invited to a mobile web survey by SMS in $expgr_3$.

Figure Annex-2 shows that an increase in ea_1 gradually raises both the participation of panelists invited to a mobile web survey by e-mail in $expgr_1$ as well as the participation of panelists invited to the same survey mode by SMS in $expgr_3$. However, the slope for the curve of panelists invited by e-mail is steeper than the one for panelists invited by SMS. Eventually, both lines cross for values larger than 6. Eventually, the graph for $expgr_3$ below the one for $expgr_1$. Consequently, a so-called disordinal interaction is present (*Hair et al. 2010, pp. 469-72*).

Figure Annex-2: Interaction Term $expgr_1 \cdot ea_1$ for Reference Group $expgr_3$

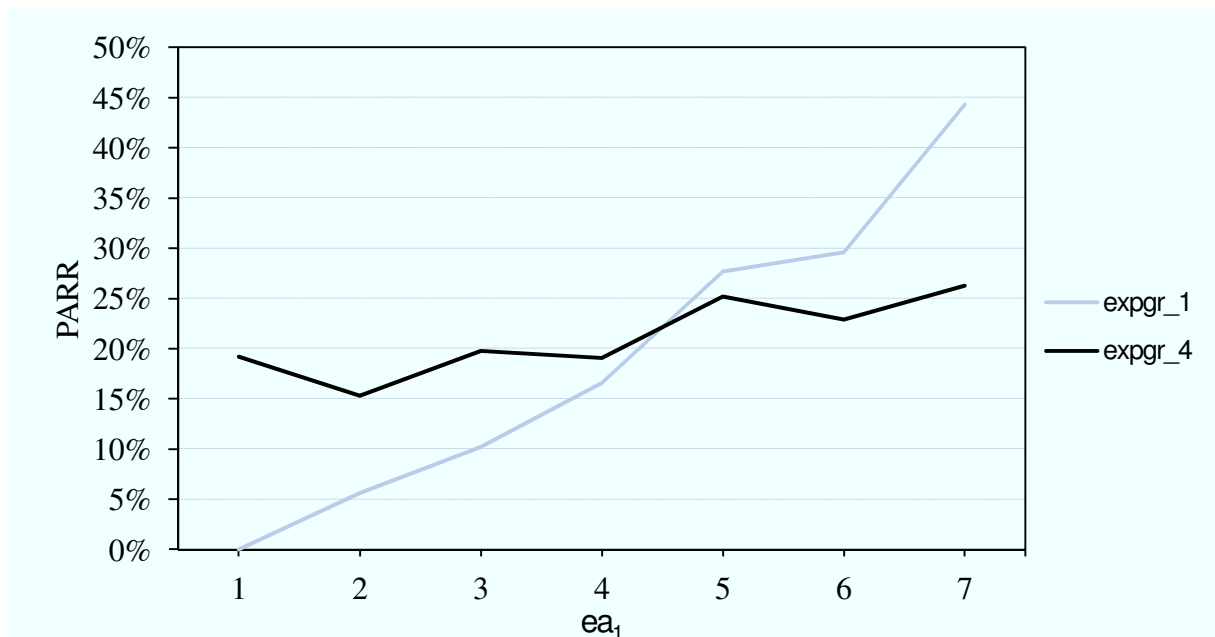


Third, and finally, the impact of moderator variable ea_1 on the relation between the membership in $expgr_1$, as nominal FIV, and participation in a web study (PAR) has been examined in model #10. This time, however, $expgr_4$ served as reference group. For the examined interac-

tion term $\text{expgr}_1 \cdot \text{ea}_1$ a highly significant odds ratio of $\text{OR}=1.518$ ($p=.000***$) has been detected. This result suggests that a one unit increase in moderator ea_1 raises the odds of participation of panelists invited to mobile web surveys by e-mail in expgr_1 1.518 times more than it affects the odds of participation of panelists invited to a stationary web survey by SMS in expgr_4 .

Figure Annex-3 shows that an increase in ea_1 gradually raises both the participation of panelists invited to a mobile web survey by e-mail in expgr_1 as well as the participation of panelists invited to stationary web surveys by SMS in expgr_4 . However, once again, the slope for the curve of panelists invited to mobile web surveys by e-mail is obviously steeper than for panelists invited to stationary web surveys by SMS. Again, both lines cross – this time for values larger than 4. Consequently, again a so-called disordinal or crossover interaction is present here (*Hair et al. 2010, pp. 469-72*).

Figure Annex-3: Interaction Term $\text{expgr}_1 \cdot \text{ea}_1$ for Reference Group expgr_4



All three effects described above have been identified as highly significant ($p=.000^{***}$) and of small effect size ($1.519 \leq OR \leq 1.578$) (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*). As odds are an alternative concept to probabilities (*Jaccard 2001, pp. 2-3*), with a raise in the moderator variable ea_1 the probability to participate in a mobile web survey to which panelists have been invited by e-mail in $expgr_1$ increases more than the probability to participate in a web survey in any of the other three experimental groups researched ($expgr_2$; $expgr_3$; $expgr_4$). Consequently, the participation rates of $expgr_1$ will raise more with an increase in ease of accessing web surveys ea_1 than for all other three groups ($expgr_2$; $expgr_3$; $expgr_4$). Therefore, hypothesis H9 may not be rejected at $\alpha=.01$ significance level.

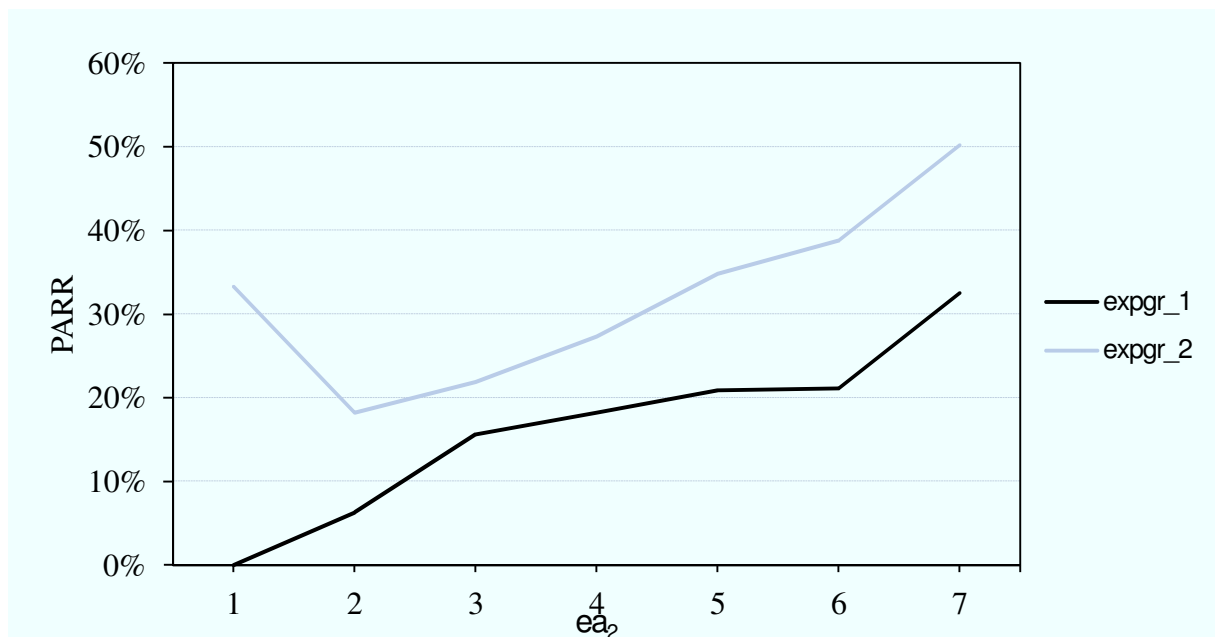
At this point it has to be stressed that in case an interaction term $expgr_1 \cdot ea_1$ is included in a Multiple Binary Logistic Regression model, the logistic coefficients of $expgr_1$, the nominal FIV, represent the ratio between the predicted odds of participation for panelists from $expgr_1$ and the predicted odds for the reference group (either $expgr_2$, $expgr_3$, or $expgr_4$) conditioned on the metric moderator ea_1 being equal to zero (*Id., pp. 34-5*). This condition requires the metric moderator to be equal to its grand mean, which in this case is zero, as the variable has previously been grand mean centered. Similar interpretational logic has to be applied to the logistic coefficient of the metric moderator variable ea_1 . The variable represents the multiplicative factor by which the predicted odds of participation change 1-unit increase in moderator ea_1 . However, it refers only to the reference group for which the value of the corresponding experimental group has been set to zero. As both of these values are so called conditional effects – because they are conditioned upon the other variable included in the interaction term being equal to zero – they are of limited interpretational value for the purpose of hypothesis testing. Hence, they are not further elaborated upon in the course of this study. For a similar reason, the constant estimated for model #9 is not further interpreted as it represents the odds of panelists participating conditioned on all other independent metric and dummy variables included in the Logistic Regression model being set to zero.

Next, estimations from models #7, #9, and #10 were incorporated in order to evaluate hypothesis H10. At first, the influence of ea_2 , the ease of accessing stationary web surveys to which participants have been invited to by email, was examined in model #7. At this, ea_2 is hypothesized to be moderating the impact of membership in $expgr_2$ on participation in a web survey (PAR). Here, ease of accessing served as metric moderator variable, $expgr_2$ as nominal FIV, participation as dependent variable, and $expgr_1$ as reference group. For the corresponding interaction term $expgr_2 \cdot ea_2$ a highly significant odds ratio of $OR=1.220$ ($p=.003^{***}$) has been

estimated. Thus, a one unit increase in ea_2 , increases the odds of participation of panelists invited to stationary web surveys by e-mail in $expgr_2$ 1.220 times more than it raises the odds of participation of panelists invited to a mobile web survey by e-mail in $expgr_1$.

Figure Annex-4 shows that an increase in ea_2 raises the participation of panelists invited to stationary web surveys by e-mail in $expgr_2$ for ease of accessing values larger than 2. Similarly, also participation rates of panelists invited to a mobile web survey by e-mail in $expgr_1$ rise with an increase in ea_2 across the entire range of values. However, for values higher than 2 the curve for $expgr_2$ shows a slightly, almost invisible, higher average slope than the curve for $expgr_1$. Because both lines do not cross – and as it is suggested by data – this indicates a weak ordinal interaction (*Hair et al. 2010, pp. 469-72*). Nevertheless, it astonishes that an increase of ease of access ea_2 from a value of 1 to 2 decreases participation of panelists invited to stationary web surveys by e-mail in $expgr_2$. As so far no plausible explanation was found for this phenomenon further research will have to provide an answer to this unfolded question.

Figure Annex-4: Interaction Term $expgr_2 \cdot ea_2$ for Reference Group $expgr_1$

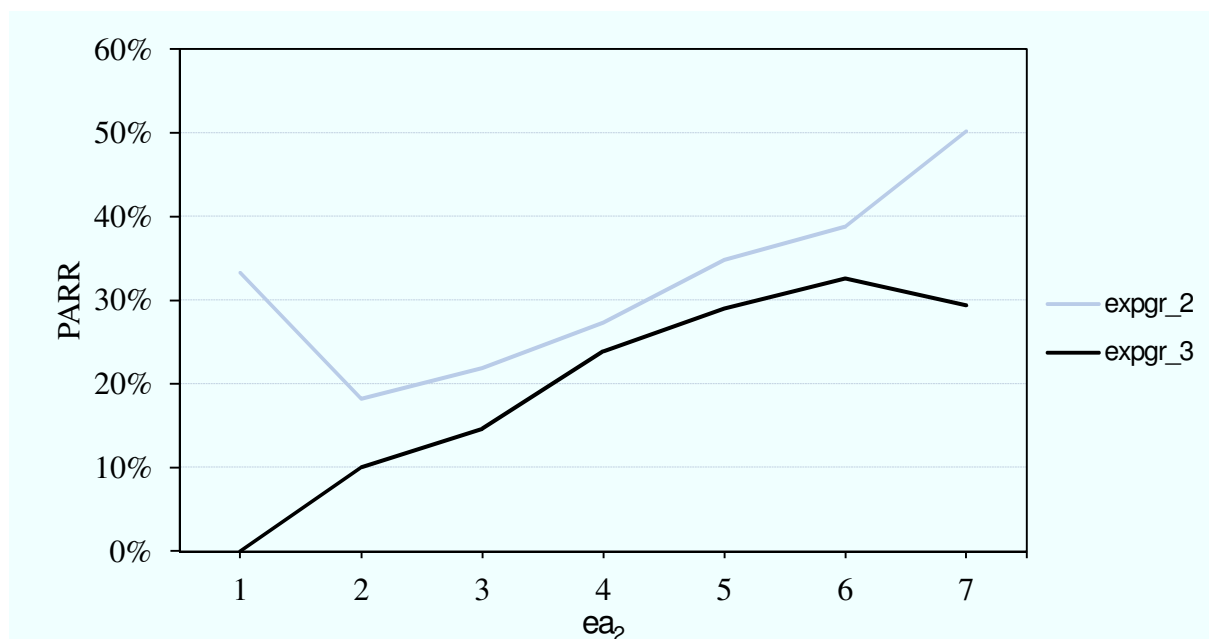


Second, the impact of the moderator variable ea_2 , moderating the same relation between membership in $expgr_2$ – as nominal FIV – and participation (PAR), have been examined within model #9. This time, however, $expgr_3$ served as reference group. Here, for the interaction term $expgr_2 \cdot ea_2$ an odds ratio of $OR=1.314$ ($p=.000***$) has been found. Consequently, a

one unit increase in the moderator variable ea_2 raises the odds of participation of panelists invited to stationary web surveys by e-mail in $expgr_2$ 1.314 times more than it mounts up the odds of participation of panelists invited to a mobile web survey by SMS in $expgr_3$.

Figure Annex-5 shows that an increase in ea_2 tends to raise the participation rates of panelists invited to a mobile web survey by SMS in $expgr_3$. Similar to Figure Annex-4, it shows that for values higher than 2 the curve for $expgr_2$ has got a slightly, almost invisible, higher average slope than the curve for $expgr_3$. As both lines do not cross, the interaction illustrated here is ordinal (*Hair et al. 2010, pp. 469-72*).

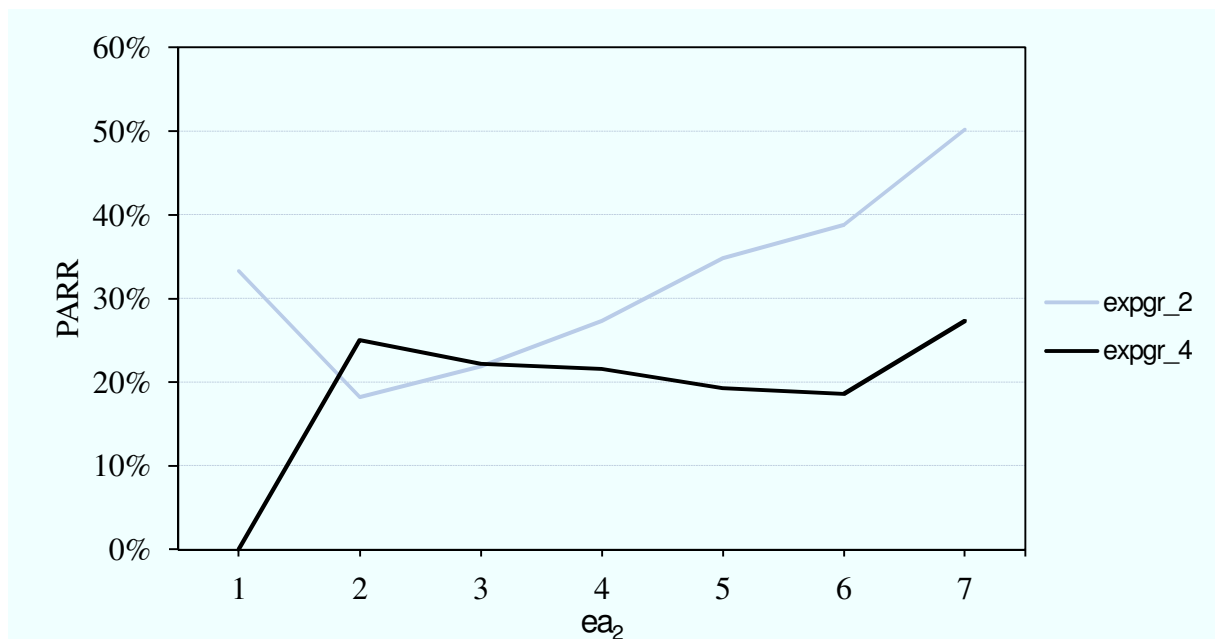
Figure Annex-5: Interaction Term $expgr_2 \cdot ea_2$ for Reference Group $expgr_3$



Third, the impact of ea_2 , moderating the relation between the membership in $expgr_2$, as nominal FIV, and participation (PAR), have also been examined in model #10. Here, $expgr_4$ served as reference group. The corresponding interaction term $expgr_2 \cdot ea_2$ showed an odds ratio of $OR=1.293$ ($p=.000***$). This highly significant result suggests that a one unit increase in the moderator ea_2 raises the odds of participation of panelists invited to stationary web surveys by e-mail in $expgr_2$ 1.293 times more than it impacts the odds of participation of panelists invited to a stationary web survey by SMS in $expgr_4$.

Figure Annex-6 shows that an increase in ea_2 tends to raise the participation rate of panelists invited to a stationary web survey by SMS in $expgr_4$ for small ea_2 values in the range from 1 to 2. In contrast to this, for values larger than 2 visual inspection of the curve shows a rather stagnating trend. As the lines for $expgr_2$ and $expgr_4$ cross between ease of accessing values of 2 and 3 a disordinal, crossover interaction exists here (Hair et al. 2010, pp. 469-72).

Figure Annex-6: Interaction Term $expgr_2 \cdot ea_2$ for Reference Group $expgr_4$



Again, all three effects were highly significant ($.000^{***} \leq p \leq .003^{***}$) but of trivial size ($1.220 \leq OR \leq 1.314$) (Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192). It may be assumed that the triviality of effect sizes may be partly due to the inexplicable run of the curve depicting the participation rates for $expgr_2$ for very small values of ea_2 . Nevertheless, also trivial effect sizes are considered as practically relevant results regarding participation rates in survey research⁵⁵⁷. Therefore, with an increase in the moderator variable ea_2 the probability of participating in a stationary web survey to which panelists have been invited by e-mail in $expgr_2$ raises stronger than the probability of participating in a web survey in any other experimental group ($expgr_1$; $expgr_3$; $expgr_4$). Hence, with an increase in ease of accessing web surveys ea_2 the participation rates of the $expgr_2$ will also raise more than for all other groups

⁵⁵⁷ Q.v. Section 4.7.

(expgr₁; expgr₃; expgr₄). Therefore, hypothesis H10 may not be rejected at $\alpha=.01$ significance level.

Finally, for the evaluation of hypotheses H11 and H12, estimations from the Multiple Binary Logistic Regression models #7 to #10 were interpreted. In these models the influence of the third ease of access variable ea₃, moderating the impact of membership in expgr₃ on participation in a web survey (PAR), and, respectively, the influence of the fourth ease of access variable ea₄, moderating the impact of membership in expgr₄ on participation in a web survey (PAR), have been examined. At this, ea₃ represents the ease of accessing mobile web surveys for which an invitation has been sent by SMS and received on a mobile device. In contrast, ea₄ stood for the ease of accessing stationary web surveys for which an invitation has been sent by SMS and, hence, was received on a mobile device.

Unfortunately, none of the corresponding interaction terms – neither expgr₃ · ea₃ nor expgr₄ · ea₄ – proved to be significant ($\alpha=.1$). These results suggest that there is no significant difference between the impact of a one unit increase in the moderator ea₃ on the odds of participation of panelists invited to mobile web survey by SMS in expgr₃ and on the odds of participation of panelists from other experimental groups (expgr₁; expgr₂; expgr₄). All the same, there is no significant difference between the impact of a one unit increase in the moderator ea₄ on the odds of participation of panelists invited to stationary web survey by SMS in expgr₄ compared to the odds of participation of panelists from other experimental groups (expgr₁; expgr₂; expgr₃). Consequently, both hypothesis H11 and H12 had to be rejected at $\alpha=.10$ significance level. The corresponding graphical display of this evaluation may be found in Annex LXXXVIII to Annex XCIII of this study.

For the sake of completeness, in addition, to the prior evaluation procedures eight further Multiple Binary Logistic Regression models #11 to #18 with interaction terms have been estimated. However, these models were similar to previously estimated models #7 to #10. For this purpose four subsamples (N=2,562) were formed from the main study sample (N=5,124) each filtering the sample for one factor level. For example, the first subsample included only panelists who, in the course of the study, have been invited to mobile web surveys. On the contrary, only those panelists invited to stationary web surveys have been included into the second subsample. Moreover, subsample three comprised only panelists invited by SMS, and subsample four only those invited by e-mail. Subsamples one and two were mutually exclusive. So were subsamples three and four. One of the two experimental groups, manipulating

the other factor not filtered for, was included in the model. The other was chosen as reference group.

As a consequence of forming subsamples the dependent variable of the survey (PAR) did not depict general participation in a web survey anymore. Instead it denoted participation in a mobile web survey for the first subsample, a stationary web survey for the second subsample, a web survey to which panelists have been invited by SMS for the third web subsample, and participation in a web survey to which panelists have been invited by e-mail for the fourth subsample.

In brief, the results of all estimations of the eight models showed an unacceptable ($R^2 < .2$) model fit in terms of Nagelkerke-Pseudo- R^2 -Statistics ($.153 \leq R^2 \leq .199$). Besides, also trimming by means of the IBM SPSS 21.0 “Backward Elimination (Likelihood Ratio)” procedure (*IBM 2012b, p. 4*) did not improve model fit ($.150 \leq R^2 \leq .195$). Consequently, as these models showed inferior results compared to previous models (models #7 to #10), a detailed interpretation of their coefficients has been omitted as this would have been beyond the scope of this study. The corresponding evaluation result may be found in the annexes of this study.

Summary

It has been shown that participation in stationary web surveys to which panelists have been invited by e-mail in expgr_2 , will increase stronger than for other combinations of survey and invitation modes in case panelists perceive a survey easier to access. This is expressed through the interaction of expgr_2 with variable ea_2 (H10: $1.220 \leq \text{OR} \leq 1.314$, $.000*** \leq p \leq .003***$)⁵⁵⁸. Therefore, it is recommended to researchers to frequently emphasize in contacts – e.g. in pre-notifications, invitations, and reminders – that such web surveys are particularly easy to access. A similar interaction effect was found for the ease of accessing ea_1 of mobile web surveys for which e-mail invitations have been send in expgr_1 (H9: $1.519 \leq \text{OR} \leq 1.578$, all $p = .000***$)⁵⁵⁹. Thus, it is suggested to stress the ease of accessing in all types of contacts in web surveys – both stationary and mobile – for which e-mail invitations will be sent out. This recommendation should be underpinned with further research in the future. For instance, in a simple experiment it could be explicitly tested whether e-mail invitations to web surveys, in which the ease of accessing the survey is emphasized in the text body, lead to higher participation rates compared to invitations in which this feature is not

⁵⁵⁸ $1/.820 \leq \text{OR} \leq 1/.761$.

⁵⁵⁹ models #8 to #10, $1/.682 \leq 1/\text{OR} \leq 1/.634$.

explicitly stressed. In addition, it should be tested which of several different possible wordings, emphasizing ease of access to a web survey, is the most effective one.

Unfortunately, no support for a similar effect as for e-mails was found for SMS invitations in this research. Consequently, in total only mixed support was found for the ease of accessing web surveys as a moderator of participation in this study. Therefore, subsequent studies will have to examine why SMS do not foster the same kind of moderating impact as e-mail invitations.

Table Annex-5: Evaluation Results Research Guiding Hypotheses Regarding Interaction Effects

<i>hypothesis</i>	<i>wording</i>	<i>result</i>
H9:	<i>With an increase in the ease of accessing mobile web surveys for which links were sent in an e-mail invitation, received on a stationary or mobile device, and supposed to be accessed on a mobile phone/smartphone (ea_1) the probability of participation of panelists invited to mobile web surveys by e-mail ($expgr_1$) increases stronger than the probability of participation in any other experimental group ($expgr_2$; $expgr_3$; $expgr_4$).</i>	not rejected ($\alpha=.01$)
H10:	<i>With an increase in the ease of accessing stationary web surveys for which links were sent in an e-mail invitation, received on a stationary or mobile device, and supposed to be accessed on a PC/laptop (ea_2) the probability of participation of panelists invited to stationary web surveys by e-mail ($expgr_2$) increases stronger than the probability of participation in any other experimental group ($expgr_1$; $expgr_3$; $expgr_4$).</i>	not rejected ($\alpha=.01$)
H11:	<i>With an increase in the ease of accessing mobile web surveys for which links were sent in an SMS invitation, received on a mobile device, and supposed to be accessed on a mobile phone/smartphone (ea_3) the probability of participation of panelists invited to mobile web surveys by SMS ($expgr_3$) increases stronger than the probability of participation in any other experimental group ($expgr_1$; $expgr_2$; $expgr_4$).</i>	rejected ($\alpha=.10$)
H12:	<i>With an increase in the ease of accessing stationary web surveys for which links were sent in an SMS invitation, received on a mobile device, and supposed to be accessed on a PC/laptop (ea_4) the probability of participation of panelists invited to stationary web surveys by SMS ($expgr_4$) increases stronger than the probability of participation in any other experimental group ($expgr_1$; $expgr_2$; $expgr_3$).</i>	rejected ($\alpha=.10$)

Table Annex-6: Estimation of Covariates in Models #6 to #10

<i>variable label</i>	<i>variable</i>	<i>significances</i>	<i>effect sizes</i>	<i>direction of effect</i>	<i>dimension of effect size</i>
gender	gender	$p=.000^{***}$	$.548 \leq OR \leq .582$	negative	small
source	source of recruitment (e-mail distribution lists of universities)	$p=.000^{***}$	$.621 \leq OR \leq .637$	negative	
pp _s	intention to participate in stationary web surveys	$p=.000^{***}$	$1.466 \leq OR \leq 1.561$	positive	
pp _m	intention to participate in mobile web surveys	$p=.000^{***}$	$1.263 \leq OR \leq 1.307$	positive	trivial
it	involvement in topic	$.000^{***} \leq p \leq .012^{**}$	$1.056 \leq OR \leq 1.079$	positive	
ip _e	immediacy of perception of e-mail received on stationary or mobile device	$.000^{***} \leq p \leq .001^{***}$	$1.086 \leq OR \leq 1.127$	positive	
ip _s	immediacy of perception of SMS received on mobile device	$p=.000^{***}$	$.819 \leq OR \leq .823$	negative	
age _{ms}	age (median split)	$.053^{*} \leq p \leq .135$	$.873 \leq OR \leq .897$	negative	insignificant or trivial
iu _s	frequency of internet usage on PC or laptop	$.034^{**} \leq p \leq .354$	$.943 \leq OR \leq .967$	negative	
eu _m	frequency of e-mail usage on a smartphone or mobile phone	$.003^{***} \leq p \leq .880$	$.935 \leq OR \leq 1.017$	both	
eu _s	frequency of e-mail usage on PC or laptop	$.132 \leq p \leq .644$	$.975 \leq OR \leq 1.048$	both	insignificant
ii	involvement in incentive	$.773 \leq p \leq .963$	$.990 \leq OR \leq 1.003$	both	
iu _m	frequency of internet usage on a smartphone or mobile phone	$.678 \leq p \leq .932$	$.988 \leq OR \leq .998$	negative	

Significances and effect sizes for variables eu_s, ii, iu_m from total models #6 to #10, for eu_m from trimmed model #8 as well as total models #6, #7, #9, and #10, for iu_s from trimmed models #6, #7, #9, and #10 and total model #8, for age_{ms} from total models #7 and #10 and trimmed models #6, #8 and #9, for pp_s, pp_m, ip_e, ip_s, it, gender, and source from trimmed models #6 to #10.

Additionally, besides main and interaction effects, several covariates showed significant impact on participation⁵⁶⁰. Most importantly, small effects (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*) were detected for three variables. At this, both gender ($.548 \leq OR \leq .582$; $p=.000^{***}$) and source ($.621 \leq OR \leq .637$; $p=.000^{***}$) showed small size negative impact on participation. Here, the odds of women participating were smaller than for men. Similarly, panelists recruited from e-mail distribution lists of universities were less likely to participate than panelists recruited from other sources. In contrast, the intention to participate in stationary web surveys (pp_s) showed a small (*Id.*) positive effect on the odds of overall participation

⁵⁶⁰ models #6 to 10; q.v. Annex LXXXIII to Annex LXXXVII.

($1.466 \leq OR \leq 1.561$; $p = .000^{***}$). Likewise, the intention to participate in mobile web surveys (pp_m) raised the odds of overall participation, however, only by an effect trivial in size ($1.263 \leq OR \leq 1.307$; $p = .000^{***}$) (*Id.*). All the same, the effect of the involvement in the survey topic ($1.056 \leq OR \leq 1.079$; $.000^{***} \leq p \leq .012^{**}$) on participation was positive but trivial. Oddly, for the immediacy of perception of e-mails received on stationary or mobile devices ($1.086 \leq OR \leq 1.127$; $.000^{***} \leq p \leq .001^{***}$) and the immediacy of perception of SMS received on mobile device ($.819 \leq OR \leq .823$; $p = .000^{***}$) two effects in the opposite direction have been estimated. At this, participation is higher for panelists who perceive newly incoming e-mails more immediate than others, but it decreases for those who perceive newly incoming SMS more immediate. This counterintuitive result will have to be further examined in subsequent studies.

Furthermore, mixed evidence was found for three variables. At this, estimation for the variable age ($.873 \leq OR \leq .897$; $.053^{*} \leq p \leq .135$) indicated another negative but insignificant effect in some models. In contrast, it showed a trivial (*Cohen 1988, pp. 24-7; Gray and Kinnear 2012, p. 192*), weakly significant, negative effect in other models, which indicated that the odds of participation decrease for panelists older than 24 years. All the same, the effects of the frequency of internet usage on a PC or laptop ($.943 \leq OR \leq .967$; $.034^{**} \leq p \leq .354$), as well as the frequency of e-mail usage on a smartphone or mobile phone ($.935 \leq OR \leq 1.017$; $.003^{***} \leq p \leq .880$) showed inconsistencies regarding their significance and direction. Finally, the effects of the variables frequency of e-mail usage on PCs and laptops ($.975 \leq OR \leq 1.048$; $.132 \leq p \leq .644$), involvement in the incentive offered ($.990 \leq OR \leq 1.003$; $.773 \leq p \leq .963$), and the frequency of internet usage on a smartphone or mobile phone ($.988 \leq OR \leq .998$; $.678 \leq p \leq .932$) were consistently insignificant across all models tested. An overview of the results regarding all covariates estimated may be found in previous Table Annex-6. Moreover, at this point is should, once again, be mentioned that regarding outcome rates in survey research even small effects may have a substantial impact on the costs of a survey project⁵⁶¹.

⁵⁶¹ Q.v. Section 4.7.

Table Annex-7: Multiple Binary Logistic Regression Trimmed Model #6

-2LL=5,311.971 -2LR- χ^2 = 860.741 Nagelkerke-Peudo-R ² = .221					
variable label	B	SE	Wald	p	OR
expgr ₁	.177	.100	3.123	.077*	1.194
expgr ₂	.991	.095	107.840	.000***	2.693
expgr ₃	.445	.098	20.650	.000***	1.561
ea ₂	.395	.035	129.483	.000***	1.485
ea ₃	.068	.023	8.941	.003***	1.071
ea ₄	-.273	.021	175.664	.000***	.761
pp _s	.430	.041	112.371	.000***	1.538
pp _m	.259	.020	165.771	.000***	1.296
ip _e	.105	.025	17.851	.000***	1.111
ip _s	-.195	.033	35.051	.000***	.823
iu _s	-.059	.028	4.483	.034**	.943
it	.068	.022	9.739	.002***	1.071
age _{ms}	-.122	.071	2.917	.088*	.885
gen	-.600	.071	71.045	.000***	.549
sou	-.468	.102	20.938	.000***	.626
DVA ₁	-.883	.153	33.224	.000***	.414
DVA ₂	-1.265	.472	7.166	.007***	.282
const.	-.678	.126	28.916	.000***	.508

Dependent variable: PAR; N=5,124.

Table Annex-8: Multiple Binary Logistic Regression Trimmed Model #7

-2LL= 5,303.170 -2LR- χ^2 =869.542 Nagelkerke-Peudo-R ² = .223					
variable label	B	SE	Wald	p	OR
expgr ₂	.796	.095	70.783	.000***	2.216
expgr ₃	.270	.097	7.829	.005***	1.311
expgr ₄	-.180	.100	3.247	.072*	.835
ea ₂	.341	.039	76.867	.000***	1.406
ea ₃	.068	.023	8.749	.003***	1.070
ea ₄	-.275	.021	176.283	.000***	.760
expgr ₂ · ea ₂	.199	.068	8.654	.003***	1.220
pp _s	.430	.041	111.631	.000***	1.537
pp _m	.260	.020	166.246	.000***	1.297
ip _e	.107	.025	18.352	.000***	1.113
ip _s	-.198	.033	35.790	.000***	.821
iu _s	-.059	.028	4.505	.034**	.943
it	.069	.022	9.986	.002***	1.072
age _{ms}	-.127	.071	3.159	.075*	.881
gen	-.602	.071	71.117	.000***	.548
sou	-.470	.103	21.030	.000***	.625
DVA ₁	-.904	.154	34.428	.000***	.405
DVA ₂	-1.287	.474	7.388	.007***	.276
const.	-.490	.126	15.090	.000***	.613

Dependent variable: PAR; N=5,124.

Table Annex-9: Multiple Binary Logistic Regression Trimmed Model #8

-2LL= 5,345.066 -2LR- χ^2 = 827.646 Nagelkerke-Peudo-R ² = .213					
variable label	B	SE	Wald	p	OR
expgr ₁	-.918	.098	87.573	.000***	.399
expgr ₃	-.516	.090	32.852	.000***	.597
expgr ₄	-.995	.094	111.273	.000***	.370
ea ₁	.167	.031	29.702	.000***	1.182
ea ₄	-.243	.020	142.113	.000***	.784
expgr ₁ · ea ₁	.418	.061	46.816	.000***	1.519
pp _s	.445	.040	124.906	.000***	1.561
pp _m	.244	.020	146.024	.000***	1.277
ip _e	.119	.025	22.892	.000***	1.127
ip _s	-.197	.033	36.160	.000***	.821
eu _m	-.067	.023	8.772	.003***	.935
it	.069	.022	10.267	.001***	1.072
gen	-.541	.070	60.615	.000***	.582
sou	-.452	.101	20.194	.000***	.637
DVA ₁	-.539	.167	10.432	.001***	.583
DVA ₂	-1.302	.468	7.743	.005***	.272
const.	.210	.112	3.516	.061*	1.234

Dependent variable: PAR; N=5,124.

Table Annex-10: Multiple Binary Logistic Regression Trimmed Model #9

-2LL= 5,247.386 -2LR- χ^2 = 925.326 Nagelkerke-Peudo-R ² = .236					
variable label	B	SE	Wald	p	OR
expgr ₁	-.396	.101	15.287	.000***	.673
expgr ₂	.513	.091	31.483	.000***	1.671
expgr ₄	-.466	.098	22.817	.000***	.627
ea ₂	.285	.039	52.372	.000***	1.330
ea ₄	-.289	.021	193.869	.000***	.749
expgr ₁ · ea ₁	.456	.058	61.214	.000***	1.578
expgr ₂ · ea ₂	.273	.068	16.026	.000***	1.314
pp _s	.437	.041	114.749	.000***	1.549
pp _m	.268	.020	181.191	.000***	1.307
ip _e	.106	.025	17.894	.000***	1.111
ip _s	-.199	.033	36.539	.000***	.819
iu _s	-.057	.028	4.239	.040**	.945
it	.076	.022	12.124	.000***	1.079
gen	-.602	.071	71.498	.000***	.548
sou	-.453	.102	19.797	.000***	.636
DVA ₁	-.841	.155	29.387	.000***	.431
DVA ₂	-1.275	.468	7.432	.006***	.279
const.	-.278	.115	5.821	.016**	.757

Dependent variable: PAR; N=5,124.

Table Annex-11: Multiple Binary Logistic Regression Trimmed Model #10

variable label	-2LL=5,438.679 -2LR- χ^2 =734.032 Nagelkerke-Pseudo-R ² = .191				
	B	SE	Wald	p	OR
expgr ₂	.907	.080	127.026	.000***	2.477
expgr ₃	.397	.083	22.960	.000***	1.487
ea ₁	-.141	.038	13.444	.000***	.869
ea ₂	.162	.041	15.226	.000***	1.176
ea ₃	.045	.027	2.753	.097*	1.047
expgr ₁ · ea ₁	.417	.059	50.738	.000***	1.518
expgr ₂ · ea ₂	.257	.068	14.481	.000***	1.293
pp _s	.383	.040	92.475	.000***	1.466
pp _m	.233	.020	138.210	.000***	1.263
ip _e	.082	.025	11.230	.001***	1.086
ip _s	-.200	.033	37.807	.000***	.819
iu _s	-.048	.028	2.981	.084*	.953
it	.054	.022	6.360	.012**	1.056
age _{ms}	-.136	.070	3.743	.053*	.873
gen	-.565	.070	64.582	.000***	.569
sou	-.476	.101	22.350	.000***	.621
DVA ₁	-.765	.159	23.229	.000***	.465
DVA ₂	-1.079	.464	5.403	.020**	.340
const.	-.583	.114	25.959	.000***	.558

Dependent variable: PAR; N=5,124.

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