Strategic Change

WILEY

RESEARCH ARTICLE OPEN ACCESS

How Does Entrepreneurs' Grit Predict Effectual Decision-Making?

Kris Gericke[1] | Andrea Greven[1] | Malte Brettel[1,2]

[1]RWTH Innovation and Entrepreneurship Group (WIN)—TIME Research Area, RWTH Aachen University, Aachen, Germany | [2]Entrepreneurship and Innovation Group, WHU—Otto Beisheim School of Management, Vallendar, Germany

Correspondence: Kris Gericke (gericke@time.rwth-aachen.de)

Received: 24 July 2024 | **Revised:** 18 May 2025 | **Accepted:** 19 June 2025

Keywords: effectuation | entrepreneurship | grit | self-regulation theory

ABSTRACT

Entrepreneurs' grit is one of the most relevant predictors of new venture performance. We investigate whether the "stubbornness" of entrepreneurs' grit negatively relates to their effectual decision-making abilities. Understanding the underlying mechanisms is relevant because the effectual decision-making abilities of founders are crucial for new venture performance. We leverage self-regulation theory to gain a deeper understanding, analyzing grit (perseverance of effort, passion attainment, consistency of interest) and effectual decision-making (experimentation, flexibility) on their reflective subdimensions. Using survey data from 451 entrepreneurs in the DACH region, we validate our research model by applying structural equation modeling. We find two results. First, we reveal that grit's perseverance of effort and grit's passion attainment positively relate to effectual flexibility. Second, we uncover a negative association between grit's consistency of interest and effectual experimentation. We thus advance the academic discussion about a potential stubbornness of gritty entrepreneurs. We argue that grit's consistency of interest weakens the entrepreneurs' experimentation abilities, which are crucial for finding the right product-market fit.

1 | Introduction

How do you succeed while 90% of startups fail (Forbes 2015)? In 1997, Amazon CEO Jeff Bezos wrote to his shareholders in his initial annual letter, saying: "It's all about the long-term," adding, "we are working to build something important, something that matters to our customers, something that we can all tell our grandchildren about" (Bezos 1997). This first shareholder letter is attached to all subsequent letters since 1997.

One academic construct is consistent with Jeff Bezos's answer: grit—or passion and perseverance for long-term goals (Duckworth et al. 2007). Duckworth et al. (2007) positioned the construct as the best predictor of retention in education, military, and sales. More recently, entrepreneurship research has uncovered the relevance of grit for performance (Khan et al. 2021; Mueller et al. 2017). Studies identify positive outcomes of grit, such as increased resilience (Houston et al. 2021) or coping with stress and adversity (Arco-Tirado et al. 2019), but also negative outcomes, such as perfectionist tendencies (Houston et al. 2021), reduced help-seeking (Credé et al. 2017), or incurring costly persistence (Lucas et al. 2015).

Grit is important in the context of new ventures as it has the highest predictive power for retention in a high-adversity environment (Arco-Tirado et al. 2019) and has therefore been positively associated with venture performance (Khan et al. 2021; Mueller et al. 2017). However, echoing previous findings on the dark side of grit, we argue that grit's "stubbornness" (Khan et al. 2021) hinders the flexible and experimental approach of effectuation, which is also crucial for venture performance (Perry et al. 2012). Effectual decision-making (Chandler et al. 2011) is required, especially in the early stages of a venture to "pivot" (i.e., changing company's direction in response

Summary

- We provide evidence of a potential "stubbornness" in the decision-making of gritty entrepreneurs which might harm their ability to experiment, that is find a good product-market-fit.
- 451 survey responses of entrepreneurs in the DACH region.
- Grit's consistency of interest negatively predicts effectual experimentation.
- We advance the literature on a potential "stubbornness" of gritty entrepreneurs.

to market changes or new information) and find the venture's product-market fit (*The lean startup*, Ries 2011). Grit may be less helpful for new ventures as entrepreneurs need to experiment and be flexible.

Yet, scarce research connects grit with effectual decision-making. This study focuses on two of the four subdimensions of effectuation (i.e., flexibility and experimentation; Chandler et al. 2011) as they are consistent with the adaptive and iterative nature required to achieve a good "product-market fit" as an entrepreneur (*The lean startup*, Ries 2011). We do not focus on the effectuation sub-dimension "affordable loss" as it relates more to initial decision boundaries, which we believe are less relevant for the long-term perspective of gritty entrepreneurs.

We address two research gaps. First, as mentioned, prior research yields inconsistent results on the potential outcomes of grit (Houston et al. 2021). Looking at the negative side of grit's outcomes reveals a need for more empirical studies on high-grit entrepreneurs' potential "stubbornness" (Khan et al. 2021). To the best of our knowledge, research has not yet considered whether gritty entrepreneurs can use effectual decision-making, for example, to achieve a better "product-market fit" (Ries 2011). We address this gap following research calls by Duckworth et al. (2021) and Southwick et al. (2019) for a better understanding of the downsides of grit, specifically the potential "stubbornness" of high-grit entrepreneurs (Gabay-Mariani et al. 2024; Khan et al. 2021; Lucas et al. 2015).

Second, as effectuation affects organizational outcomes, academia has displayed increasing interest in the underlying dynamics over the last two decades (Grégoire and Cherchem 2020). More recently, scholars have attempted to close the research gap on individual-level antecedents that previous effectuation studies have overlooked (Stroe et al. 2018). However, researchers primarily explore the positive or "bright" side (Maccoby 2000; Wales et al. 2013), analyzing, for example, individual-level antecedents that support effectuation, such as self-efficacy, optimism, or perspective-taking (Zhang et al. 2019). Given the dynamic venture environment and the finite resources of an entrepreneur, effectual decision-making is critical for venture performance (Evans 1991; Stieglitz et al. 2016). Hence, it is essential to understand which antecedents hinder entrepreneurs' effectuation abilities. Grit's consistency of interest appears to present an especially striking contrast to the inherent experimentation of effectuation, and, based on the results of our thorough literature research, no study has analyzed this relationship yet. Furthermore, Wu et al. (2020) call on research to use concepts like grit to advance the entrepreneurial literature of effectuation.

Our study aims to connect grit empirically (Jachimowicz et al. 2018) with effectual decision-making (Chandler et al. 2011), which research has primarily linked to venture performance (Perry et al. 2012). We address two research questions: (1) How does entrepreneurs' level of grit relate to effectual experimentation? (2) How does entrepreneurs' level of grit relate to effectual flexibility? To validate our research model, we apply structural equation modeling. We test our hypotheses using 451 responses by top management team members from cross-industry ventures in Austria (A), Germany (D), and Switzerland (CH) (the so-called DACH region) that we surveyed between October and December 2023. We define ventures as firms that are younger than 10 years (Steigertahl et al. 2018). Our results support our hypotheses and provide insights into the relationship between grit and effectual decision-making.

We find that grit has mixed consequences for effectual decision-making. Consequently, we use and argue for an in-depth view of the subdimensions of grit and effectual decision-making to analyze all underlying mechanisms. As a result, our study makes three theoretical contributions.

First, we advance the literature on noncognitive skills within the entrepreneurship context. Following the psychology literature (Credé et al. 2017; Paunonen et al. 2003), cognitive skills are characterized by general mental abilities and are less malleable over time, for example logical reasoning or memory. In contrast, noncognitive skills are characterized by patterns of thoughts, feelings, and behaviors that evolve from interaction with the environment and are therefore receptive to interventions (Jordan et al. 2019). Grit is one such noncognitive skill (Credé et al. 2017; Mooradian et al. 2016). These skills can more accurately predict a specific behavior or response to a specific environment (Paunonen et al. 2003), that is grit shows predictive power beyond the Big Five personality traits and enables prediction of employee retention, entrepreneurial success, or societal impact (Duckworth et al. 2007; Kaes et al. 2025; Wolfe and Patel 2016). Furthermore, this differs from the psychological literature on motivational cognition, that is goal activation and goal shielding (Gollwitzer and Bargh 1996; Shah et al. 2002), as we argue that grit is not a cognitive representation of motivation, but rather a noncognitive skill of motivational persistence, for example in the adverse environment of entrepreneurship (Arco-Tirado et al. 2019). Consequently, there is a need to investigate these noncognitive skills as they have significant and differentiated effects (Brunello 2011; Humphries and Kosse 2017). In particular, Mooradian et al. (2016) call for more research on noncognitive skills and their impact on entrepreneurial outcomes.

Second, we extend the literature on the "dark side" of grit within the entrepreneurship context, as we find that grit's

consistency of interest negatively relates to effectual experimentation. Thus, we present evidence for the previous notion of the "stubborn" high-grit entrepreneur (Lucas et al. 2015; Khan et al. 2021), given that the entrepreneur's grit seems to hinder experimentation. We thus answer research calls for more empirical work on grit's potential downsides (Duckworth et al. 2021) and simultaneously narrow the research gap regarding more empirical work on individual-level antecedents that may harm effectual decision-making (Shirokova et al. 2023).

Third, we expand the literature on the positive outcomes of grit within the entrepreneurship context, as we find that grit's perseverance of effort and grit's passion attainment positively relate to effectual flexibility. We thus respond to Wu et al. (2020), who call for research linking grit with effectuation. Such insights are crucial for entrepreneurs as effectual decision-making is essential for "pivoting" and determining a venture's product-market fit (*The lean startup*, Ries 2011).

Beyond our theoretical contributions, our study has practical implications for at least three groups of practitioners: entrepreneurs, investors, and educators. First, we argue that high-grit entrepreneurs should be aware of their consistency of interest, especially in early firm stages (Reymen et al. 2015), because it may harm their abilities to experiment. Second, we suggest that investors could use the subdimensions of grit as an investment criterion as we show that grit as a noncognitive skill can predict the entrepreneurs' effectual decision-making, which is closely related to venture performance (Perry et al. 2012). Third, we encourage classroom interventions to promote grit at a subdimensional level (Alan et al. 2019; Christopoulou et al. 2018; Fosnacht et al. 2019), although caution is needed regarding the consistency of interest in grit.

2 | Theory and Hypotheses

2.1 | Entrepreneurs' Grit and Its Outcomes

In its original definition, grit represents "passion and perseverance for long-term goals" (Duckworth et al. 2007, 1087) and comprises self-control over a prolonged period (Duckworth and Gross 2014). Passion reflects the ability to maintain focus on long-term goals (Duckworth and Quinn 2009). Perseverance describes the ability to overcome difficulties, failure, and hardship while preserving motivation (Duckworth et al. 2007). Recently, however, Jachimowicz et al. (2018) have criticized the two-factor structure, claiming that the original scale by Duckworth et al. (2007) fails to reflect passion. Thus, Jachimowicz et al. (2018) have reframed the initial passion items as "consistency of interest" and included "passion attainment" as a third reflective sub-dimension. Other scholars agree, adding that the original scale captures attentional control (Jordan et al. 2019) rather than passion. As a result, this study uses the extended scale of grit by Jachimowicz et al. (2018), which includes three subdimensions: "perseverance of effort," "consistency of interest," and "passion attainment." First, perseverance of effort is defined as consistently working toward set goals and always maintaining the effort (Duckworth et al. 2007). Second, consistency of interest refers to a direction or a goal that is important to one and that one does not want to change (Jachimowicz et al. 2018). Third, passion attainment is defined as "whether people experience desired levels of passion" (Jachimowicz et al. 2018, 9980).

Grit is conceptualized as a malleable rather than an enduring personality trait (Duckworth et al. 2007). Further, it is treated as a noncognitive skill (Credé et al. 2017). Cognitive skills are characterized by general mental abilities and become less malleable over time. In contrast, noncognitive skills are characterized by patterns of thoughts, feelings, and behaviors (Jordan et al. 2019). They evolve from interactions with the environment and are hence receptive to interventions and incentivization control (Jordan et al. 2019).

The construct of grit has already found wide application in a diverse field of studies. Duckworth et al. (2007) show that grit is a strong predictor of academic success (grade point average and level of education completed) and military tenacity (retention of first-year cadets at the military academy). Within the work environment, research has linked grit to retention probability (Eskreis-Winkler et al. 2014), job satisfaction (Ion et al. 2017), work engagement (Southwick et al. 2019), and work goal achievement (Khan et al. 2021). It is worth noting that the beneficial impacts of grit on life outcomes go beyond those that can be accounted for by an individual's intelligence quotient (IQ) or the domains of the Big Five factor model of personality traits (Duckworth and Quinn 2009; Mooradian et al. 2016). Regarding entrepreneurship, grit has the highest predictive power of retention in high-adversity environments (Arco-Tirado et al. 2019) and has, therefore, been positively associated with venture performance (Khan et al. 2021; Mueller et al. 2017).

However, several studies have raised concerns regarding the inconsistent results in predicting performance (Credé 2018; Credé et al. 2017). These research findings indicate that psychological assets that are typically considered positive might transform into burdens in certain situations (Von Culin et al. 2014). For instance, prior studies revealed that grit can also lead to additional effort on nonproductive goals, which constitutes inappropriate persistence or stubbornness (Howard et al. 2019; Lucas et al. 2015; Khan et al. 2021). In the same vein, entrepreneurs with higher grit can emerge as costly for organizational performance because their over-commitment to a course of action can become stubborn to the point of investing in less-than-optimal or even negative directions (Hietala et al. 2002; Lindberg and Wincent 2011).

Therefore, the context of new ventures seems to be of great interest. On the one hand, shifting gears, adapting to a market demand, and experimenting by testing hypotheses about the market, are very important for venture performance (Perry et al. 2012). Especially in the seed phase, that is having a product but no significant traction yet, "pivoting" is required to achieve a good "product-market-fit" (Ries 2011). Thus, the potential "stubbornness" of grit seems to hinder the necessary experimentation and flexibility. On the other hand, previous research suggests that grit is very important in contexts with a high degree of adversity, such as new ventures (Arco-Tirado et al. 2019). Entrepreneurs need to demonstrate grit to pursue their goals and overcome emerging obstacles (Mueller et al. 2017). Possessing grit means putting forth a lot of effort and maintaining motivation over a

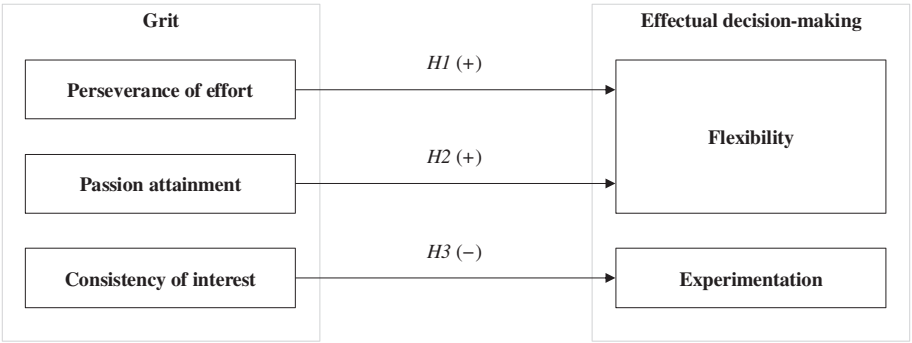

FIGURE 1 | Research model.

lengthy period to achieve long-term goals (Eskreis-Winkler et al. 2014).

This study tries to disentangle the theoretical mechanisms of grit by following the self-regulation theory.

2.2 | The Theoretical Mechanisms of Grit

According to the cognitive theory of self-regulation, individuals are responsible for directing their motivation, thoughts, and behaviors when pursuing joy, comfort, and success (Bandura 1991). The theory defines self-regulation as an individual's ability to "convert future events into current motivators and regulators of behavior" (Bandura 1991, 248). Scholars have extended the theoretical approach in several directions, for example, feedback control processes (Carver and Scheier 2001), self-regulated learning (Zimmerman and Moylan 2009), and delayed gratification (Mischel 2014). Much of entrepreneurs' success in achieving their desired goals is determined by their ability to regulate their cognition, emotions, and behaviors (Siegert et al. 2004). Self-regulation theory can thus help clarify the mutual interactions of entrepreneurs' cognitive, emotional, and motivational processes during their entrepreneurial journey. Moreover, observing self-regulation mechanisms can help understand how entrepreneurs act to pursue opportunities (O'Shea et al. 2017) and uphold long-term goals (Werner and Milyavskaya 2019), as it often takes several months or years to realize the potential of their ventures. Self-regulation theory is also applicable to grit, a construct related to self-control (Duckworth and Gross 2014). Further, Duckworth and Gross (2014) indicate that entrepreneurs with high-grit exhibit high levels of self-control to maintain effort and make the right decisions to achieve long-term goals. Even though Bandura (1991, 248) refers to the "causal agent" when introducing self-regulated behavior, we argue that self-regulation theory can also help explain the potentially negative effects on effectual decision-making. A high-grit entrepreneur may be too committed to and convinced of a certain strategy to experiment and test different avenues of actions. However, as opportunities arise and become manifest, high-grit entrepreneurs may reevaluate given the self-regulated feedback process and show flexibility.

Figure 1 Depicts the research model of this study.

2.3 | The Relationship Between Perseverance of Effort and Effectual Flexibility

For a long time, entrepreneurship scholars predominantly believed that individuals engaged in entrepreneurial activities follow rational, goal-oriented methods (Bird and Waters 1989). Consequently, most business schools focused on teaching an entrepreneurial decision-making process that is intentional and goal-oriented, a concept Sarasvathy (2001) termed the "causation model." However, Sarasvathy (2001) challenged this view, proposing that entrepreneurs are better served by "effectuation" to master the dynamic environment of entrepreneurship. Overall, this perspective induced a significant shift in how entrepreneurship is understood. Interestingly, practicing entrepreneurs use effectuation and causation in tandem (Sarasvathy 2001, 2003), although the effectual approach has primarily been linked to venture performance (Perry et al. 2012). According to the definition by Sarasvathy and Dew (2008), an effectual process starts with an individual's available resources and competencies and focuses on optimizing performance using these resources with the leverage of experimentation and flexibility. More specifically, Sarasvathy (2001) defines effectual experimentation as testing different approaches in the marketplace before settling on a business concept. Moreover, effectual flexibility constitutes the ability to move to other possibilities and abandon previous plans (Sarasvathy 2001).

We hypothesize that grit's perseverance of effort is positively related to effectual flexibility for two reasons. First, entrepreneurs with high perseverance of effort are keen to *learn continuously*. Perseverance of effort is defined as working vigorously toward predefined objectives and maintaining the effort despite failure, adversity, and plateaus in the progress (Duckworth et al. 2007). Over time, many entrepreneurs rely on known strategies, increasingly ignoring new strategies that challenge their cemented assumptions (Nadkarni and Narayanan 2007). However, Suzuki et al. (2015) find that perseverant and passionate individuals are more open to experiences and, hence, more curious to attain new information. Following self-regulation theory, perseverant and passionate entrepreneurs prevent the process of intellectual deadening with the associated self-regulation capabilities that encourage them to keep attaining new information. They use self-regulated learning to avert becoming biased by their own experiences. Self-regulated learning involves goal-directed

activities, such as processing information, practicing, and relating new learning to prior knowledge (Panadero 2017). Hence, we argue, while learning continuously, perseverant entrepreneurs remain more flexible.

Second, entrepreneurs with high perseverance of effort tend to have a *resilient mindset* which is characterized by their continued commitment to their goals despite adverse circumstances (Duckworth et al. 2007). This resilient mindset enables them to withstand uncertainty and repeated setbacks—both common characteristics in the adverse context of entrepreneurship (Arco-Tirado et al. 2019). The constant effort of these entrepreneurs to overcome obstacles and develop adaptive strategies in response to changing circumstances in the entrepreneurial landscape (Stieglitz et al. 2016) promotes mental flexibility. Rather than rigidly sticking to a single plan, these entrepreneurs actively seek alternative paths when they encounter obstacles. For example, they are more likely to revise their strategies in response to real-time feedback and new information (Suzuki et al. 2015), indicating a capacity for flexible effectual decision-making. In this way, perseverance of effort supports not only action, but also the kind of dynamic, iterative thinking that underpins effectual flexibility. We hypothesize:

H1. *Entrepreneurs' perseverance of effort is positively related to flexibility.*

2.4 | The Relationship Between Passion Attainment and Flexibility

Following (Jachimowicz et al. 2018, 9980), we define passion attainment as "whether people experience desired levels of passion." Passion attainment is distinct from harmonious passion, where pleasure derives from an activity, not because of pressure (Stroe et al. 2018; Vallerand et al. 2003). Jachimowicz et al. (2018) argue that individuals typically use their personal passion attainment scale to assess whether the passion experienced has fulfilled their expectations. The attainment or shortage of passion is more important than the absolute levels of harmonious passion. We hypothesize that entrepreneurs' passion attainment is positively related to effectual flexibility for two reasons.

First, entrepreneurs with high passion attainment are *closer to new information*. Obtaining information from other individuals requires entrepreneurs to imagine what others know, value what others know, gain timely access to these individuals' thinking, and believe the activities involved will not be cost-prohibitive (Borgatti and Cross 2003). Attaining passion entails strong engagement and not being discouraged by adversities arising on the way (Duckworth et al. 2007). Being passionate about an activity also more closely connects an entrepreneur to the most relevant information sources, for example, to other entrepreneurs. Such a close connection makes it very likely that entrepreneurs know what information their contacts can provide, evaluate the worth of this information, and can access it. Accordingly, Suzuki et al. (2015) found grit to be positively related to information absorption capabilities. In line with this argumentation, passionate entrepreneurs are more aware of opportunities that arise and can also fully evaluate the potential outcomes. Consequently, they can take action and flexibly steer their venture through a dynamic market. Hence, entrepreneurs with high passion attainment favor flexibility.

Second, entrepreneurs with high passion attainment tend to be *growth-oriented*. Gritty entrepreneurs are more likely to view setbacks as opportunities for growth rather than insurmountable obstacles (Myers et al. 2016). Jachimowicz et al. (2018) refer to attaining harmonious passion. Harmoniously passionate entrepreneurs understand that rigid adherence to a predefined plan may not be the most effective approach as there is significant risk in the market environment (Stroe et al. 2018). Thus, they tend toward an adaptive, less predetermined decision-making process and consider opportunities as they arise. We therefore hypothesize:

H2. *Entrepreneurs' passion attainment is positively related to flexibility.*

2.5 | The Relationship Between Consistency of Interest and Experimentation

Experimentation represents "a series of trial and error changes pursued along various dimensions of strategy, over a relatively short period of time, in an effort to identify and establish a viable basis for competing" (Nicholls-Nixon et al. 2000, 496). In the context of new ventures, experimentation can be referred to as "pivoting," a structured course correction designed to test a new fundamental hypothesis about the product, strategy, and engine for growth (Ries 2011). As a result, we argue that experimentation in entrepreneurship always has an exploratory rather than a confirmatory nature due to its high correlation with uncertainty (Chandler et al. 2011). In contrast, consistency of interest refers to a direction or a goal that you care about and you do not want to change (Jachimowicz et al. 2018). Therefore, we hypothesize that grit's consistency of interest is negatively related to experimentation for two reasons.

First, entrepreneurs with high consistency of interest are *reluctant to explore novel options* because they perceive experimentation as a deviation from their fixed interests, that is their belief in how to proceed as a venture. Consistency of interest is defined as continual persistence in the face of difficulty (Duckworth et al. 2007). Entrepreneurs high in consistency of interest are more inclined to adhere to familiar and established approaches, as these align with their enduring interests. Experimentation, in contrast, involves a willingness to step into uncharted territory and explore new possibilities (Chandler et al. 2011). Thus, the stable and consistent nature of entrepreneurs' interests may act as a barrier to engaging in the uncertain and unpredictable sphere of experimentation. As a result, entrepreneurs who are high in consistency of interest are less inclined to experiment because they are reluctant to explore novel options.

Second, entrepreneurs of new ventures with high consistency of interest exercise a *high effort of self-control*, preventing them from experimenting. According to self-regulation theory, entrepreneurs increase their efforts to control what they think, say, and do, trying to be the person they want to be both in a particular situation and in the longer term (Bandura 1991).

Thus, consistency of interest itself can be seen as a high effort of self-control. This high effort of self-control can create a cognitive barrier against deviating from established paths, hindering entrepreneurs' willingness to embrace uncertainty and try unconventional methods that represent the core of experimentation (Chandler et al. 2011). Hence, entrepreneurs with high consistency of interest are less inclined to use experimentation as part of effectuation. We therefore hypothesize:

H3. *Entrepreneurs' consistency of interest is negatively related to experimentation.*

3 | Method

3.1 | Sample and Procedure

In conducting our study, we used a self-reported online survey. We focused on the top management teams of ventures because founders and executives both shape crucial entrepreneurial outcomes (Hensellek et al. 2023). We define ventures as firms that are 10 years and younger (Steigertahl et al. 2018). To ensure the high validity and reliability of our questionnaire, we ran comprehensive tests using a pre-study ($N = 15$) with researchers and practitioners. The data collection took place between October and December 2023. Using the PitchBook database, we identified a total of 17,149 potential participants to whom we sent the survey. We received 1267 responses, accounting for an overall response rate of 7.39%. After eliminating incomplete survey responses, 619 submitted and complete responses remained. Among these, we identified and removed 37 responses with missing items for our main constructs. Moreover, we excluded 16 responses because the firm age exceeded 10 years; we dropped another 77 responses because the respondents were not among the firms' top management teams. We furthermore eliminated 18 responses originated in firms that did not have their headquarters within the DACH region; 2 respondents had spent less than 20 s on a survey page; another 18 respondents had answered the survey in less than 15 min, indicating careless or unengaged survey participation (Ward and Meade 2023). We also checked for unusual low standard deviation (below 0.5) of variables with Likert scales (1–7) but the minimum standard deviation was 1.1. Our final sample includes 451 top management team members from 426 ventures. Hence, our sample includes 13 respondent pairs from the same venture. Table 1 provides a comprehensive overview of the sample selection procedure.

From a demographic perspective, 84% of the respondents were male, which we expected given the underrepresentation of female founders in entrepreneurship (Rocha and Van Praag 2020). The mean age of respondents was 44 years (SD = 10.32, Min = 25, Max = 66). The average survey respondent had 6 years of entrepreneurial experience (SD = 8.31). From a venture perspective, 65% of the ventures were headquartered in Germany, 11% in Austria, and 23% in Switzerland. The firm stages ranged from seed (10%), startup (35%), early expansion (27%), expansion (24%) to consolidate mature firm (4%). Table 2 shows the main sample characteristics.

TABLE 1 | Overview of sample selection procedure.

Sample selection procedure	Number of entrepreneurs	Relative to previous step
Initial sample of entrepreneurs in DACH region from PitchBook since 2010 and survey distribution	21,335	
(–) Bounced distribution; opt-outs	(–) 4186	
Remaining	17,149	80.38%
(–) Entrepreneurs not accessing the online survey	(–) 15,882	
Remaining entrepreneurs accessed survey	1267	7.39%
(–) Eliminated nonfinalized responses	(–) 648	
Remaining finalized responses	619	48.86%
(–) Eliminated due to (1) missing items in main constructs, (2) venture age > 10 years, (3) no member of TMT, (4) not headquartered in DACH, (5) careless survey responses, and (6) low variance within Likert scale answers	(–) 168	
Final sample for analysis	451	72.86%

3.2 | Measures

Following the recommendations by Podsakoff et al. (2003), we assured respondents of anonymity and used only well-established and validated constructs in our survey. Our latent measurements were based on 7-point Likert scales ranging from "1 = strongly disagree" to "7 = strongly agree."

3.2.1 | Independent Variable

We use the grit scale developed by Jachimowicz et al. (2018) that comprises a total of 12 items (Cronbach's $\alpha = 0.81$). This second-order scale has three subdimensions (perseverance of effort, consistency of interest, and passion attainment). Perseverance of effort ($\alpha = 0.73$) includes 4 reversed items, for example, "I often

TABLE 2 | Sample characteristics.

Individual age	
< 30	5%
31–40	35%
41–50	28%
51–60	26%
> 60	6%
Gender	
Female	16%
Male	84%
Highest level of education	
High school (Abitur)	5%
Vocational training after high school	3%
Bachelor's degree	14%
Master's degree	56%
PhD or equivalent	22%
Entrepreneurial experience	
0	36%
1–5 years	29%
6–10 years	16%
11–15 years	6%
15 years	13%
Headquarter location	
Germany	65%
Austria	11%
Switzerland	23%
Firm stage	
Seed	10%
Startup	35%
Early expansion	27%
Expansion	24%
Consolidate mature firm	4%

Note: $N = 451$; entrepreneurial experience refers to experience prior to the current venture.

set a goal but later choose to pursue a different one." Consistency of interest ($\alpha = 0.72$) includes 4 items, such as "I finish whatever I begin." Passion attainment ($\alpha = 0.91$) includes 4 reversed items, for example, "I am less passionate for my work than I should be."

3.2.2 | Dependent Variables

We use two subdimensions of the effectual decision-making scale developed by Chandler et al. (2011) as the dependent variable, which yields a Cronbach's alpha of 0.70. Our scale includes two dimensions: experimentation and flexibility. Experimentation ($\alpha = 0.77$) uses 4 items, for example, "We experimented with different products and/or business models." Flexibility ($\alpha = 0.56$) consists of 4 items, for example, "We allowed the business to evolve as opportunities emerged." It is important to note that we exclude the affordable loss subdimension of the original scale by Chandler et al. (2011) as we find they provide no significant or relevant insights.

3.2.3 | Controls

We use individual and company controls which previous researchers have connected, that is found a relationship, with grit or effectual decision-making. Thus, we control for demographic factors such as gender & age (Khan et al. 2021), and education & prior experience (Eskreis-Winkler et al. 2014; Sarasvathy and Dew 2008). Moreover, we control for strategic risk-taking (Wolfe and Patel 2016) and entrepreneurial self-efficacy because both risk perception and self-efficacy affect effectual decision-making (Stroe et al. 2018). On the company level, we control for the firm stage, as previous studies suggest that early-stage ventures are more prone to take risks in their decision-making than ventures in later stages (Cochrane 2005).

Tables 3 and 4 present a comprehensive overview of the construct items.

3.3 | Bias Testing

3.3.1 | Confirmatory Factor Analysis

We use Stata 18 to conduct a confirmatory factor analysis (CFA) of a 5-factor CFA model including the applied latent constructs (1) perseverance of effort, (2) consistency of interest, (3) passion attainment, (4) experimentation, and (5) flexibility. We apply the maximum-likelihood technique (Anderson and Gerbing 1988) to assess factor loadings. Following Hair Jr et al. (2019), we disregard all items with factor loadings below |0.5|, resulting in disregarding one item in perseverance of effort and one item in flexibility (see Tables 3 and 4). Our resulting 5-factor CFA model shows acceptable data fit ($\chi^2 = 451$, df = 129, $\chi^2/\text{df} = 3.49$, CFI = 0.90, TLI = 0.88, RMSEA = 0.07, SRMR = 0.11), according to Kline (2023).

3.3.2 | Validity and Reliability

We calculate Cronbach's alphas (α) for all reflective constructs; except for flexibility ($\alpha = 0.56$), all constructs are above the standard threshold of 0.7 (Black and Babin 2019). We also compute composite reliability (CR) and average variance extracted (AVE) for all first-order latent constructs. All applied latent constructs yield a CR higher than 0.7 and an AVE higher than 0.5 (Bagozzi and Yi 1988). We keep flexibility with the slightly low Cronbach's alpha because of its overall good reliability (CR = 0.78, AVE = 0.62). As the square root of the AVE for each variable exceeds its maximum correlation with any other variable (Fornell and Larcker 1981), we can confirm the overall

TABLE 3 | Scale items: grit.

Perseverance of effort
I often set a goal but later choose to pursue a different one. R
I have been obsessed with a certain idea or project for a short time but later lost interest. R*
New ideas and new projects sometimes distract me from previous ones. R
I have difficulty maintaining my focus on projects that take more than a few months to complete. R
Consistency of interest
I finish whatever I begin.
Setbacks don't discourage me.
I am a hard worker.
I am diligent.
Passion attainment
I am less passionate for my work as I should be. R
I often feel as if I have to be more passionate for my work. R
I frequently feel obliged to be more passionate for my work than I currently am. R
I feel that I am not passionate enough for the work I am doing. R

Note: R = reversed item; source of construct and items: Jachimowicz et al. 2018; * = dropped due to low factor loading < 0.5 (Hair Jr et al. 2019).

TABLE 4 | Scale items: effectual decision-making.

Experimentation
We experimented with different products and/or business models.
The product/service that we now provide is essentially the same as originally conceptualized. R
The product/service that we now provide is substantially different than we first imagined.
We tried a number of different approaches until we found a business model that worked.
Flexibility
We allowed the business to evolve as opportunities emerged
We adapted what we were doing to the resources we had.*
We were flexible and took advantage of opportunities as they arose.
We avoided courses of action that restricted our flexibility and adaptability.

Note: R = reversed item; source of construct and items: Chandler et al. (2011); * = dropped due to low factor loading < 0.5 (Hair Jr et al. 2019).

convergent and discriminant validity of our model. Table 5 includes a comprehensive overview.

3.3.3 | Common Method Bias

We use two approaches to prevent common method bias in our sample. Common method bias refers to patterns in respondents' answers that are caused by the survey design rather than differences in content (Podsakoff et al. 2012). First, we ensure confidentiality and anonymity, and offer a secure environment, indicating to respondents that there are no right or wrong answers. Second, we consistently separate the measures of our model in our survey design to prevent respondents from drawing conclusions about the underlying hypotheses or the relationships between independent and dependent variables (Podsakoff et al. 2012).

Furthermore, we perform two statistical tests to rule out the possibility of common method bias. First, following Miller and Simmering (2023) and Simmering et al. (2015), we include in our survey the marker variable "attitude toward the color blue." In line with Lindell and Whitney (2001), we then conduct a common latent factor test, finding no structural differences due to the included marker variable (Podsakoff et al. 2003). We also include the marker variable in our structural equation models, resulting neither in an improvement in the R^2 statistics nor in any significant connections between the marker variable and our latent variables. Second, we conduct the Harman's single factor test (Harman 1967), performing an unrotated principal component

TABLE 5 | Convergent and discriminant validity of reflective constructs.

	Cronbach's alpha	Composite reliability	Average variance extracted
Perseverance of effort	0.73	0.83	0.63
Consistency of interest	0.72	0.81	0.60
Passion attainment	0.91	0.94	0.80
Experimentation	0.77	0.87	0.73
Flexibility	0.56	0.78	0.62

Note: Perseverance of effort & flexibility both without item 2; thresholds for validity: alpha > 0.7, CR > 0.7, AVE > 0.5.

factor analysis with a single factor for all variables included in the model. This factor explains less than 50% of the overall variance. Accordingly, we conclude that common method bias is not likely to affect our study (Podsakoff et al. 2003).

3.3.4 | Nonresponse Bias

Following Berg (2005), we segment our sample into three equal groups of early, medium, and late respondents to investigate a potential nonresponse bias. Our tests reveal no structural differences among the characteristics (gender, experience, self-efficacy, risk-taking, and firm stage) across the three groups. We only identify a nonresponse bias within the control variables regarding respondents' age ($p < 0.01$); the respondents who answered earlier were 3 years younger on average ($M_1 = 42$; $M_3 = 45$). This finding aligns with Herzing and Blom (2019), who show that older respondents with lower digital affinity are hesitant to participate in online surveys. Hence, we conclude that nonresponse bias does not threaten our sample, based on the assumption that nonresponders are similar to late responders (Berg 2005).

3.3.5 | Single-Informant Bias

To control for a potential single-informant bias resulting from a subjective assessment of top management members as our source of information, we follow a dyadic research approach. Our sample includes 13 respondent pairs from the same venture. We calculate intraclass correlation coefficients (ICC) for effectual decision-making, including a team perspective, for example: "We analyzed long run opportunities and selected what we thought would provide the best returns" (Chandler et al. 2011). The ICC for effectual decision-making is 0.42, indicating a fair level of agreement among the responses (Cicchetti 1994). However, it is worth noting that the true agreement between the top management team members might be understated, as our findings could reflect contextual variability in how individuals perceive the implemented planning and goal-oriented processes (Chandler et al. 2011; Nishii and Wright 2007; Wright and Boswell 2002). Overall, we argue that a single-informant bias unlikely affects our statistical results.

3.3.6 | Multicollinearity

We compute variance inflation factors (VIF) for each structural relationship in our measurement model to control for multicollinearity. The maximum single variance inflation factor (Max VIF = 1.69) is below the threshold of 5.0, and the correlations of all major constructs remain below 0.3 (e.g., Kalnins 2018; Hair Jr et al. 2019). Only perseverance of effort and passion attainment show a slightly high correlation of 0.33. However, given the small deviation, multicollinearity presents a very limited risk of bias in our study.

4 | Results

4.1 | Descriptive Statistics

We provide an overview of our descriptive statistics and pairwise correlations in Table 6.

4.2 | Structural Equation Modeling

We use Stata 18 for the structural equation modeling to test our hypotheses. H1 states that entrepreneurs' perseverance of effort is positively related to flexibility. H2 states that entrepreneurs' passion attainment is also positively related to flexibility. We find evidence supporting both hypotheses ($\beta = 0.12$, $p < 0.05$, and $\beta = 0.18$, $p < 0.01$, respectively). H3 states that entrepreneurs' consistency of interest is negatively related to experimentation, for which we also find evidence ($\beta = -0.18$, $p < 0.01$).

Furthermore, we find that the control variable firm stage is negatively related to experimentation ($\beta = -0.19$, $p < 0.01$) and positively related to flexibility ($\beta = 0.12$, $p < 0.05$). This finding is consistent with previous results by Reymen et al. (2015), who reveal evidence that young ventures need more experimentation as they face more uncertainty trying to find the right product-market fit. Moreover, older ventures increasingly face opportunities that arise on the way; thus, they need more flexibility and less experimentation. Table 7 shows the results of the structural equation modeling.

4.3 | Robustness Tests

To test the robustness of our results, we calculate our model using hierarchical linear regression analysis. We thus confirm all our hypotheses (H1, H2, and H3). Moreover, we see significant improvements regarding R^2 and F-statistics from our baseline models to all other models. Tables 8 and 9 show the comprehensive results of the hierarchical linear regression analyses. Table 10 summarizes our hypotheses and results.

To further assess the robustness of our research and to test our main results, we calculate several other models by excluding the control variables (age, gender, entrepreneurial experience, entrepreneurial self-efficacy, strategic risk-taking, and firm stage), adding social desirability (Kemper et al. 2012), and adding psychological resilience (Chadwick and Raver 2020) as a similar but distinct construct. The findings support our main

TABLE 6 | Correlation and descriptive matrix.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Perseverance	1.00										
(2) Consistency	0.27*	1.00									
(3) Passion	0.33*	0.25*	1.00								
(4) Experiment		−0.15*		1.00							
(5) Flexibility	0.16*		0.21*		1.00						
(6) Age		0.21*	0.27*	−0.10*		1.00					
(7) Gender[a]			0.12*			0.21*	1.00				
(8) Experience		0.17*	0.21*			0.57*	0.18*	1.00			
(9) ESE			0.11*				0.08	0.10*	1.00		
(10) Risk-taking	0.08		0.09*						0.08	1.00	
(11) Firm stage[b]		−0.10*		−0.18*	0.11*	0.25*	0.24*	0.16*			1.00
Descriptive statistics											
Mean	5.52	4.63	5.6	5.33	4.18	5.68	44.35	1.84	6.11	5.02	1.74
SD	1.02	1.23	1.4	1.03	1.55	0.88	10.32	0.37	8.31	1.54	0.78

Note: $N = 451$.
Abbreviations: age, individual age; consistency, consistency of interest; ESE, entrepreneurial self-efficacy; experience, entrepreneurial experience prior the current venture; experiment, experimentation; passion, passion attainment; Perseverance, perseverance of effort; risk-taking, strategic risk-taking.
[a]1 = female; 2 = male.
[b]1 = seed; 2 = startup; 3 = early expansion; 4 = expansion; 5 = mature consolidate firm.
*$p < 0.05$; coefficients only visible if $p < 0.1$.

TABLE 7 | Results of structural equation modeling.

	Flexibility	Experimentation
Individual-level controls		
Age	0.00	−0.06
Gender[a]	−0.09	−0.01
Experience	0.04	0.08
Entrepreneurial self-efficacy	−0.02	−0.01
Strategic risk-taking	−0.02	0.05
Firm-level controls		
Firm stage[b]	0.12*	−0.19**
Direct effects		
Perseverance of effort	0.12*	0.05
Consistency of interest	−0.03	−0.18**
Passion attainment	0.18**	−0.01

Note: $N = 451$.
Abbreviations: Age, individual age; experience, entrepreneurial experience prior the current venture.
[a]1 = female; 2 = male.
[b]1 = seed; 2 = startup; 3 = early expansion; 4 = expansion; 5 = mature consolidate firm.
*$p < 0.05$.
**$p < 0.01$.

TABLE 8 | Results of hierarchical regression analysis (Flexibility).

	Controls only	Main effects	Full model
Individual-level controls			
Age	0.03		0.00
Gender[a]	−0.08		−0.09
Experience	0.05		0.04
Entrepreneurial self-efficacy	0.00		−0.02
Strategic risk-taking	0.00		−0.02
Firm-level controls			
Firm stage[b]	0.12*		0.12*
Direct effects			
Perseverance of effort		0.11*	0.11*
Consistency of interest		−0.03	−0.03
Passion attainment		0.18**	0.18**
R-squared	0.02	0.05	0.07

Note: $N = 451$.
Abbreviations: Age, individual age; experience, entrepreneurial experience prior the current venture.
[a]1 = female; 2 = male.
[b]1 = seed; 2 = startup; 3 = early expansion; 4 = expansion; 5 = mature consolidate firm.
*$p < 0.05$.
**$p < 0.01$.

TABLE 9 | Results of hierarchical regression analysis (experimentation).

	Controls only	Main effects	Full model
Individual-level controls			
Age	−0.11		−0.06
Gender[a]	0.01		0.00
Experience	0.07		0.08
Entrepreneurial self-efficacy	−0.03		−0.01
Strategic risk-taking	0.05		0.05
Firm-level controls			
Firm stage[b]	−0.17**		−0.19**
Direct effects			
Perseverance of effort		0.05	0.05
Consistency of interest		−0.16**	−0.18**
Passion attainment		−0.03	−0.01
R-squared	0.04	0.03	0.07

Note: $N = 451$.
Abbreviations: Age, individual age; experience, entrepreneurial experience prior the current venture.
[a]1 = female; 2 = male.
[b]1 = seed; 2 = startup; 3 = early expansion; 4 = expansion; 5 = mature consolidate firm.
**$p < 0.01$.

TABLE 10 | Overview of hypotheses and empirical support.

Hypothesis	Relationship	Direction	Supported?
H1	Perseverance of effort → Flexibility	+	Y
H2	Passion attainment → Flexibility	+	Y
H3	Consistency of interest → Experimentation	–	Y

results. Accordingly, we follow the argumentation of Southwick et al. (2019), who differentiate grit from resilience with the requirement of passion and the emphasis on a long-term effort.

We also control for overidentification and the endogeneity of our independent variables (perseverance of effort, consistency of interest, and passion attainment) using the instrumental variables self-evaluation (Judge et al. 2003), mindfulness (Brown and Ryan 2003), and extrinsic motivation (DeTienne et al. 2008). All three constructs are significantly related to the independent variables (relevance condition) but not related to the dependent variables—thus, all three constructs are not related to the error term of the model (exclusion restriction). All three instruments are jointly significant predictors of grit, as indicated by the *F*-statistics for the excluded instruments ($p < 0.01$). Additionally, we find no evidence of overidentification (Hansen 1982; Sargan 1983) since the instruments used in the model do not show signs of significant correlation with the error term. Finally, the corresponding endogeneity test is not significant ($p > 0.05$). Hence, we conclude a low likelihood of endogeneity.

5 | Discussion

5.1 | Theoretical Implications

Our study makes three contributions. First, we extend the literature on noncognitive skills in the context of new ventures. Following the psychology literature (Credé et al. 2017; Paunonen et al. 2003), cognitive skills are characterized by general mental abilities and are less malleable over time, for example logical thinking or motivation. In contrast, noncognitive skills are characterized by patterns of thoughts, feelings, and behaviors, that develop from interactions with the environment and are therefore susceptible to intervention (Jordan et al. 2019). Although motivation can be cognitively activated (Gollwitzer and Bargh 1996), we argue that grit reflects the ability to sustain this motivational activation over time and to resist competing goals (Shah et al. 2002). We argue that grit is not a cognitive representation of motivation, but rather a noncognitive skill of motivational persistence (Credé et al. 2017)—especially over long periods of time and in challenging environments such as entrepreneurship (Arco-Tirado et al. 2019). This is consistent

with Paunonen et al. (2003), who argue that narrow noncognitive traits such as grit can predict specific goal-directed behaviors more accurately than broad traits, especially in specific settings such as entrepreneurship. Grit shares the variance of the Big Five personality traits but also has a unique variance in predicting employee retention, entrepreneurial success, or societal impact (Duckworth et al. 2007; Kaes et al. 2025; Wolfe and Patel 2016). Accordingly, we find that grit has both positive and negative effects on entrepreneurs' effectual decision-making and thus argue for a multidimensional approach to analyzing these relationships. Our findings show that grit's perseverance of effort and grit's passion attainment positively relate to flexibility (H1, H2). However, we find that grit's consistency of interest negatively relates to experimentation (H3). A high-grit entrepreneur thus can change plans, show flexibility, and grasp opportunities as they arise. In contrast, a high-grit entrepreneur might also fail to engage actively in experimenting and opportunity-seeking. Experimenting is critical as young ventures need to experiment to establish the right product-market fit and succeed in their dynamic entrepreneurial environment (Reymen et al. 2015; Ries 2011; Stieglitz et al. 2016).

Second, we advance the literature on and the understanding of the "dark sides" of grit within the new venture context, answering respective research calls by Duckworth et al. (2021) and Southwick et al. (2019). We specifically support the notion of a potential "stubbornness" of high-grit entrepreneurs (Lucas et al. 2015; Khan et al. 2021) as we find a negative association between grit's consistency of interest and entrepreneurs' experimentation. More precisely, we expand the previous notion of a potential goal-setting lock-in effect of grit (Lucas et al. 2015). In their study, Lucas et al. (2015) found that participants with high-grit were less willing to give up when they failed, even if their persistent behavior incurred costs. Our study reveals a similar result: The entrepreneurs in our sample who are consistent in their interests, pursuing and adhering to their long-term plans, are less likely to experiment, indicating a certain degree of "stubbornness" (Lucas et al. 2015; Khan et al. 2021). In addition, our findings extend the literature on effectuation. Prior scholars tend to primarily explore the positive or "bright" side of innovation and performance (Maccoby 2000; Wales et al. 2013). In the research stream of effectuation that means analyzing, for example, self-efficacy, perspective-taking, or optimism as individual-level antecedents that promote effectuation (Zhang et al. 2019). Our work, in contrast, considers an individual-level antecedent that can harm effectual decision-making, following the call of (Shirokova et al. 2023) and contributing to research on the "dark" side of effectuation.

Third, we extend the literature on the positive outcomes of grit within the new venture context. Prior research has identified positive outcomes of grit, such as increased resilience (Houston et al. 2021), coping with stress and adversity (Arco-Tirado et al. 2019), and retention (Duckworth et al. 2007). Grit is even positioned as one of the best predictors of success within entrepreneurship (Khan et al. 2021; Mueller et al. 2017). Our findings expand this positive view, showing that grit's perseverance of effort and grit's passion attainment are positively related to entrepreneurs' effectual flexibility. We thus respond to Wu et al. (2020), who call for research linking grit with effectuation. However, we argue that there is a fine line within our results. High-grit entrepreneurs can adapt and change plans when opportunities emerge. Yet, they are also "stubborn" (Khan et al. 2021) in the sense that their consistency of interest weakens their willingness to experiment. As a result, high-grit entrepreneurs do not experiment but are willing to adapt as soon as the opportunity arises. This is relevant as this can be an issue—especially for young ventures when experimenting is one of the key components of finding the right product-market fit (Reymen et al. 2015; Ries 2011).

5.2 | Practical Implications

Beyond our academic contributions, our research acts as a reference point for entrepreneurs and investors to assess and be aware of grit's importance on a sub-dimensional level. Entrepreneurs and investors should carefully monitor the subdimension consistency of interest.

First, entrepreneurs of new ventures must be aware of the inconsistent effects of grit's subdimensions on their effectual decision-making abilities. Our empirical findings indicate that high-grit entrepreneurs with increased perseverance of effort and passion attainment are well suited to pursue opportunities as they arise, displaying effectual flexibility. However, the same high-grit entrepreneurs may show increased consistency of interest. Consequently, they lack the willingness to experiment—which might present a risk because experimentation is critical for determining the right product-market fit (Ries 2011), especially in early-stage firms (Reymen et al. 2015). Hence, high-grit entrepreneurs should be aware of the subdimensions of grit and their potential positive and negative effects on effectual decision-making.

Second, investors could use a tool such as measuring noncognitive factors, like grit, to make investment decisions. Assessing grit could help investors arrive at a more precise upfront evaluation of entrepreneurs in young ventures, potentially resulting in more successful investment decisions. Moreover, investors could implement training measures or interventions within their portfolio companies to encourage grit, hoping to increase effectual decision-making abilities. However, we strongly advise investors to scrutinize the subdimensions of grit as these affect entrepreneurs' effectual decision-making abilities differently. Furthermore, fostering grit might harm entrepreneurs' experimentation willingness, a consequence of which investors should also be aware. This aspect is particularly relevant when recruiting a late co-founder for a portfolio startup as a high-grit founder might be more useful in later than earlier firm stages.

Third, classroom interventions to promote entrepreneurial grit in schools should not be implemented carelessly (Alan et al. 2019; Christopoulou et al. 2018; Fosnacht et al. 2019). We find a negative relationship between grit's consistency of interest and experimentation, supporting previous insights on perfectionism (Houston et al. 2021), costly persistence (Lucas et al. 2015), and help-seeking (Credé et al. 2017). Experimentation in entrepreneurship can be referred to as "pivoting," a structured course correction designed to test a new fundamental hypothesis about a product, strategy, or growth engine (Ries 2011). In particular, entrepreneurs of young ventures rely on experimentation to test their hypotheses to achieve a good product-market fit. Therefore,

fostering grit through classroom trainings can be harmful for children who want to become entrepreneurs. As a result, we encourage classroom interventions to promote grit at a sub-dimensional level due to the known positive effects (Duckworth et al. 2007; Kaes et al. 2025; Wolfe and Patel 2016), but caution is needed regarding the consistency of interest in grit.

5.3 | Limitations and Further Research

Despite its theoretical and practical contributions, this study is subject to certain limitations and offers opportunities for future research.

First, this study relies on self-reported measures for all collected data. Hence, our data are potentially subject to biases. As a countermeasure, we implement various pre- and post-study remedies, as discussed in the method section. Yet, future research could benefit by applying other methods, such as secondary data approaches or experimental designs.

Second, our study relies on survey data we received from October to December 2023. It is important to note that a holistic assessment of individuals' perception may fluctuate in response to daily events, business cycles, or individual work experiences (Dalal et al. 2014). Moreover, we cannot preclude the possibility of reversed causality (Hamilton and Nickerson 2003). Effectual decision-making may lead to higher grit and vice versa. Although there is ample evidence that grit is largely stable over time (Duckworth et al. 2007; Duckworth and Quinn 2009), the level of grit may still be subject to fluctuations that we cannot systematically capture in this study. To achieve higher validity and obtain further insights into the underlying mechanisms, future research may consider longitudinal or experimental methods to provide solid evidence of causality.

Third, our selected sample is subject to another potential limitation. We focused our research on the DACH (Germany, Austria, and Switzerland) region, which allows us to examine a relatively homogenous population of entrepreneurs. However, this approach entails limited generalizability, as we cannot transfer our findings to other cultural environments. The effect of grit might vary because entrepreneurship and demands vary among markets (Brinckmann et al. 2019). In some cultural contexts, experimenting might be seen as failure; some industries might need more experimenting than others. Future research could investigate the external validity of our findings in other settings, such as cultural and industry contexts. Next to that, research on the effect of team members that shape the entrepreneurial decision-making process, such as team heterogeneity or team conflict, might produce interesting insights for the relationship between grit and effectual decision-making.

Acknowledgments

Open Access funding enabled and organized by Projekt DEAL.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

Alan, S., T. Boneva, and S. Ertac. 2019. "Ever Failed, Try Again, Succeed Better: Results From a Randomized Educational Intervention on Grit." *Quarterly Journal of Economics* 134, no. 3: 1121–1162.

Anderson, J. C., and D. W. Gerbing. 1988. "Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach." *Psychological Bulletin* 103, no. 3: 411–423.

Arco-Tirado, J. L., A. Bojica, F. Fernández-Martín, and R. H. Hoyle. 2019. "Grit as Predictor of Entrepreneurship and Self-Employment in Spain." *Frontiers in Psychology* 10: 389.

Bagozzi, R. P., and Y. Yi. 1988. "On the Evaluation of Structural Equation Models." *Journal of the Academy of Marketing Science* 16: 74–94.

Bandura, A. 1991. "Social Cognitive Theory of Self-Regulation." *Organizational Behavior and Human Decision Processes* 50, no. 2: 248–287.

Berg, N. 2005. *Non-Response Bias*, 2: 865–873. Encyclopedia of Social Measurement.

Bezos, J. 1997. "Shareholder Letter." Seattle, WA.

Bird, F. B., and J. A. Waters. 1989. "The Moral Muteness of Managers." *California Management Review* 32, no. 1: 73–88.

Black, W., and B. J. Babin. 2019. "Multivariate Data Analysis: Its Approach, Evolution, and Impact." In *The Great Facilitator: Reflections on the Contributions of Joseph F. Hair, Jr. to Marketing and Business Research*, 121–130. Springer.

Borgatti, S. P., and R. Cross. 2003. "A Relational View of Information Seeking and Learning in Social Networks." *Management Science* 49, no. 4: 432–445.

Brinckmann, J., J. Villanueva, D. Grichnik, and L. Singh. 2019. "Sources of Strategic Flexibility in New Ventures: An Analysis of the Role of Resource Leveraging Practices." *Strategic Entrepreneurship Journal* 13, no. 2: 154–178.

Brown, K. W., and R. M. Ryan. 2003. "The Benefits of Being Present: Mindfulness and Its Role in Psychological Well-Being." *Journal of Personality and Social Psychology* 84, no. 4: 822–848.

Brunello, G. 2011. "Non-Cognitive Skills and Personality Traits: Labour Market Relevance and Their Development in Education & Training Systems."

Carver, C. S., and M. F. Scheier. 2001. *On the Self-Regulation of Behavior.* Cambridge University Press.

Chadwick, I. C., and J. L. Raver. 2020. "Psychological Resilience and Its Downstream Effects for Business Survival in Nascent Entrepreneurship." *Entrepreneurship Theory and Practice* 44, no. 2: 233–255.

Chandler, G. N., D. R. DeTienne, A. McKelvie, and T. V. Mumford. 2011. "Causation and Effectuation Processes: A Validation Study." *Journal of Business Venturing* 26, no. 3: 375–390.

Christopoulou, M., A. Lakioti, C. Pezirkianidis, E. Karakasidou, and A. Stalikas. 2018. "The Role of Grit in Education: A Systematic Review." *Psychology* 9, no. 15: 2951–2971.

Cicchetti, D. V. 1994. "Guidelines, Criteria, and Rules of Thumb for Evaluating Normed and Standardized Assessment Instruments in Psychology." *Psychological Assessment* 6, no. 4: 284–290.

Cochrane, J. H. 2005. "The Risk and Return of Venture Capital." *Journal of Financial Economics* 75, no. 1: 3–52.

Credé, M. 2018. "What Shall We Do About Grit? A Critical Review of What We Know and What We Don't Know." *Educational Researcher* 47, no. 9: 606–611.

Credé, M., M. C. Tynan, and P. D. Harms. 2017. "Much Ado About Grit: A Meta-Analytic Synthesis of the Grit Literature." *Journal of Personality and Social Psychology* 113, no. 3: 492–511. https://doi.org/10.1037/pspp0000102.

Dalal, R. S., D. P. Bhave, and J. Fiset. 2014. "Within-Person Variability in Job Performance: A Theoretical Review and Research Agenda." *Journal of Management* 40, no. 5: 1396–1436.

DeTienne, D. R., D. A. Shepherd, and J. O. De Castro. 2008. "The Fallacy of "Only the Strong Survive": The Effects of Extrinsic Motivation on the Persistence Decisions for Under-Performing Firms." *Journal of Business Venturing* 23, no. 5: 528–546.

Duckworth, A., and J. J. Gross. 2014. "Self-Control and Grit: Related but Separable Determinants of Success." *Current Directions in Psychological Science* 23, no. 5: 319–325.

Duckworth, A. L., C. Peterson, M. D. Matthews, and D. R. Kelly. 2007. "Grit: Perseverance and Passion for Long-Term Goals." *Journal of Personality and Social Psychology* 92, no. 6: 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087.

Duckworth, A. L., and P. D. Quinn. 2009. "Development and Validation of the Short Grit Scale (GRIT–S)." *Journal of Personality Assessment* 91, no. 2: 166–174.

Duckworth, A. L., P. D. Quinn, and E. Tsukayama. 2021. "Revisiting the Factor Structure of Grit: A Commentary on Duckworth and Quinn (2009)." *Journal of Personality Assessment* 103, no. 5: 573–575.

Eskreis-Winkler, L., E. P. Shulman, S. A. Beal, and A. L. Duckworth. 2014. "The Grit Effect: Predicting Retention in the Military, the Workplace, School and Marriage." *Frontiers in Psychology* 5: 36.

Evans, J. S. 1991. "Strategic Flexibility for High Technology Manoeuvres: A Conceptual Framework." *Journal of Management Studies* 28, no. 1: 69–89.

Forbes. 2015. "90% of Startups Fail: Here's What You Need to Know About the 10%." https://www.forbes.com/sites/neilpatel/2015/01/16/90-of-startups-will-fail-heres-what-you-need-to-know-about-the-10/?sh=41495e8c6679.

Fornell, C., and D. F. Larcker. 1981. "Evaluating Structural Equation Models With Unobservable Variables and Measurement Error." *Journal of Marketing Research* 18, no. 1: 39–50.

Fosnacht, K., K. Copridge, and S. A. Sarraf. 2019. "How Valid Is Grit in the Postsecondary Context? A Construct and Concurrent Validity Analysis." *Research in Higher Education* 60: 803–822.

Gabay-Mariani, L., B. Bastian, A. Caputo, and N. Pappas. 2024. "Hidden Stories and the Dark Side of Entrepreneurial Commitment." *International Journal of Entrepreneurial Behavior & Research* 30, no. 6: 1553–1575.

Gollwitzer, P. M., and J. A. Bargh. 1996. *The Psychology of Action: Linking Cognition and Motivation to Behavior*. Guilford Press.

Grégoire, D. A., and N. Cherchem. 2020. "A Structured Literature Review and Suggestions for Future Effectuation Research." *Small Business Economics* 54: 621–639.

Hair, J., Jr., M. Page, and N. Brunsveld. 2019. *Essentials of Business Research Methods*. Routledge.

Hamilton, B. H., and J. A. Nickerson. 2003. "Correcting for Endogeneity in Strategic Management Research." *Strategic Organization* 1, no. 1: 51–78.

Hansen, L. P. 1982. "Large Sample Properties of Generalized Method of Moments Estimators." *Econometrica: Journal of the Econometric Society* 50: 1029–1054.

Harman, D. 1967. "A Single Factor Test of Common Method Variance." *Journal of Psychology* 35: 359–378.

Hensellek, S., L. Kleine-Stegemann, and T. Kollmann. 2023. "Entrepreneurial Leadership, Strategic Flexibility, and Venture Performance: Does Founders' Span of Control Matter?" *Journal of Business Research* 157: 113544.

Herzing, J. M. E., and A. G. Blom. 2019. "The Influence of a Person's Digital Affinity on Unit Nonresponse and Attrition in an Online Panel." *Social Science Computer Review* 37, no. 3: 404–424.

Hietala, P., S. N. Kaplan, and D. T. Robinson. 2002. "What Is the Price of Hubris? Using Takeover Battles to Infer Overpayments and Synergies." National Bureau of Economic Research Cambridge, Mass, USA.

Houston, J. M., A. Luchner, A. J. Davidson, J. Gonzalez, N. Steigerwald, and C. Leftwich. 2021. "The Bright and Dark Aspects of Grit in the Pursuit of Success." *Psychological Reports* 124, no. 2: 839–861. https://doi.org/10.1177/0033294120907316.

Howard, J. M., B. C. Nicholson, and S. R. Chesnut. 2019. "Relationships Between Positive Parenting, Overparenting, Grit, and Academic Success." *Journal of College Student Development* 60, no. 2: 189–202.

Humphries, J. E., and F. Kosse. 2017. "On the Interpretation of Non-Cognitive Skills–What Is Being Measured and Why It Matters." *Journal of Economic Behavior & Organization* 136: 174–185.

Ion, A., A. Mindu, and A. Gorbănescu. 2017. "Grit in the Workplace: Hype or Ripe?" *Personality and Individual Differences* 111: 163–168.

Jachimowicz, J. M., A. Wihler, E. R. Bailey, and A. D. Galinsky. 2018. "Why Grit Requires Perseverance and Passion to Positively Predict Performance." *Proceedings of the National Academy of Sciences* 115, no. 40: 9980–9985.

Jordan, S. L., G. R. Ferris, W. A. Hochwarter, and T. A. Wright. 2019. "Toward a Work Motivation Conceptualization of Grit in Organizations." *Group & Organization Management* 44, no. 2: 320–360.

Judge, T. A., A. Erez, J. E. Bono, and C. J. Thoresen. 2003. "The Core Self-Evaluations Scale: Development of a Measure." *Personnel Psychology* 56, no. 2: 303–331.

Kaes, M., S. Kruse, C. Maus, C. Krieweth, and M. Brettel. 2025. "Entrepreneurs Can Create a Better Tomorrow: The Relationship Between Entrepreneurial Grit, Nonfinancial Success, and Societal Impact." *Journal of Small Business Management* 63, no. 2: 653–685.

Kalnins, A. 2018. "Multicollinearity: How Common Factors Cause Type 1 Errors in Multivariate Regression." *Strategic Management Journal* 39, no. 8: 2362–2385. Portico. https://doi.org/10.1002/smj.2783.

Kemper, C. J., C. Beierlein, D. Bensch, A. Kovaleva, and B. Rammstedt. 2012. "Eine Kurzskala Zur Erfassung Des Gamma-Faktors Sozial Erwünschten Antwortverhaltens: Die Kurzskala Soziale Erwünschtheit-Gamma (KSE-G)."

Khan, R., J. Neveu, and G. Murtaza. 2021. "Is Grit Hurting You? The Dark Side of Psychological Resources in Goal Pursuit." *Applied Psychology. An International Review* 70, no. 3: 1323–1344. https://doi.org/10.1111/apps.12279.

Kline, R. B. 2023. *Principles and Practice of Structural Equation Modeling*. Guilford publications.

Lindberg, E., and J. Wincent. 2011. "Goal Commitment and Performance: An Empirical Study Incorporating Role-Stress Literature to Reveal Functional and Dysfunctional Influences." *Journal of Applied Social Psychology* 41, no. 11: 2634–2655.

Lindell, M. K., and D. J. Whitney. 2001. "Accounting for Common Method Variance in Cross-Sectional Research Designs." *Journal of Applied Psychology* 86, no. 1: 114–121.

Lucas, G. M., J. Gratch, L. Cheng, and S. Marsella. 2015. "When the Going Gets Tough: Grit Predicts Costly Perseverance." *Journal of Research in Personality* 59: 15–22.

Maccoby, E. E. 2000. "Parenting and Its Effects on Children: On Reading and Misreading Behavior Genetics." *Annual Review of Psychology* 51, no. 1: 1–27.

Miller, B. K., and M. J. Simmering. 2023. "Attitude Toward the Color Blue: An Ideal Marker Variable." *Organizational Research Methods* 26, no. 3: 409–440.

Mischel, W. 2014. *The Marshmallow Test: Understanding Self-Control and How to Master it*. Random House.

Mooradian, T., K. Matzler, B. Uzelac, and F. Bauer. 2016. "Perspiration and Inspiration: Grit and Innovativeness as Antecedents of Entrepreneurial Success." *Journal of Economic Psychology* 56: 232–243. https://doi.org/10.1016/j.joep.2016.08.001.

Mueller, B. A., M. T. Wolfe, and I. Syed. 2017. "Passion and Grit: An Exploration of the Pathways Leading to Venture Success." *Journal of Business Venturing* 32, no. 3: 260–279. https://doi.org/10.1016/j.jbusvent.2017.02.001.

Myers, C. A., C. Wang, J. M. Black, N. Bugescu, and F. Hoeft. 2016. "The Matter of Motivation: Striatal Resting-State Connectivity Is Dissociable Between Grit and Growth Mindset." *Social Cognitive and Affective Neuroscience* 11, no. 10: 1521–1527.

Nadkarni, S., and V. K. Narayanan. 2007. "Strategic Schemas, Strategic Flexibility, and Firm Performance: The Moderating Role of Industry Clockspeed." *Strategic Management Journal* 28, no. 3: 243–270.

Nicholls-Nixon, C. L., A. C. Cooper, and C. Y. Woo. 2000. "Strategic Experimentation: Understanding Change and Performance in New Ventures." *Journal of Business Venturing* 15, no. 5–6: 493–521.

Nishii, L. H., and P. M. Wright. 2007. "Variability Within Organizations: Implications for Strategic Human Resource Management."

O'Shea, D., F. Buckley, and J. Halbesleben. 2017. "Self-Regulation in Entrepreneurs: Integrating Action, Cognition, Motivation, and Emotions." *Organizational Psychology Review* 7, no. 3: 250–278.

Panadero, E. 2017. "A Review of Self-Regulated Learning: Six Models and Four Directions for Research." *Frontiers in Psychology* 8: 422.

Paunonen, S. V., G. Haddock, F. Forsterling, and M. Keinonen. 2003. "Broad Versus Narrow Personality Measures and the Prediction of Behaviour Across Cultures." *European Journal of Personality* 17, no. 6: 413–433.

Perry, J. T., G. N. Chandler, and G. Markova. 2012. "Entrepreneurial Effectuation: A Review and Suggestions for Future Research." *Entrepreneurship Theory and Practice* 36, no. 4: 837–861.

Podsakoff, P. M., S. B. MacKenzie, J.-Y. Lee, and N. P. Podsakoff. 2003. "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies." *Journal of Applied Psychology* 88, no. 5: 879–903.

Podsakoff, P. M., S. B. MacKenzie, and N. P. Podsakoff. 2012. "Sources of Method Bias in Social Science Research and Recommendations on How to Control It." *Annual Review of Psychology* 63: 539–569.

Reymen, I. M. M. J., P. Andries, H. Berends, R. Mauer, U. Stephan, and E. Van Burg. 2015. "Understanding Dynamics of Strategic Decision Making in Venture Creation: A Process Study of Effectuation and Causation." *Strategic Entrepreneurship Journal* 9, no. 4: 351–379.

Ries, E. 2011. *The Lean Startup*. Vol. 27, 2016–2020. Crown Business.

Rocha, V., and M. Van Praag. 2020. "Mind the Gap: The Role of Gender in Entrepreneurial Career Choice and Social Influence by Founders." *Strategic Management Journal* 41, no. 5: 841–866.

Sarasvathy, S., and N. Dew. 2008. "Effectuation and Over–Trust: Debating Goel and Karri." *Entrepreneurship Theory and Practice* 32, no. 4: 727–737.

Sarasvathy, S. D. 2001. "Causation and Effectuation: Toward a Theoretical Shift From Economic Inevitability to Entrepreneurial Contingency." *Academy of Management Review* 26, no. 2: 243–263.

Sarasvathy, S. D. 2003. "Entrepreneurship as a Science of the Artificial." *Journal of Economic Psychology* 24, no. 2: 203–220.

Sargan, J. D. 1983. "Identification in Models With Autoregressive Errors." In *Studies in Econometrics, Time Series, and Multivariate Statistics*, 169–205. Elsevier.

Shah, J. Y., R. Friedman, and A. W. Kruglanski. 2002. "Forgetting All Else: On the Antecedents and Consequences of Goal Shielding." *Journal of Personality and Social Psychology* 83, no. 6: 1261–1280.

Shirokova, G., L. Selivanovskikh, M. H. Morris, and A. Bordunos. 2023. "Unravelling the Relationship Between Dark Triad Traits and Effectuation and Causation Within Small-And Medium-Sized Enterprises." *British Journal of Management* 34, no. 3: 1555–1583.

Siegert, R. J., K. M. McPherson, and W. J. Taylor. 2004. "Toward a Cognitive-Affective Model of Goal-Setting in Rehabilitation: Is Self-Regulation Theory a Key Step?" *Disability and Rehabilitation* 26, no. 20: 1175–1183.

Simmering, M. J., C. M. Fuller, H. A. Richardson, Y. Ocal, and G. M. Atinc. 2015. "Marker Variable Choice, Reporting, and Interpretation in the Detection of Common Method Variance: A Review and Demonstration." *Organizational Research Methods* 18, no. 3: 473–511.

Southwick, D. A., C.-J. Tsay, and A. L. Duckworth. 2019. "Grit at Work." *Research in Organizational Behavior* 39: 100126. https://doi.org/10.1016/j.riob.2020.100126.

Steigertahl, L., R. Mauer, and J.-B. Say. 2018. "EU Startup Monitor." ESCP Europe Jean-Baptiste Say Institute.

Stieglitz, N., T. Knudsen, and M. C. Becker. 2016. "Adaptation and Inertia in Dynamic Environments." *Strategic Management Journal* 37, no. 9: 1854–1864.

Stroe, S., V. Parida, and J. Wincent. 2018. "Effectuation or Causation: An fsQCA Analysis of Entrepreneurial Passion, Risk Perception, and Self-Efficacy." *Journal of Business Research* 89: 265–272.

Suzuki, Y., D. Tamesue, K. Asahi, and Y. Ishikawa. 2015. "Grit and Work Engagement: A Cross-Sectional Study." *PLoS One* 10, no. 9: e0137501.

Vallerand, R. J., C. Blanchard, G. A. Mageau, et al. 2003. "Les Passions de L'ame: On Obsessive and Harmonious Passion." *Journal of Personality and Social Psychology* 85, no. 4: 756–767.

Von Culin, K. R., E. Tsukayama, and A. L. Duckworth. 2014. "Unpacking Grit: Motivational Correlates of Perseverance and Passion for Long-Term Goals." *Journal of Positive Psychology* 9, no. 4: 306–312.

Wales, W. J., V. K. Gupta, and F.-T. Mousa. 2013. "Empirical Research on Entrepreneurial Orientation: An Assessment and Suggestions for Future Research." *International Small Business Journal* 31, no. 4: 357–383.

Ward, M. K., and A. W. Meade. 2023. "Dealing With Careless Responding in Survey Data: Prevention, Identification, and Recommended Best Practices." *Annual Review of Psychology* 74: 577–596.

Werner, K. M., and M. Milyavskaya. 2019. "Motivation and Self-Regulation: The Role of Want-To Motivation in the Processes Underlying Self-Regulation and Self-Control." *Social and Personality Psychology Compass* 13, no. 1: e12425.

Wolfe, M. T., and P. C. Patel. 2016. "Grit and Self-Employment: A Multi-Country Study." *Small Business Economics* 47: 853–874.

Wright, P. M., and W. R. Boswell. 2002. "Desegregating HRM: A Review and Synthesis of Micro and Macro Human Resource Management Research." *Journal of Management* 28, no. 3: 247–276.

Wu, L., H. Liu, and K. Su. 2020. "Exploring the Dual Effect of Effectuation on New Product Development Speed and Quality." *Journal of Business Research* 106: 82–93.

Zhang, Y., L. Cui, G. Zhang, S. Sarasvathy, and R. Anusha. 2019. "An Exploratory Study of Antecedents of Entrepreneurial Decision-Making Logics: The Role of Self-Efficacy, Optimism, and Perspective Taking." *Emerging Markets Finance and Trade* 55, no. 4: 781–794.

Zimmerman, B. J., and A. R. Moylan. 2009. "Self-Regulation: Where Metacognition and Motivation Intersect." In *In Handbook of Metacognition in Education*, 299–315. Routledge.