Journal of Business Research 219 (2027) 116615



Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres



Serendipity and innovation in new ventures: The moderating role of primary investor type

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ARTICLE INFO

Keywords:
Serendipity
Social cognitive theory
Innovation radicalness
Innovation speed
Investor types
Bootstrapping
New ventures

ABSTRACT

Rather than pure luck or a fully planned search, opportunities in new ventures frequently emerge from serendipitous discoveries. While research has emphasized the antecedents of serendipity, empirical evidence on its innovation outcomes remains scarce. Drawing on social cognitive theory, we argue that serendipity's value depends on environmental conditions, which shape whether unexpected discoveries are recognized and translated into venture-level action. Analyzing survey data from 386 founders and CXOs of new ventures in Western and Northern Europe, we find that serendipity is positively associated with innovation radicalness and speed. These relationships are contingent on investor type: Compared with bootstrapped ventures, the positive associations are weaker in ventures backed by venture capitalists, business angels, or family and friends. These findings advance our understanding of serendipity's contingent value in early-stage entrepreneurship and highlight investor dynamics as a boundary condition shaping innovation trajectories.

1. Introduction

In the dynamic landscape of new ventures, innovation is crucial for survival but is often impeded by limited resources or extreme uncertainty (Fultz & Hmieleski, 2021). Consequently, innovation does not always emerge from systematic planning alone. Instead, it can also stem from unexpected observations and unplanned discoveries. For instance, the iconic FREITAG bags were born from a chance observation of truck tarpaulins, which led to an unexpected opportunity that the founder purposefully brought to fruition (Sarasvathy, 2025). This was an example of serendipity. According to Busch (2022, p. 16), serendipity is "a surprising discovery that results from unplanned moments in which our decisions and actions lead to valuable outcomes." Although individuals enact this process, it manifests in new ventures through venture-level action and resource allocation. Nevertheless, serendipity in new ventures is neither a mere coincidence nor universally beneficial. Instead of arising from passive waiting, it emerges as a by-product of active experimentation, customer interaction, or problem-solving. Companies can embed serendipity within their structured innovation processes rather than replacing them (Busch, 2022). Further, through conscious interpretation and purposeful action, ventures can transform unplanned events into strategic opportunities (Cunha et al., 2015; Yaqub, 2018). Yet, the conditions under which serendipity translates into innovation outcomes remain unclear.

Addressing this gap, this study empirically examines the relationship between serendipity and innovation, as measured by the radicalness and speed of innovation, in new ventures, and how it is moderated by the venture's primary investor type. We draw on social cognitive theory (SCT) (Albert Bandura, 1986) to explain these relationships. SCT posits that personal factors, behavior, and the environment are mutually interdependent through the concept of triadic reciprocal determinism (Albert Bandura, 1986). Building on this, we argue that the translation of serendipitous discoveries into innovation outcomes is not random but is instead shaped by venture-specific behavior and environmental conditions. A key environmental characteristic of young ventures is the primary investor type (e.g., venture capitalists [VCs], business angels

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https://doi.org/10.1016/j.jbusres.2026.116615
Received 28 November 2024; Received in revised form 7 October 2026; Accepted 13 October 2026
Available online 15 October 2026
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Open access funding enabled and organized by Projekt DEAL.

[BAs], and family and friends [F&F], versus bootstrapping) (Collewaert et al., 2021; Hellmann & Puri, 2002). Intuitively, one may expect external investors to amplify the effect of serendipity on innovation by providing additional resources, expertise, and legitimacy (Collewaert et al., 2021; Hellmann & Puri, 2002). However, this view fails to consider the trade-offs associated with external capital. Professional investors' formal governance and control mechanisms, which are often aimed at promoting professionalization and reducing risk, can instead impose rigid boundaries. We argue that these constraints may limit the cognitive and behavioral freedom vital for identifying and taking advantage of serendipitous discoveries (Di Pietro et al., 2018; Kaiser & Berger, 2021). Because serendipity requires flexibility rather than tight control, external governance by investors may act as a contextual constraint rather than a catalyst (Busch & Grimes, 2023).

Specifically, we seek to address the following research questions: Is serendipity positively related to innovation radicalness and speed in new ventures? Further, how, and to what extent, does the primary investor type attenuate the relationship between serendipity and innovation outcomes? To answer these questions, we analyze a dataset of 386 founders and CXOs from a cross-national sample of ventures founded since 2018 in Western and Northern Europe. We find that serendipity is significantly associated with innovation radicalness and speed. However, relative to bootstrapped ventures, this relationship is significantly weaker in ventures with VC, BA, and F&F as the primary investor types.

Our study makes at least two key contributions to the existing literature. First, we identify the primary investor type as a significant boundary condition of the serendipity-innovation relationship. Our findings are contrary to the intuitive assumption that external capital can amplify the innovation-promoting effect of serendipity by providing additional resources and expertise. Instead, we show that ventures funded by VC, BA, and F&F benefit significantly less from serendipitous discoveries than bootstrapped ventures. This suggests that external funding structures can constrain rather than enable the exploitation of serendipity. Further, building on the SCT, we provide new insights into the relationship between realizing serendipitous opportunities and a venture's social and financial environment (Collewaert et al., 2021; Hmieleski & Baron, 2009). This work responds to Busch's (2022) call for a detailed analysis of the social mechanisms underlying the exploitation of serendipitous events. Second, we show that serendipity can be linked to innovation outcomes such as radicalness and speed, moving beyond the previous focus on its antecedents (Busch, 2022; Fultz & Hmieleski, 2025; Fultz & Hmieleski, 2021; Hilmersson et al., 2021). This direct effect supports and expands existing planning-based innovation models. However, this effect depends on the context and is not universally valid.

2. Theoretical background and hypotheses

2.1. Serendipity in new ventures

Serendipity is a "surprising discovery that results from unplanned moments in which our decisions and actions lead to valuable outcomes" (Busch, 2022, p. 16). While serendipity is conceptualized as a process through which unexpected discoveries generate value (Busch, 2022), the mechanisms through which such discoveries translate into venture-level outcomes remain relatively underexplored (Fultz & Hmieleski, 2021). Crucially, serendipity requires more than chance occurrences; firms must recognize unexpected events and deliberately exploit them to create value (Busch, 2022). Meanwhile, serendipitous discoveries are not inherently beneficial (Hmieleski et al., 2013). Their potential manifests only when individuals and organizations mobilize resources and take purposive action to transform them into concrete outcomes (Busch & Barkema, 2022; Busch & Grimes, 2023; Fultz & Hmieleski, 2021).

To theorize how this transformation unfolds in entrepreneurial settings, we draw on SCT (Albert Bandura, 1986; Wood & Bandura, 1989), following its application in entrepreneurship research (Hmieleski & Baron, 2009). SCT posits that human action results from reciprocal interactions among three core dimensions: personal factors, behavior, and environment. Personal factors, encompassing cognitive schemas, beliefs, and affective states, shape how individuals interpret unexpected stimuli (Albert Bandura, 1986; Benight & Bandura, 2004; Wood & Bandura, 1989). Self-efficacy, a core component of SCT, is central to these personal factors. It describes individuals' belief in their capability to execute the courses of action required to manage prospective situations (Bandura, 1986). In entrepreneurial settings, this concept extends to the venture level as entrepreneurial self-efficacy. Entrepreneurial self-efficacy represents the collective cognitive capability that enables a new venture to mobilize the persistence and strategic flexibility necessary to navigate high-uncertainty environments (Chen et al., 1998; Hmieleski & Baron, 2009). Behavior refers to purposive actions such as experimentation, strategic decision-making, and resource allocation. The environment dimension includes contextual conditions, such as market dynamics, competitive pressures, and stakeholder expectations (Albert Bandura, 1986; Wood & Bandura, 1989).

Applied to serendipity, SCT suggests that unexpected events become consequential only when personal factors enable their recognition, behavioral responses translate recognition into deliberate action, and environmental conditions permit or support corresponding action (Bandura, 2001; Albert Bandura, 1986). Thus, serendipity is an emergent process shaped by reciprocal interactions among cognition, entrepreneurial behavior, and contextual affordances. Crucially, SCT provides a coherent grounding explaining how ventures transform unexpected discoveries into venture-level outcomes (Hmieleski & Baron, 2009). This mechanism is particularly salient in new ventures. Compared with established firms, new ventures typically operate under conditions of resource scarcity, structural flexibility, and heightened uncertainty (Du & Kim, 2021; Grichnik et al., 2014). These characteristics may increase their exposure to unexpected events while limiting the resources required to exploit them. Consequently, serendipity may represent an alternative pathway to innovation in contexts where formalized research and development (R&D) processes and extensive planning are infeasible. Simultaneously, the successful transformation of serendipitous discoveries depends on contextual factors that shape entrepreneurial discretion and resource deployment.

Overall, we conceptualize serendipity as a higher-order construct comprising Mertonian and Walpolian dimensions (Fultz & Hmieleski, 2021). Mertonian serendipity involves finding an unexpected solution to a focal problem (Yaqub, 2018). Walpolian serendipity refers to situations wherein the search for one solution leads to an unexpected discovery that addresses a different problem (Yaqub, 2018). Together, these dimensions capture the extent to which new ventures experience and recognize potentially valuable unexpected discoveries.

In summary, serendipity is not merely a cognitive phenomenon but a process with strategic implications. Moreover, whether serendipitous discoveries translate into meaningful innovation outcomes depends on the interplay among personal factors, behavior, and environment. Accordingly, our model conceptualizes serendipity as a venture-level process, with its outcomes depending on the dynamic interplay among personal factors, behavior, and environment.

2.2. Serendipity, innovation, and primary investor types in new ventures

In new ventures, innovation is a central mechanism for establishing competitive advantage under conditions of uncertainty and resource constraints (Barney, 1991; Ritala & Hurmelinna-Laukkanen, 2013). Innovation refers to introducing products or services that are novel or substantially improved relative to the status quo and generate meaningful customer benefits (Schilling, 2013). For new ventures, innovation is particularly critical because they often lack established reputations, extensive networks, and resources required for gradual market penetration (Du & Kim, 2021; Grichnik et al., 2014). Consequently, innovation serves not only as a growth mechanism but as a means of survival.

Extant research distinguishes multiple innovation forms that differ in their strategic implications (e.g., Ritala & Hurmelinna-Laukkanen, 2013; Schilling, 2013). Consistent with our theoretical focus, we conceptualize innovation radicalness and speed as venture-level outcomes that capture distinct dimensions of competitive positioning in new ventures. Radical innovations introduce solutions that are "new to the world and exceptionally different from existing products and processes" (Schilling, 2013, p. 47). They challenge incumbents' established competencies and reduce the effectiveness of competitive responses (Hill & Rothaermel, 2003). Innovation speed reflects the extent to which a venture introduces novel offerings before competitors. A faster time to market enables first-mover advantages such as increased customer attention, the establishment of entry barriers, and enhanced profitability (Lieberman & Montgomery, 1988; Ritala & Hurmelinna-Laukkanen, 2013). For resource-constrained new ventures, both the degree of departure from existing solutions and speed of market introduction represent critical venture-level performance dimensions.

Serendipity may provide an alternative pathway to achieving these outcomes. In new ventures, innovation frequently emerges not from linear planning processes but from navigating uncertainty and responding to unexpected events. New ventures operating under conditions of limited resources and high volatility may be well positioned to recognize and seize serendipitous discoveries (Busch & Barkema, 2022; Fultz & Hmieleski, 2021). When unexpected insights are interpreted as valuable and translated into entrepreneurial action, they may yield solutions that depart from established trajectories or accelerate development.

Further, the literature has linked serendipity to organizational improvisation, which is defined as the deliberate and extemporaneous composition and execution of novel action (Cunha et al., 2010; Fultz & Hmieleski, 2021). Improvisation is a behavioral mechanism through which unexpected events can be acted upon immediately and transformed into value-creating outcomes (Moorman & Miner, 1998; Vera & Crossan, 2005). While improvisation captures the implementation of novel action under conditions of uncertainty, serendipity refers to recognizing and valuing unexpected events as potentially valuable inputs (Busch, 2022; Busch & Grimes, 2023; Cunha et al., 2015). In this sense, improvisation may constitute one behavioral pathway through which serendipitous insights are enacted. However, the two constructs of serendipty and improvisation remain conceptually distinct (Busch, 2022). Accordingly, serendipity does not arise independently of human action but depends on how ventures interpret and respond to unexpected situations (Busch, 2022; Garud et al., 2018). This relationship may be particularly pronounced under conditions of resource constraint, where improvised action substitutes for formalized planning (Baker & Nelson, 2005; Fisher, 2012).

Accordingly, based on SCT (Albert Bandura, 1986; Wood & Bandura, 1989), we argue that serendipitous discoveries influence innovation outcomes when targeted entrepreneurial action follows the cognitive recognition of unexpected events. This process enables new ventures to develop vastly different solutions (radicalness) and rapidly bring them to market (speed). However, the SCT emphasizes that a venture's actions are always embedded in environmental conditions which significantly shape the scope of action, perceived risk, and resource allocation. In new ventures, the primary investor type is a key environmental condition. Studies show that investors not only provide financial capital but also significantly influence strategic direction through governance structures, monitoring, and consulting (Collewaert et al., 2021; Hellmann & Puri, 2002; Kaplan & Strömberg, 2004).

Furthermore, the relationship between ventures and investors fundamentally differs depending on the investor type (Liebregts et al., 2023). Institutional investors, such as VCs or BAs, often restrict decision-making autonomy due to professionalization pressures (Di Pietro et al., 2018). Lower autonomy and higher pressure reduce the time available for exploring and exploiting serendipity (Kaiser & Berger, 2021). While VCs often promote efficiency and professionalization, F&F financing introduces a social dimension. According to Lee and Persson (2016), the desire to avoid social conflict and potential loss of personal relationships in the event of failure may cause entrepreneurs to adopt a more cautious approach. Heightened risk aversion may constrain a venture's willingness to pivot or exploit radical, serendipitous discoveries. Since pursuing serendipity requires freedom and a focus on resources (Cunha et al., 2015), the primary investor type establishes the framework within which cognitive interpretations and behavioral responses to serendipitous discoveries occur. Thus, the effectiveness with which serendipity translates into innovation radicalness or speed depends on the primary investor type (e.g., VC, BA, or F&F). Fig. 1 summarizes our proposed research model.

2.3. Relationship between serendipity and innovation radicalness in new ventures

Innovation radicalness is defined as the extent to which a venture's products or services represent breakthrough novelties or significant advances over the status quo (Gatignon et al., 2002). We argue that serendipity is positively related to innovation radicalness through three key mechanisms: (1) disrupting existing search and thought patterns; (2) stimulating intrinsic motivation and persistent exploration; and (3) enabling novel combinations of knowledge and identification of latent market needs. While we theorize these mechanisms to explain the postulated relationships, we do not empirically test these mechanisms. Rather, our empirical contribution lies in examining the moderating relationships between serendipity, innovation, and primary investor type, rather than identifying the underlying cognitive or behavioral processes themselves.

First, serendipity is not limited to predefined problems or research designs (Busch & Grimes, 2023; Cunha et al., 2010). Traditional research processes involve a planned, path-dependent sequence of steps, from defining the problem and developing a hypothesis to collecting and analyzing data (Sekaran & Bougie, 2013). Consequently, the process often identifies or rejects only the anticipated results (Busch & Grimes, 2023). In contrast, serendipity can arise outside of planned thought and search patterns. Without a predefined research design, serendipity expands the search space beyond existing questions (Fink et al., 2017). Moreover, surprising observations disrupt cognitive and technological path dependencies, opening up alternative development routes and novel solution spaces. These unexpected moments can challenge existing assumptions (Austin et al., 2012; Hilmersson et al., 2021). Thus, serendipity may increase the likelihood of fundamental, unconventional innovations, thereby boosting the degree of innovation radicalness in new ventures.

Second, serendipitous events often generate enthusiasm, curiosity, and intrinsic motivation in those involved. Individuals have a fundamental need to explore the unknown and understand connections (Oudeyer et al., 2016; Ryan & Deci, 2000). Bandura's (1986) SCT helps theoretically explain these motivational effects. We argue that serendipitous events function as external stimuli that trigger cognitive reevaluations. In new ventures with high entrepreneurial self-efficacy, individuals interpret unexpected observations as controllable opportunities rather than coincidences or disruptions. The intensive, persistent, and creative exploration typical of new ventures tends to be more successful in mobilizing supporters ("followership") for ideas than purely planned research efforts (Manning et al., 2024). Broad support promotes the development, refinement, and implementation of initially random discoveries. Serendipity increases innovation radicalness by activating strong intrinsic motivation in entrepreneurs and garnering collective support. These factors encourage the thorough exploration and consistent implementation of ideas, even those which are risky and radical.

Third, serendipity enables ventures and entrepreneurs to recombine diverse knowledge and recognize unanticipated market opportunities. Serendipitous discoveries often occur outside of the original research area and require integrating different knowledge domains (Cunha et al.,

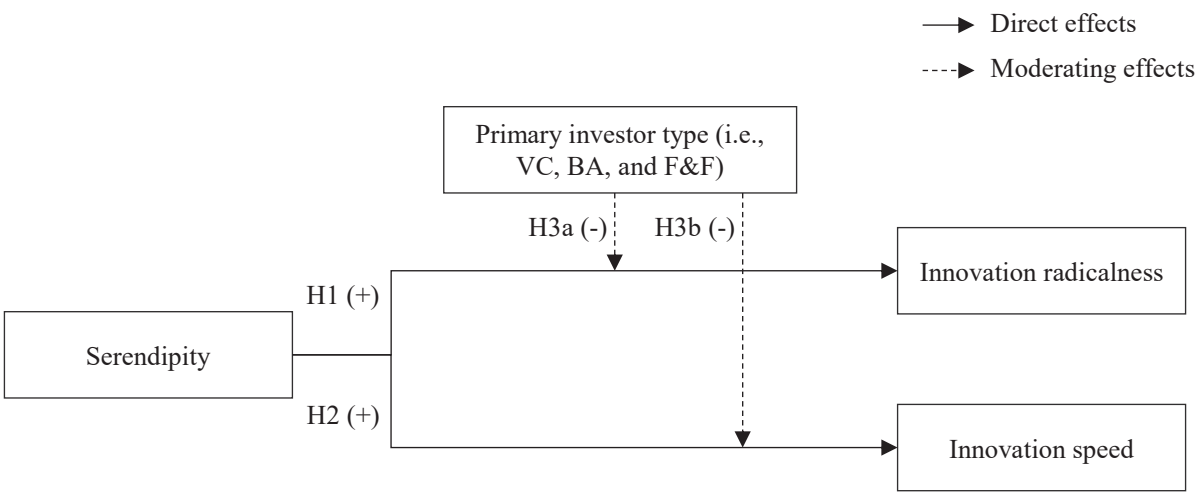


Fig. 1. Research model and hypotheses. *Note: Primary investor type includes VC = Venture Capitalist; BA = Business Angel; and F&F = Family and Friends. We also measured bank loan, crowdfunding, and public funding. The last three categories are measured and displayed in the analysis but are not part of our conceptual model. The reference group for investor types is "bootstrapped.".*

2010). These novel knowledge combinations are considered a central source of radical innovation (Fleming, 2001; Xiao et al., 2022). Additionally, chance observations can reveal overlooked user needs or market opportunities (Busch, 2022; Fultz & Hmieleski, 2025). When ventures question existing assumptions and explore new solution spaces, innovations emerge that transcend incremental improvements and create new markets (Katila & Ahuja, 2002; March, 1991; Sprong et al., 2021). Thus, we argue that combining distant areas of knowledge and identifying latent needs early on promotes developments beyond existing concepts, fostering more radical innovations in new ventures.

In summary, we theorize that serendipity: (1) disrupts existing paths of development and thinking, (2) stimulates intrinsically motivated and persistent exploration, and (3) enables novel combinations of knowledge and unexpected market opportunities. These mechanisms increase the likelihood of radical innovations. Accordingly, we hypothesize:

Hypothesis 1. (*(H1)*) *Serendipity is positively related to innovation radicalness in new ventures.*

Relationship between serendipity and innovation speed.

Innovation speed is defined as the rate at which a venture introduces innovative products or services compared to its competitors (Shan et al., 2016). We argue that serendipity is positively associated with innovation speed in new ventures, with three key mechanisms explaining this relationship: (1) shortening processes, (2) increasing resource efficiency, and (3) accelerating decision-making and action dynamics.

First, traditional innovation processes often follow a linear, sequential logic with clearly defined phases, such as problem definition, research design, testing, and evaluation (Stefanov et al., 2022). This structure is time-consuming and involves iterative testing cycles. By contrast, serendipity enables the direct leap to a potential solution, sometimes even without explicitly defining a problem (Yaqub, 2018), and shortens or completely skips the individual phases of the classic innovation process. Rather than requiring firms to systematically develop and test hypotheses, serendipity allows immediately usable insights or prototypes to emerge. In dynamic and uncertain environments where innovation processes are not strictly linear anyway, serendipity acts less as an element of chance and more as a shortcut within an iterative system (Busch & Grimes, 2023). By shortening or substituting sequential process steps, serendipity reduces the time between idea conception and market launch, thereby accelerating the innovation process.

Second, developing new products requires considerable financial and non-financial resources (Hertel et al., 2021). For new ventures, raising capital, building teams, and developing expertise are particularly time-consuming (Dotzler, 2012; Lazar et al., 2020; Prommer et al., 2020). Mobilizing these resources can significantly delay the innovation process. However, serendipitous discoveries often arise from ongoing activities or projects with already allocated resources (Yaqub, 2018), thereby reducing the need for additional resource acquisition. Such discoveries also enable the immediate recombination and utilization of existing knowledge and capabilities without incurring the costs and delays associated with mobilizing new resources (Fleming, 2001). By relying on available resources rather than requiring new ones, serendipity increases resource efficiency in the innovation process. This improved efficiency allows ventures to implement innovations more quickly, thereby increasing innovation speed (Fultz & Hmieleski, 2021). Since serendipity builds on existing resources, routines, and competencies while avoiding additional mobilization processes, it shortens the time to implementation and increases innovation speed.

Third, traditional innovation processes often involve extensive risk analyses and decision-making cycles (March 1991). Although diligent evaluations aim to reduce uncertainty (Eisenhardt & Tabrizi, 1995), they prolong the time to market. Conversely, serendipitous discoveries often feature apparent technical feasibility or usefulness, shortening the risk assessment phase (Yaqub, 2018). According to SCT, perceived entrepreneurial self-efficacy significantly influences how new ventures address uncertainty (Albert Bandura, 1986). Serendipitous events can function as mastery experiences which strengthen confidence in one's problem-solving abilities. High self-efficacy reduces perceived risks, increases decisiveness, and promotes agentic behavior. Rather than acting passively, entrepreneurs interpret unexpected observations as controllable opportunities. This reassessment shortens decision-making cycles and increases the willingness to quickly implement innovations despite remaining uncertainty. This mechanism has a particularly strong accelerating effect in new ventures characterized by structural flexibility and low path dependency (Gruber et al., 2013). By strengthening self-efficacy, streamlining risk assessments, and promoting agentic decision-making, serendipity accelerates the implementation of innovative ideas, thereby increasing innovation speed.

Some scholars argue that the unpredictability of serendipitous discoveries, with their unforeseeable timing and emergence, can cause delays (Merton & Barber, 2011). However, this stance assumes a passive waiting for chance occurrences. Empirically, serendipitous discoveries arise more frequently during ongoing experiments, problem-solving

activities, or market interactions (Busch & Grimes, 2023). Furthermore, planned innovation processes, especially those involving technological and market uncertainty, are associated with considerable temporal uncertainties (Gruber et al., 2013). This is because technical, market-related, organizational, and resource-related uncertainties often only become apparent as radical innovation projects progress, since teams have incomplete knowledge even with formal planning (O'Connor & Rice, 2013; Pich et al., 2002). Anticipating these unforeseeable uncertainties is difficult, and instead requires adaptive learning loops and a trial-and-error approach. Hence, formally planned processes rarely proceed in a purely linear fashion in practice (Salerno et al., 2015; Sommer & Loch, 2004). In such contexts, serendipity acts less as a disruptor and more as a potential shortcut within an already uncertain innovation process.

Together, our arguments suggest that serendipity can accelerate innovation processes in new ventures. Accordingly, we hypothesize:

Hypothesis 2. (*(H2)*) *Serendipity is positively related to innovation speed in new ventures.*

Moderating role of primary investor type.

Based on the SCT, one may argue that the utilization of serendipitous discoveries is not isolated but rather shaped by the interplay of individual cognitions and situational environmental conditions (Wood & Bandura, 1989). In particular, the primary investor type is a key contextual factor because investors significantly influence new ventures' decision-making processes and strategic direction (Liebregts et al., 2023). Given the differences between VCs, BAs, and F&F, the relationships between ventures and investors fundamentally differ depending on the investor type (Collewaert et al., 2021; Hellmann & Puri, 2002; Lee & Persson, 2016). VCs are professional financial intermediaries with exit horizons and control mechanisms (Berger et al., 1998; Bonnet & Wirtz, 2012). By contrast, according to Drover et al. (2017), BAs are often more operationally involved and sometimes non-financially motivated (Baty & Sommer, 2002; Kaiser & Berger, 2021). F&F financing primarily builds on social capital and trust (Lee & Persson, 2016). Still, all three investor types create additional expectations, control mechanisms, and accountability requirements compared with those of bootstrapped ventures. We argue that this attenuates the positive effects of serendipity on innovation outcomes in new ventures which rely on VC, BA, or F&F financing relative to bootstrapped ventures.

First, utilizing serendipitous discoveries requires a willingness to deviate from existing plans and reallocate resources. However, external investors influence strategic decisions by providing advice, monitoring progress, and, at times, exercising formal control rights (Hellmann & Puri, 2002; Kaplan & Strömberg, 2004). In VC and BA financing, investments are often tied to predefined milestones and targets (Gompers & Lerner, 2001). These constraints increase path dependencies and decrease incentives to deviate from the original roadmap. Similarly, for F&F financing, the moral obligation to close associates can reduce venture risk propensity (Lee & Persson, 2016). From an external perspective, serendipitous opportunities often seem unconventional and difficult to predict (Cunha et al., 2010; Meyers, 2008). Therefore, the likelihood that entrepreneurs in investor-funded ventures consistently pursue such opportunities diminishes. Consequently, the relationships of serendipity with innovation radicalness and speed weaken.

Second, external capital providers' involvement increases reporting, coordination, and relationship management requirements (Bammens & Collewaert, 2014; Kaiser & Berger, 2021; Panda & Dash, 2016). These additional tasks reduce the temporal and cognitive resources available to new ventures for exploring and elaborating on serendipitous discoveries. According to Busch (2022), serendipity is only utilized when it aligns with current organizational priorities. In investor-funded ventures, these priorities often shift toward achieving goals, meeting growth targets, or preparing for an exit. This shift decreases the likelihood that ventures will pursue unexpected observations with intensity. Consequently, the implementation of serendipitous discoveries becomes rarer and slower.

Third, from the SCT perspective, external investors' presence alters the social evaluation context of decision-making (Albert Bandura, 1986). In particular, ventures with such investors are subject to stronger observation and higher expectations of legitimacy. According to Albert Bandura (1986), perceived evaluation influences actors' self-efficacy and risk-taking behavior. While bootstrapped ventures can pursue serendipitous discoveries based on implicit knowledge and intuition, in investor-funded ventures, entrepreneurs are required to rationalize and legitimize their discoveries. Although serendipitous discoveries may exhibit immediate intuitive or perceived value, their formal evaluation and justification are often difficult in early stages, particularly in terms of quantifiable market potential or financial returns (Glücksman, 2020; Lafarre & Schoonbrood, 2023). This difficulty may lead to preemptive self-censorship. This increased evaluation apprehension reduces agentic behavior and slows decision-making (Albert Bandura, 1986). Thus, the radicalness and speed of innovation implementation are both dampened in investor-funded ventures relative to bootstrapped ventures.

In summary, external investors weaken the positive effects of serendipity on innovation outcomes by (1) reducing strategic flexibility and increasing path dependency, (2) reallocating temporal and cognitive resources in favor of investor management, and (3) intensifying legitimacy expectations, which influence self-efficacy and risk-taking behavior. These mechanisms are significantly less pronounced in bootstrapped ventures because they have greater decision-making autonomy, less external control, and more organizational flexibility (Gruber et al., 2013). Accordingly, we hypothesize:

Hypothesis 3a. (*(H3a)*) *Relative to bootstrapped ventures, the positive relationship between serendipity and innovation radicalness is weaker in new ventures with VC, BA, and F&F as the primary investor types.*

Hypothesis 3b. (*(H3b)*) *Relative to bootstrapped ventures, the positive relationship between serendipity and innovation speed is weaker in new ventures with VC, BA, and F&F as the primary investor types.*

3. Method

3.1. Sample and procedure

We collected our sample from Crunchbase (base year 2023), a global database containing private and public companies, including new ventures. Both entrepreneurship and management research have extensively drawn on Crunchbase (Dushnitsky & Sarkar, 2022; Miric et al., 2021; Wang et al., 2022). Following extant research (e.g., Fultz & Hmieleski, 2021; Michaelis et al., 2020), we defined firms as new ventures if they had been founded within the preceding five years (i.e., 2018 or later). To increase the generalizability of our findings, we considered new ventures from various countries based on their headquarters' location as indicated in Crunchbase. Eventually, we included ventures in Western (i.e., Belgium, France, Ireland, Luxembourg, Monaco, Netherlands, United Kingdom) and Northern Europe (i.e., Denmark, Finland, Iceland, Norway, Sweden) according to the CIA Factbook country classification (CIA, 2024). For our sample, we targeted the founders of the identified ventures.

Using their e-mail addresses listed in Crunchbase, we randomly sampled founders of the identified ventures and invited them to participate in our anonymized online survey. The invitation contained a description of the research project, a small financial incentive, and the offer to donate to an NGO on behalf of the participant for each response received. We initially contacted 22,020 founders between September and December 2023. After accounting for 1,784 bounce-backs and dropouts, our final initial sample comprised 20,236 founders. To enhance response rates, we sent three reminders and received 1,258 completed

surveys, yielding a response rate of 6 percent. After excluding incomplete submissions, 474 valid responses remained. Consistent with our sampling requirements, we excluded responses from participants: 1) who characterized their ventures as non-profits (2 responses) or whose primary business activity comprised investing in other companies (e.g., VCs; 8 responses), as their objectives and dynamics fundamentally differ from the profit-oriented ventures in our focus; 2) who indicated a venture founding date before 2018 (19 responses), and those who were not founders or CXOs (4 responses); 3) who were unengaged (18 responses); 4) who were from ventures that had a single CXO (34 responses); and 5) who did not indicate their ventures' primary investor type (3 responses), as the lack of these data prohibits an investigation of the focal relationships. Consequently, our data collection yielded a final sample size of 386 observations. Table 1 presents details on the characteristics and demographics of the ventures and respondents in our sample. We compiled our sample from Crunchbase, which primarily lists externally visible and often venture-backed startups. Thus, growth-oriented and innovation-driven ventures are likely to be overrepresented. As Table 1 shows, over 80% of the ventures in our sample have raised more than €100,000 in external funding. We discuss these boundaries of generalizability in the limitations section.

3.2. Measurement

We used well-established scales to measure our constructs and ran extensive pretests with 20 academic researchers and entrepreneurs before data collection. We measured all our items using seven-point Likert scales (i.e., 1 = strongly disagree; 7 = strongly agree). Table 2 shows the items used to measure our latent core constructs.

Table 1
Sample characteristics.

Birth year			Size of revenues		
	2000 and after	1%		No revenue	25%
	1999–1990	22%		1–100 K €	29%
	1989–1980	33%		100 K–250 K €	14%
	1979–1970	25%		250 K–500 K €	10%
	1969–1960	13%		500 K–750 K €	2%
	1959–1950	5%		750 K–1mln €	4%
Gender				1mln–2mln €	7%
	Male	85%		2mln–5mln €	5%
	Female	13%		5mln–10mln €	2%
	Diverse	<1%		10mln–50mln €	1%
	Prefer not to state	1%		More than 50mln €	<1%
Country			Venture type		
	France	8%		Service-based	53%
	United Kingdom	41%		Non-service-based	47%
	The Netherlands	15%	Level of funds raised		
	Belgium	5%		Less than 25 K €	12%
	Ireland	5%		25 K–100 K €	7%
	Luxembourg	2%		100 K–500 K €	25%
	Sweden	8%		500 K–1mln €	16%
	Norway	3%		1mln–5mln €	25%
	Denmark	5%		5mln–10mln €	7%
	Finland	5%		More than 10mln €	7%
	Iceland	1%	Primary investor type		
	Other	3%		None	17%
Founding year				VC	35%
	2023	3%		F&F	7%
	2022	9%		Bank loan	2%
	2021	21%		Business Angel	24%
	2020	26%		Crowdfunding	1%
	2019	22%		Public funding (e.g., grants)	6%
	2018	18%		Other	9%

Note: N = 386.

All focal constructs were conceptualized and measured at the venture level. Serendipity captures a firm's general tendency to recognize and exploit unexpected discoveries. Innovation radicalness and speed reflect a venture's overall innovation positioning relative to prior solutions and competitors. Because respondents were founders or senior executives with comprehensive knowledge of their ventures' activities, we considered them appropriate key informants for firm-level assessments (Kumar et al., 1993).

Serendipity (α = 0.78). We measured serendipity using the six-item scale of Fultz and Hmieleski (2021) comprising two dimensions: Walpolian *(three items; α = 0.83)* and Mertonian serendipity *(three items; α = 0.88)*. Walpolian serendipity refers to the search for a solution to a given problem that leads to finding a solution to a different problem. Mertonian serendipity refers to the search for a solution to a given problem that leads to finding a solution to the same problem (Yaqub, 2018). We obtained the overall measure for serendipity by averaging the scores of the two dimensions (Fultz & Hmieleski, 2021).

Innovation radicalness (α = 0.91). We measured innovation radicalness using the four-item scale developed by Gatignon et al. (2002) and Govindarajan and Kopalle (2006). The scale assesses the degree to which a venture's products or services are breakthrough innovations and major advances compared to the status quo. We adapted the items to refer to the products or services of the respondents' companies. For example, we changed the original item "INNOVATION was a breakthrough innovation" to "Our product/service is a breakthrough innovation." We phrased the items such that they capture a venture's overall innovation positioning rather than an isolated product. We averaged the responses to the individual questions to obtain an overall innovation radicalness measure. Given that many new ventures in our sample operate with a limited number of core offerings, their primary product or service often serves as their central value proposition. Accordingly, we conceptualized radicalness as a venture-level assessment of the extent to which a venture's core offering departs from prior market solutions.

Innovation speed (α = 0.75). We used four items based on the scale developed by Shan et al. (2016) to measure the speed at which a venture introduces innovative products or services relative to its competitors. We averaged the responses to the individual questions to obtain an overall measure of innovation speed.

Primary investor type. We captured the primary investor type following DeTienne and Cardon (2008). The respondents indicated their primary investors via the categories "None," "VC," "Family & Friends (F&F)," "Bank Loan," "Business Angel," "Crowdfunding," "Public Funding (e.g., grants)," and "Other." To test our moderating hypotheses, we focus on the primary investor types VC, BA, and F&F relative to bootstrapped ventures (i.e., "None"). Research has shown that these three investor types are significantly associated with strategic decision-making and direction in new ventures (e.g., Collewaert et al., 2021; Hellmann & Puri, 2002; Lee & Persson, 2016).

3.3. Control variables

At the venture level, we controlled for the *venture type* (i.e., service-based versus non-service-based). Service-based ventures systematically differ from their non-service-based counterparts in their innovation processes, R&D spending, and their speed and flexibility in testing and iterating offerings (e.g., Ettlie & Rosenthal, 2011; Nijssen et al., 2006; Ordanini & Parasuraman, 2011). Furthermore, we controlled for the *size of revenues* as a measure of a venture's size and maturity (Josefy et al., 2015). We also controlled for the *number of CXOs*, as it may affect our dependent variables. Next, we controlled for the *country* of a venture's headquarters, as national context may also considerably influence

Table 2
Measurement items and standardized factor loadings.

Constructs and items	*Standardized factor loadings*			
	1st order	2nd order	CR	AVE
Serendipity (Fultz & Hmieleski, 2021)			0.86	0.76
Walpolian		0.99		
As we seek to solve one problem, we often discover the solution to a completely different problem.	0.78			
As we go about our normal business operations, we often discover solutions to problems we were not originally looking for.	0.88			
We often stumble on unexpected opportunities for new products or services.	0.75			
Mertonian		0.73		
When we try to solve a particular problem, we usually find a solution that is unexpected.	0.90			
When we solve a particular problem, the solution is often unexpected.	0.90			
We often develop new products or services in unexpected ways.	0.75			
Innovation radicalness * (Gatignon et al., 2002)			0.91	0.72
Our product/service is a revolutionary improvement over previous products/services.	0.83			
Our product/service is a breakthrough innovation.	0.89			
Elements of our product/service represent major advances from a user's perspective.	0.80			
Our product/service is based on an innovation that clearly separates it from previous products/services.	0.86			
Innovation speed (Shan et al., 2016)			0.75	0.43
Relative to major competitors that have developed similar innovations in our industry, our innovation speed is much higher (Innovation speed = time between start of development and commercialization/launch).	0.59			
In our industry, our company has a reputation for being among the first to introduce new products/services into the market.	0.71			
Relative to the assigned schedule, our development "on-time performance" is often ahead of the assigned schedule.	0.55			
In our industry, we are usually among the first to spot and build on new trends.	0.76			
Self-efficacy (Zellweger et al., 2011)			0.86	0.60
I feel capable of running my own firm.	0.81			
I am confident that running my own firm will be a success.	0.81			
I have all the necessary knowledge to manage my own firm.	0.68			
I have the entrepreneurial skills to operate my own firm.	0.79			
Social desirability (Hays et al., 1998)			0.70	0.38
I am always courteous even to people who are disagreeable.	0.58			
I generally tend not to take advantage of someone.**	–			
I tend to forgive and forget instead of trying to get even.	0.64			
Even when I don't get my way, I do not feel resentful.	0.68			
No matter who I'm talking to, I'm always a good listener.	0.53			

Note: * The items were slightly adapted to refer to the products/services of the respondents' companies. ** Item excluded during CFA due to low factor loading (< 0.5). Abbreviations: CR = Composite reliability; AVE = Average variance extracted.

innovativeness (Anokhin & Schulze, 2009; Bukowski & Rudnicki, 2019; Kolokas et al., 2022). We controlled for founders' *satisfaction with access to resources*, as perceived resource availability can shape strategic behavior and innovation potential. Research highlights that resource slack is a double-edged sword for new ventures, offering both enabling advantages and potential inefficiencies (Bradley, Wiklund, & Shepherd, 2011).

At the individual level, we controlled for *self-efficacy* and demographic factors, including *gender*, *birth year*, and *education*. Self-efficacy is particularly relevant in the context of innovation, as entrepreneurial action often depends on the perceived balance between the desirability of an outcome and one's confidence in achieving it (Albert Bandura, 1986). Entrepreneurs with high self-efficacy are more likely to act on serendipitous cues, even when such moves might appear unconventional to others (Brinckmann & Kim, 2015; Chen et al., 1998). Additionally, we accounted for *social desirability*, given that the radicalness of innovation and rapid innovation speed are widely viewed as favorable traits among entrepreneurs (Anderson et al., 2014), potentially influencing survey responses.

3.4. Measurement model and model tests

To ensure the robustness of our results, we relied on established and validated measures used in extant studies. We pretested the questionnaire with a panel of 20 academic researchers and entrepreneurs to ensure comprehensibility and coherence of response formats. We assured respondents of full confidentiality and anonymity, and implemented multiple timing and attention checks to identify and exclude inattentive or random responses, following best practices in survey research (Podsakoff et al., 2012).

We ran a confirmatory factor analysis (CFA) in IBM Amos 28 with the five latent variables of our research model as distinct constructs (i.e., serendipity, innovation radicalness, innovation speed, self-efficacy, and social desirability) to examine our primary measurement model. In the CFA, we dropped one item from the social desirability scale (Hays et al., 1989) due to a low factor loading (Hair et al., 2010). We established goodness of fit using the Amos plugin Model Fit Measures (Gaskin et al., 2022). The measurement model demonstrated excellent fit ($\chi^2 = 404.06$, df = 198, CFI = 0.949, SRMR = 0.055, RMSEA = 0.052, PClose = 0.317).

To rule out common method bias, we followed Simmering et al. (2015) and used the marker variable blue attitude (Miller & Chiodo, 2009). We ran a chi-square difference test wherein the marker variable blue attitude influenced all items of our latent variables. We then compared the unconstrained model to the zero-constrained model. The chi-square difference test was non-significant (p = 0.10; 90% confidence interval), suggesting that our model is not likely to be affected by common method bias (Simmering et al., 2015).

Next, reliability was established as the composite reliability scores ranged from 0.70 (social desirability) to 0.91 (innovation radicalness), exceeding the threshold of 0.7 (Hair et al., 2021) for all constructs. Convergent validity was established, in line with Lam (2012), as the average variance extracted (AVE) values for two of the five latent constructs (innovation speed: 0.43; social desirability: 0.38) were below the recommended threshold of 0.5 (Fornell & Larcker, 1981). However, Fornell and Larcker (1981) acknowledge that AVE is a more conservative measure and that convergent validity can be established solely based on composite reliability. As all constructs in our model exceeded the composite reliability threshold of 0.5 (Fornell & Larcker, 1981), we concluded that internal reliability was acceptable (cf., Lam, 2012).

Given that the AVE exceeded the maximum shared variance for each construct, we confirmed discriminant validity (Fornell & Larcker, 1981). Overall, these statistics provide support for the reliability and convergent and discriminant validity of our model.

To address potential concerns regarding our small sample size, we tested for non-response bias. Following Armstrong and Overton (1977), we compared early and late respondents by splitting our sample into three equal-sized groups and running independent sample t-tests on gender, birth year, founding year, country, venture phase, venture size, and revenue size. We did not detect any statistically significant differences between early and late respondents (t-tests with $p > 0.10$). Thus, non-response bias was unlikely to be an issue in our data.

To detect single-informant bias, we collected responses from co-founders and co-CXOs of our respondents in a second survey (Strese et al., 2018; van Bruggen et al., 2002). Specifically, we compared the responses of 32 informants to those of our 386 initial respondents (dyadic rate: 8.3%). We assessed interrater agreement (r_{wg}) for serendipity, innovation radicalness, and innovation speed. The results for serendipity ($r_{wg} = 0.76$), innovation radicalness ($r_{wg} = 0.87$), and innovation speed ($r_{wg} = 0.73$) exceeded thresholds for acceptable agreement ($r_{wg} > 0.7$) between informants (Brown & Hauenstein, 2005). Thus, single-informant bias was not an issue in our data.

Finally, we tested for multicollinearity and conducted separate ordinary least squares regressions to estimate variance inflation factors (VIFs) for each predicted variable. Since the highest VIF value is 1.11, all factors were below the critical threshold of 10 (Hair et al., 2010; Kleinbaum et al., 1988). Thus, multicollinearity was unlikely to be an issue in our data.

4. Results

We tested our research model using hierarchical linear regression with ordinary least squares (OLS) in Stata 17. Table 3 displays the correlations and descriptive statistics. Table 4 shows the results of our regression models for the dependent variable innovation radicalness, while Table 5 presents the results for the dependent variable innovation speed.

Table 3 reveals significant positive correlations of innovation radicalness with venture type (i.e., service-based versus non-service-based) ($r = 0.22$, $p = 0.00$), birth year ($r = 0.11$, $p = 0.03$), education ($r = 0.11$, $p = 0.03$), self-efficacy ($r = 0.19$, $p = 0.00$), and social desirability ($r = 0.11$, $p = 0.04$). Revenue size and innovation radicalness exhibit a significant negative correlation ($r = -0.19$, $p = 0.00$). The significant positive correlation with venture type (coded: 1 = service-based, 2 = non-service-based) hints at higher innovation radicalness among non-service-based ventures, consistent with previous studies (e.g., Ferreira et al., 2013). Birth year (i.e., founder age) is linked to founders' experience (Zhao et al., 2021), which the literature has found to be positively related to innovation (Robson et al., 2012). The same is true for the founder's education level (Robson et al., 2009). Self-efficacy is a precondition for founders to act on opportunities which may drive innovation radicalness. Higher self-efficacy leads founders to pursue more challenging opportunities (Albert Bandura, 1986), which may foster higher innovation radicalness if successfully addressed.

Entrepreneurs perceive developing highly innovative products as attractive (Anderson et al., 2014), and hence, may give socially desirable answers. Meanwhile, the negative correlation between revenue size and innovation radicalness stems from increasingly complex decision-making and organizational structures which reduce autonomy and flexibility (Josefy et al., 2015).

We find significant positive correlations of resource access ($r = 0.12$, $p = 0.02$), self-efficacy ($r = 0.33$, $p = 0.00$), and social desirability ($r = 0.10$, $p = 0.05$) with innovation speed. Access to sufficient resources to invest in exploiting identified opportunities is required to drive innovation (Bradley, Shepherd, & Wiklund, 2011). Meanwhile, the reasons for the identified positive effects of self-efficacy and social

Table 3
Correlation and descriptive statistics.

Variables	Mean	SD*	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Venture type[1]	1.47	0.50	1	2	1.00													
2. Size of revenues	3.20	2.35	1	11	−0.23***	1.00												
3. Number of CXOs	3.20	1.16	2	6	0.00	0.23***	1.00											
4. Country	4.33	3.45	1	13	−0.08	0.07	0.09	1.00										
5. SAR[2]	3.52	1.88	1	7	0.03	0.16**	0.11*	0.05	1.00									
6. Gender	1.17	0.46	1	4	0.06	−0.06	−0.01	0.02	−0.04	1.00								
7. Birth year	25.72	11.13	1	55	0.02	0.10	0.16**	−0.07	−0.13*	−0.15**	1.00							
8. Education	5.15	1.19	1	7	0.16**	−0.03	0.12*	−0.05	0.01	−0.05	0.18***	1.00						
9. Self-efficacy	5.58	1.07	1	7	−0.10	0.08	0.03	−0.05	0.11*	0.01	0.03	−0.09	1.00					
10. Social desirability	5.27	1.04	2.25	7	−0.05	−0.06	−0.01	−0.04	0.13**	0.02	−0.01	−0.13*	0.13*	1.00				
11. Primary investor type	3.48	2.22	1	8	0.05	−0.06	−0.05	0.03	−0.03	0.03	0.10*	−0.04	−0.00	0.04	1.00			
12. Serendipity	4.86	1.07	1.5	7	−0.05	−0.17***	−0.06	−0.06	−0.00	−0.02	0.08	−0.08	0.17***	0.22***	−0.00	1.00		
13. Innovation radicalness	5.73	1.22	1	7	0.22***	−0.19***	0.07	0.02	−0.03	−0.01	0.11*	0.11*	0.19***	0.11*	0.09	0.29***	1.00	
14. Innovation speed	4.81	1.14	1	7	−0.03	0.05	0.08	0.04	0.12*	0.00	0.02	−0.08	0.33***	0.10*	0.03	0.35***	0.41***	1.00

Note: N = 386; *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$; Pearson correlation coefficient; [1] Binary variable, 1 = yes, 2 = no; [2] SAR = Satisfaction with access to resources. * SD = Standard deviation.

Table 4
Results of hierarchical linear regression for innovation radicalness.

Dependent variable: Innovation radicalness	Model 1	Model 2	Model 3
Venture type; Reference: Service-based			
Non-service-based	0.412	0.441	0.456
	(0.001)	(0.000)	(0.000)
Size of revenues	−0.074	−0.045	−0.041
	(0.008)	(0.097)	(0.130)
Number of CXOs	0.074	0.084	0.053
	(0.172)	(0.110)	(0.310)
Country; Reference: France			
United Kingdom	0.025	0.046	0.040
	(0.916)	(0.841)	(0.860)
The Netherlands	−0.030	0.099	0.085
	(0.909)	(0.699)	(0.735)
Belgium	−0.341	−0.162	−0.226
	(0.321)	(0.626)	(0.491)
Ireland	−0.065	−0.035	0.005
	(0.849)	(0.915)	(0.989)
Luxembourg	0.510	0.487	0.318
	(0.320)	(0.326)	(0.514)
Sweden	0.119	0.172	0.059
	(0.689)	(0.548)	(0.836)
Norway	0.409	0.422	0.356
	(0.297)	(0.266)	(0.341)
Denmark	−0.324	−0.209	−0.215
	(0.331)	(0.517)	(0.500)
Finland	0.259	0.482	0.336
	(0.453)	(0.153)	(0.315)
Iceland	0.384	0.392	0.422
	(0.646)	(0.629)	(0.596)
Other	0.563	0.354	0.230
	(0.151)	(0.353)	(0.545)
SAR[1]	−0.029	−0.030	−0.021
	(0.382)	(0.348)	(0.512)
Gender; Reference: Male			
Female	−0.097	−0.068	−0.115
	(0.579)	(0.688)	(0.493)
Diverse	0.938	1.055	0.805
	(0.417)	(0.345)	(0.464)
Prefer not to state	−0.323	−0.453	−0.338
	(0.585)	(0.428)	(0.549)
Birth year	0.011	0.008	0.008
	(0.051)	(0.159)	(0.150)
Education	0.073	0.084	0.090
	(0.160)	(0.097)	(0.070)
Self-efficacy	0.270	0.227	0.250
	(0.000)	(0.000)	(0.000)
Social desirability	0.104	0.050	0.043
	(0.078)	(0.388)	(0.449)
Primary investor type; Reference: Bootstrapped			
VC	0.436	0.442	3.716
	(0.017)	(0.012)	(0.000)
F&F	0.306	0.294	2.532
	(0.261)	(0.263)	(0.017)
Bank loan	0.062	−0.176	2.344
	(0.885)	(0.676)	(0.376)
Business Angel	0.490	0.499	3.111
	(0.011)	(0.007)	(0.000)
Crowdfunding	0.811	1.000	−0.730
	(0.329)	(0.213)	(0.959)
Public funding	0.789	0.824	2.680
	(0.007)	(0.003)	(0.065)
Other	0.220	0.240	2.377
	(0.369)	(0.312)	(0.020)
(H1) Serendipity		0.292	0.736
		(0.000)	(0.000)
Moderation*			
(H3a) Serendipity x VC			−0.669
			(0.000)
(H3a) Serendipity x F&F			−0.458
			(0.028)
Serendipity x Bank loan			−0.509
			(0.304)
(H3a) Serendipity x Business Angel			−0.531
			(0.001)
Serendipity x Crowdfunding			0.413
			(0.895)
Serendipity x Public funding			−0.382
			(0.194)
Serendipity x Other			−0.435
			(0.032)
Constant	2.537	1.480	−0.741
p-value	(0.000)	(0.014)	(0.345)
R-squared	0.206	0.260	0.302
Adjusted *R*-squared	0.142	0.198	0.228

Note: N = 386; Results of ordinary least squares (OLS) regression; [1] SAR: Satisfaction with access to resources. * Reference group for investor types is "bootstrapped.".

desirability are identical to the relationships found for innovation radicalness.

Next, Table 4 (Model 2) shows that serendipity is positively associated with innovation radicalness ($\beta = 0.29$, $p = 0.00$). Thus, H1 is supported.

Similarly, Table 5 (Model 2) shows that serendipity is positively associated with innovation speed ($\beta = 0.35$, $p = 0.00$). Thus, H2 is supported.

Table 4 (Model 3) indicates negative and significant two-way interactions of serendipity with the primary investor types of VC ($\beta = -0.67$, $p = 0.00$), F&F ($\beta = -0.46$, $p = 0.03$), and BA ($\beta = -0.53$, $p = 0.00$). These results indicate that the relationship between serendipity and innovation radicalness is weaker in new ventures with VC, BA, and F&F as primary investor types relative to bootstrapped ventures. Fig. 2 displays the moderating effect of these three primary investor types and bootstrapping. Overall, the results support H3a.

Similarly, Table 5 (Model 3) shows negative and significant two-way interactions of serendipity with the primary investor types of VC ($\beta = -0.49$, $p = 0.00$), F&F ($\beta = -0.51$, $p = 0.01$), and BA ($\beta = -0.41$, $p = 0.01$). This indicates that the relationship between serendipity and innovation speed is weaker in new ventures with VC, BA, and F&F as primary investor types relative to bootstrapped ventures. Fig. 3 displays the moderating effect of these primary investor types and bootstrapping. Overall, the results support H3b.

4.1. Supplementary analyses

We ran three supplementary analyses to test the robustness of our findings and address concerns of overfitting or distortion by outliers due to the relatively small sample size (Scheaf et al., 2023). First, we ruled out biased results due to overfitting our model (Harrell, 2015) by running our main models without controls. The hypothesized relationships remained stable in direction and significance. We additionally examined models considering significant controls only. Again, the direction of the hypothesized relationships remained unchanged and statistically significant.

Second, we tested the robustness of H1 and H2 by excluding observations with the maximum score (7) on the dependent variables (i.e., innovation radicalness and innovation speed, respectively) to reduce the influence of potential outliers. The results remained robust in direction and significance.

Third, we addressed potential issues arising from endogeneity (i.e., omitted variable bias) with the instrumental variable method as outlined by Bascle (2008). Using the ivreg2 Stata command, we followed the two-stage least-squares approach (Baum, 2006). In the relationship between serendipity and innovation radicalness, we implemented the instruments political skill (Ferris et al., 2005) and environmental mastery from the eudaimonic well-being scale of Ryff and Keyes (1995). The first-stage regressions demonstrated that our instruments are valid ($p < 0.05$). The results for the Sargan statistics and endogeneity test are insignificant ($p = 0.36$; $p = 0.39$). In the relationship between

Table 5
Results of hierarchical linear regression for innovation speed.

Dependent variable: Innovation speed	Model 1	Model 2	Model 3
Venture type; Reference: Service-based			
Non-service-based	0.013	0.048	0.047
	(0.917)	(0.680)	(0.686)
Size of revenues	0.011	0.046	0.047
	(0.672)	(0.073)	(0.064)
Number of CXOs	0.058	0.070	0.041
	(0.260)	(0.152)	(0.402)
Country; Reference: France			
United Kingdom	−0.132	−0.106	−0.123
	(0.560)	(0.619)	(0.561)
The Netherlands	−0.150	0.007	−0.006
	(0.556)	(0.976)	(0.980)
Belgium	−0.600	−0.383	−0.417
	(0.070)	(0.222)	(0.178)
Ireland	−0.221	−0.185	−0.135
	(0.499)	(0.550)	(0.659)
Luxembourg	−0.069	−0.096	−0.235
	(0.889)	(0.837)	(0.610)
Sweden	−0.124	−0.059	−0.167
	(0.663)	(0.826)	(0.535)
Norway	−0.090	−0.075	−0.185
	(0.810)	(0.833)	(0.600)
Denmark	−0.080	0.060	0.080
	(0.803)	(0.844)	(0.789)
Finland	−0.073	0.198	0.109
	(0.827)	(0.533)	(0.730)
Iceland	0.288	0.297	0.292
	(0.721)	(0.697)	(0.697)
Other	0.305	0.051	0.049
	(0.418)	(0.886)	(0.891)
SAR[1]	0.039	0.038	0.049
	(0.224)	(0.214)	(0.107)
Gender; Reference: Male			
Female	−0.212	−0.176	−0.200
	(0.211)	(0.271)	(0.206)
Diverse	1.299	1.441	1.276
	(0.244)	(0.172)	(0.219)
Prefer not to state	0.621	0.463	0.518
	(0.275)	(0.390)	(0.331)
Birth year	0.004	−0.000	0.000
	(0.488)	(0.963)	(0.991)
Education	−0.051	−0.038	−0.035
	(0.314)	(0.430)	(0.458)
Self-efficacy	0.339	0.287	0.291
	(0.000)	(0.000)	(0.000)
Social desirability	0.056	−0.010	−0.020
	(0.326)	(0.859)	(0.709)
Primary investor type; Reference: Bootstrapped			
VC	0.172	0.179	2.612
	(0.328)	(0.281)	(0.000)
F&F	0.214	0.200	2.680
	(0.414)	(0.420)	(0.007)
Bank loan	−0.316	−0.606	−1.320
	(0.448)	(0.127)	(0.597)
Business Angel	0.269	0.279	2.327
	(0.143)	(0.108)	(0.003)
Crowdfunding	0.477	0.707	18.909
	(0.550)	(0.350)	(0.162)
Public funding	0.434	0.476	3.182
	(0.119)	(0.071)	(0.021)
Other	−0.018	0.006	3.059
	(0.940)	(0.979)	(0.002)
(H2) Serendipity		0.355	0.741
		(0.000)	(0.000)
Moderation*			
(H3b) Serendipity x VC			−0.495
			(0.001)
(H3b) Serendipity x F&F			−0.507
			(0.010)
Serendipity x Bank loan			0.104
			(0.823)
(H3b) Serendipity x Business Angel			−0.415
			(0.007)
Serendipity x Crowdfunding			−3.950
			(0.180)
Serendipity x Public funding			−0.559
			(0.044)
Serendipity x Other			−0.623
			(0.001)
Constant	2.404	1.121	−0.688
p-value	(0.000)	(0.048)	(0.352)
R-squared	0.164	0.254	0.294
Adjusted R-squared	0.0962	0.191	0.219

Note: N = 386; Results of ordinary least squares (OLS) regression; [1] SAR: Satisfaction with access to resources. * Reference group for investor types is "bootstrapped.".

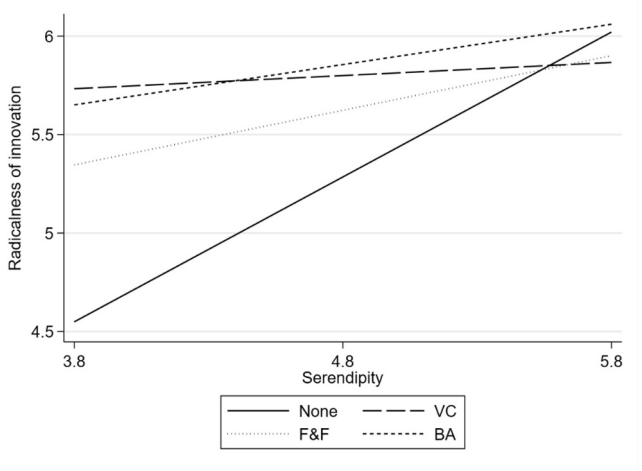


Fig. 2. Moderating effect of the primary investor type on the relationship between serendipity and innovation radicalness (Hypothesis 3a). *ote: Fig. 2 displays serendipity with the mean of the variable at 4.8, and with −1 SD (3.8) and + 1 SD (5.8).*

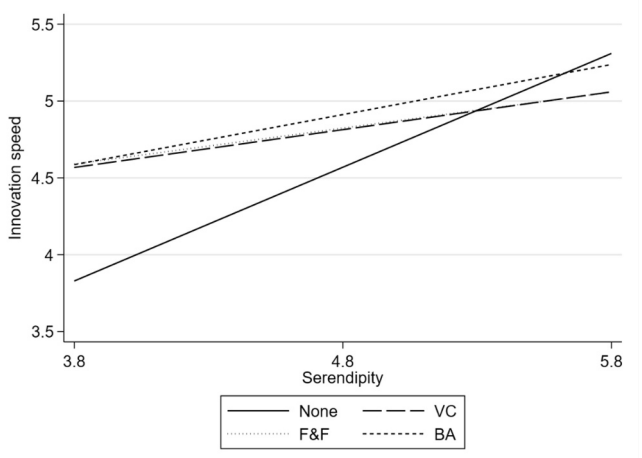


Fig. 3. Moderating effect of the primary investor type on the relationship between serendipity and innovation speed (Hypothesis 3b). *Note:* Fig. 3 displays serendipity with the mean of the variable at 4.8, and with −1 SD (3.8) and + 1 SD (5.8).

serendipity and innovation speed, we used the instruments network size (Musteen et al., 2010) and environmental dynamism (Miller & Friesen, 1982). The first-stage regressions demonstrated that our instruments are valid ($p < 0.05$). The results for the Sargan statistic and endogeneity test

are both insignificant ($p = 0.08$; $p = 0.85$). Overall, these results show that our instruments are exogenous and mitigate concerns that our findings may be biased due to omitted variables.

5. Discussion

5.1. Theoretical implications

A key contribution of our study is uncovering the boundary conditions of serendipity-driven innovation with respect to a venture's funding source. The literature often emphasizes the resource advantage of investor-backed ventures, noting that VCs and BAs provide critical access to networks, mentoring, and professionalized routines (Collewaert et al., 2021; Hellmann & Puri, 2002). However, our findings reveal a surprising effect: The structures intended to professionalize a venture may instead function as straitjackets that suppress the exploitation of serendipitous discoveries. Contrary to the perceived disadvantage of resource scarcity, our results underscore the advantage of bootstrapped ventures through the entrepreneurial resourcefulness lens. Without the need to align unconventional, emergent opportunities with the rigid expectations or reporting cycles of external investors, bootstrapped entrepreneurs have superior strategic discretion (Cunha et al., 2015). This flexibility and autonomy enable them to swiftly pivot and allocate resources toward novel, unconventional, or non-linear ideas that an investment committee may dismiss as too risky or outside the core strategy. Thus, we contribute to entrepreneurship research by showing that the absence of formal monitoring and, consequently, greater autonomy, foster a specific type of resourcefulness: the ability to transform serendipitous discoveries into radical innovations at a faster pace. We argue that alignment friction hinders the realization of serendipity in investor-backed firms.

In summary, we contribute to the literature on serendipity by exploring a moderator related to social dynamics and stakeholder interactions that affects the strength of relationships between serendipity and its outcomes, addressing recent calls by Busch (2022) and Fultz and Hmieleski (2021). Understanding this is important because the process of materialization is likely affected by social dynamics and stakeholder interactions (Busch, 2022). By exploring the primary investor type's moderating role, we illuminate the conditions at the venture level under which serendipity can be best exploited.

We also contribute to the literature on serendipity by revealing the relationship between serendipity and its outcomes. Research on serendipity suggests that entrepreneurs should exploit the potential value inherent in unexpected discoveries through purposeful action. Busch (2022) referred to this process as materialization. Consistent with our SCT framing, the ability of new ventures to materialize serendipity depends on the interplay of cognition (i.e., how entrepreneurs interpret unexpected cues), behavior (i.e., whether actors act upon such cues), and environmental conditions (i.e., whether resource allocation and discretion permit such action). However, extant evidence on the results of the materialization process is limited (Busch, 2022; Cunha et al., 2015; Hilmersson et al., 2021).

To the best of our knowledge, our study is among the first to delineate how serendipity relates to venture-level outcomes (c.f., Fultz & Hmieleski, 2021). Specifically, it suggests that serendipity is positively associated with innovation radicalness and speed in new ventures. These two aspects are important success factors for new ventures (Shan et al., 2016; Slater et al., 2014). The literature has identified several antecedents of both innovation radicalness and innovation speed, including the availability of financial and human resources, dedicated teams, and access to information and learning opportunities (Chen et al., 2010; Slater et al., 2014). However, new ventures tend to be resource-constrained (Grichnik et al., 2014). Accordingly, they may face restricted access to many of the known antecedents to innovation radicalness and innovation speed. Our findings position serendipity as an alternative pathway that may partially compensate for such constraints, as it can redirect ongoing efforts toward high-potential solution paths without requiring fully resourced, formalized search processes. This interpretation is consistent with Fultz and Hmieleski (2021), who found that resource constraints strengthen the relationship between the resourceful behavior of organizational improvisation and serendipity.

5.2. Practical implications

Our findings offer implications for entrepreneurs and investors operating in uncertain and resource-constrained environments. First, entrepreneurs may benefit from deliberately cultivating organizational conditions that increase the likelihood of recognizing and seizing unexpected discoveries. Serendipity unfolds through the interaction of cognition, behavior, and environmental context. Thus, ventures can enhance serendipity's potential by fostering cognitive openness, encouraging experimentation, and allowing strategic flexibility in resource allocation. Rather than exclusively relying on predefined innovation roadmaps, entrepreneurs may consider preserving space for exploratory initiatives and iterative development processes (Gruber et al., 2013). Such practices may be particularly valuable in dynamic or highly competitive industries, where rigid adherence to planned trajectories can limit adaptive responses.

Second, our findings contribute to the ongoing debate about optimal early-stage funding strategies (e.g., Glücksman, 2020; Lafarre & Schoonbrood, 2023). While external capital can accelerate scaling and professionalization, it may also introduce governance structures and performance expectations that shape strategic decision-making (Hellmann & Puri, 2002). Our results suggest that high levels of external control and evaluation pressure may attenuate serendipity's positive effects on innovation radicalness and speed. Bootstrapping, especially in early phases, may preserve strategic discretion and enable founders to pursue unconventional opportunities without immediate justification pressures (Winborg & Landström, 2001). Rather than advocating a universal funding model, our results indicate that while determining their financing strategy, entrepreneurs should carefully weigh the trade-offs between financial resources and strategic autonomy.

Third, entrepreneurs may increase exposure to serendipitous discoveries by engaging in diverse, interdisciplinary networks. Interactions with heterogeneous partners can broaden cognitive frames and heighten the likelihood of encountering unexpected yet valuable insights (Fleming, 2001). Structured formats, such as co-creation workshops, pilot collaborations, or temporary project teams, may further enhance the probability that such insights translate into concrete innovation outcomes.

Furthermore, the findings have important implications for investors. External investors seeking long-term value creation may benefit from balancing governance mechanisms with sufficient entrepreneurial discretion. Monitoring structures which allow flexibility in milestone adaptation, strategic pivots, and resource reallocation may enable ventures to capitalize on unforeseen opportunities. In early-stage contexts characterized by uncertainty, investors may consider funding arrangements which preserve room for experimentation rather than enforcing narrowly predefined development paths (Kaplan & Strömberg, 2004).

Finally, the timing and structure of funding rounds warrant careful consideration. Early and substantial capital injections may facilitate rapid growth while curbing organizational flexibility. Staged financing, milestone renegotiation mechanisms, or hybrid funding approaches that combine bootstrapping with external capital may help reconcile the need for resources with preserving exploratory capacity. Such balanced approaches may enhance the likelihood that ventures leverage serendipitous discoveries without compromising accountability and strategic discipline.

5.3. Limitations and future research directions

Our study has some limitations that warrant further examination. First, we build on cross-sectional data, and thus, cannot draw conclusions about the longitudinal relationships of serendipity with innovation radicalness and speed. Future research can draw on longitudinal data to shed light on the causality of these relationships. Scholars can particularly examine, from a long-term perspective, whether 1) serendipity is desirable in the long run, 2) new ventures can sustain the advantage emerging from the positive relationship between serendipity and innovation speed, and 3) ventures relying on traditional research processes can overcome their initial disadvantage.

Second, our relatively small sample size may limit the findings' generalizability. Although our relatively small sample size is common in founder research (Scheaf et al., 2023) and was addressed by testing for non-response bias, we cannot fully rule out a potential sample bias. Future studies can replicate our findings with larger, more diverse founder populations. Additionally, our reliance on Crunchbase data likely biases our sample toward externally visible, often technology-driven startups with higher-than-average levels of external funding. Therefore, our findings may not be generalizable to less visible or more resource-constrained new ventures.

Third, our research adds to the literature that considers serendipity as positive and desirable. However, serendipity may also foster the discovery of unethical opportunities, such as tax evasion, bribery, or collusion. Hence, future research can further examine the darker side of serendipity as a potential driver of unethical behavior.

Fourth, while we investigated serendipity as a driver of innovation radicalness and speed, other outcomes of serendipity require further analysis. For instance, pivoting away from an initial idea to a seemingly more attractive opportunity is an inherent part of early-stage entrepreneurship (Kirtley & O'Mahony, 2023). Future research can investigate whether serendipitous entrepreneurs and their ventures pivot more frequently and further away from their initial idea, and whether this makes them more successful.

Finally, our findings open additional promising future research avenues. First, scholars can more directly investigate the microfoundations of materialization by examining how individual- or team-level cognition, leadership, and organizational decision-making enable or hinder the conversion of serendipitous discoveries into valuable outcomes. Second, our study raises new questions about investors' role in shaping innovation processes emerging from serendipity. Studies can comprehensively explore how specific investor behaviors, such as value-adding engagement or demands for control, moderate this relationship. Third, our focus on innovation outcomes invites further analysis of whether serendipity also influences other entrepreneurial outcomes such as business model innovation, opportunity recognition, or pivoting behavior (Kirtley & O'Mahony, 2023). Finally, although we build on cross-sectional data, future longitudinal studies can investigate how the effects of serendipity unfold over time, and whether the benefits it provides persist or diminish as ventures mature. In particular, research could explore how serendipity evolves across different venture development stages, particularly whether it diminishes as ventures scale. As scaling becomes increasingly structured and process-driven, it may crowd out the openness and agility that foster serendipitous opportunities. This dynamic warrants further investigation, especially given the growing interest in scaling as a critical entrepreneurial challenge (Coviello et al., 2024).

CRediT authorship contribution statement

Andrea Greven: Writing – review & editing, Validation, Supervision, Project administration, Methodology, Conceptualization. **Jan Poblocki:** Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Denise Fischer-Kreer :** Writing – review & editing, Supervision, Conceptualization. **Christoph Maus:** Writing – review & editing, Conceptualization. **Malte Brettel:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT, DeepL, and Grammarly in to draw inspiration for arguments and improve language and orthography. After using these tools/services, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

References

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and creativity in organizations. *Journal of Management, 40*(5), 1297–1333. https://doi.org/10.1177/0149206314527128

Anokhin, S., & Schulze, W. S. (2009). Entrepreneurship, innovation, and corruption. *Journal of Business Venturing, 24*(5), 465–476. https://doi.org/10.1016/j.jbusvent.2008.06.001

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*(3), 396. https://doi.org/10.2307/3150783

Austin, R. D., Devin, L., & Sullivan, E. E. (2012). Accidental innovation: Supporting valuable unpredictability in the creative process. *Organization Science, 23*(5), 1505–1522. https://doi.org/10.1287/orsc.1110.0681

Baker, T., & Nelson, R. E. (2005). Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly, 50*(3), 329–366. https://doi.org/10.2189/asqu.2005.50.3.329

Bammens, Y., & Collewaert, V. (2014). Trust between entrepreneurs and angel investors. *Journal of Management, 40*(7), 1980–2008. https://doi.org/10.1177/0149206312463937

Bandura, A [Albert]. Self-efficacy. In I. B. Weiner & W. E. Craighead (Eds.), *The Corsini Encyclopedia of psychology* (pp. 1–3). Doi: 10.1002/9780470479216.corpsy0836.

Bandura, A [Albert]. (1986). *Social foundations of thought and action: A social cognitive theory* (1st edition). *Prentice-Hall series in social learning theory*. Prentice-Hall.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52*, 1–26. https://doi.org/10.1146/annurev.psych.52.1.1

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Bascle, G. (2008). Controlling for endogeneity with instrumental variables in strategic management research. *Strategic Organization, 6*(3), 285–327. https://doi.org/10.1177/1476127008094339

Baty, G., & Sommer, B. (2002). True then, true now: A 40-year perspective on the early stage investment market. *Venture Capital, 4*(4), 289–293. https://doi.org/10.1080/1369106022000024914

Baum, C. F. (2006). *An introdcution to modern econiometrics using stata*. A Stata Press Publication.

Benight, C. C., & [Albert] Bandura, A. (2004). Social cognitive theory of posttraumatic recovery: The role of perceived self-efficacy. *Behaviour Research and Therapy, 42*(10), 1129–1148. https://doi.org/10.1016/j.brat.2003.08.008

Berger, A. N., Saunders, A., Scalise, J. M., & Udell, G. F. (1998). The effects of bank mergers and acquisitions on small business lending. *Journal of Financial Economics, 50*(2), 187–229. https://doi.org/10.1016/S0304-405X(98)00036-1

Bonnet, C., & Wirtz, P. (2012). Raising capital for rapid growth in young technology ventures: When business angels and venture capitalists coinvest. *Venture Capital, 14*(2–3), 91–110. https://doi.org/10.1080/13691066.2012.654603

Bradley, S. W., Shepherd, D. A., & Wiklund, J. (2011). The importance of slack for new organizations facing 'tough' environments. *Journal of Management Studies, 48*(5), 1071–1097. https://doi.org/10.1111/j.1467-6486.2009.00906.x

Bradley, S. W., Wiklund, J., & Shepherd, D. A. (2011). Swinging a double-edged sword: The effect of slack on entrepreneurial management and growth. *Journal of Business Venturing, 26*(5), 537–554. https://doi.org/10.1016/j.jbusvent.2010.03.002

Brinckmann, J., & Kim, S. M. (2015). Why we plan: The impact of nascent entrepreneurs' cognitive characteristics and human capital on business planning. *Strategic Entrepreneurship Journal, 9*(2), 153–166. https://doi.org/10.1002/sej.1197

Brown, R. D., & Hauenstein, N. M. A. (2005). Interrater agreement reconsidered: An alternative to the rwg indices. *Organizational Research Methods, 8*(2), 165–184. https://doi.org/10.1177/1094428105275376

Bukowski, A., & Rudnicki, S. (2019). Not only individualism: The effects of long-term orientation and other cultural variables on national innovation success. *Cross-Cultural Research, 53*(2), 119–162. https://doi.org/10.1177/1069397118785546

Busch, C. (2022). Towards a theory of serendipity: A systematic review and conceptualization. *Journal of Management Studies, Article joms.12890. Advance online publication.*. https://doi.org/10.1111/joms.12890

Busch, C., & Barkema, H. (2022). Planned luck: How incubators can facilitate serendipity for nascent entrepreneurs through fostering network embeddedness. *Entrepreneurship Theory and Practice, 46*(4), 884–919. https://doi.org/10.1177/1042258720915798

Busch, C., & Grimes, M. (2023). Serendipity in entrepreneurship, strategy, and innovation—a review and conceptualisation. In S. Copeland, W. Ross, & M. Sand (Eds.), *Serendipity science* (pp. 69–99). Springer International Publishing. https://doi.org/10.1007/978-3-031-33529-7_5.

Chen, C. C., Greene, P. G., & Crick, A. (1998). Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? *Journal of Business Venturing, 13*(4), 295–316. https://doi.org/10.1016/S0883-9026(97)00029-3

Chen, J., Damanpour, F., & Reilly, R. R. (2010). Understanding antecedents of new product development speed: A meta-analysis. *Journal of Operations Management, 28*(1), 17–33. https://doi.org/10.1016/j.jom.2009.07.001

CIA. (2024). *The World Factbook - Europe*. https://www.cia.gov/the-world-factbook/europe/.

Collewaert, V., Filatotchev, I., & Khoury, T. A. (2021). The view of angels from above: Angel governance and institutional environments. *Academy of Management Perspectives, 35*(1), 9–24. https://doi.org/10.5465/amp.2017.0191

Coviello, N., Autio, E., Nambisan, S., Patzelt, H., & Thomas, L. D. (2024). Organizational scaling, scalability, and scale-up: Definitional harmonization and a research agenda. *Journal of Business Venturing, 39*(5), Article 106419. https://doi.org/10.1016/j.jbusvent.2024.106419

Cunha, M. P.e., Clegg, S. R., & Mendonça, S. (2010). On serendipity and organizing. *European Management Journal, 28*(5), 319–330. https://doi.org/10.1016/j.emj.2010.07.001

Cunha, M. P.e., Rego, A., Clegg, S., & Lindsay, G. (2015). The dialectics of serendipity. *European Management Journal, 33*(1), 9–18. https://doi.org/10.1016/j.emj.2014.11.001

DeTienne, D. R., & Cardon, M. S. (2008). *The impact of new venture design on entrepreneurial exit*. Frontiers of Entrepreneurship Research.

Di Pietro, F., Prencipe, A., & Majchrzak, A. (2018). Crowd equity investors: An underutilized asset for open innovation in startups. *California Management Review, 60*(2), 43–70. https://doi.org/10.1177/0008125617738260

Dotzler, F. (2012). Raising the first round of venture capital: What founding teams should understand. *The Journal of Private Equity, 16*(1), 9–12. https://doi.org/10.3905/JPE.2012.16.1.009

Drover, W., Busenitz, L., Matusik, S., Townsend, D., Anglin, A., & Dushnitsky, G. (2017). A review and road map of entrepreneurial equity financing research: Venture capital, corporate venture capital, angel investment, crowdfunding, and accelerators. *Journal of Management, 43*(6), 1820–1853. https://doi.org/10.1177/0149206317690584

Du, Y., & Kim, P. H. (2021). One size does not fit all: Strategy configurations, complex environments, and new venture performance in emerging economies. *Journal of Business Research, 124*, 272–285. https://doi.org/10.1016/j.jbusres.2020.11.059

Dushnitsky, G., & Sarkar, S. (2022). Here comes the sun: The impact of incidental contextual factors on entrepreneurial resource acquisition. *Academy of Management Journal, 65*(1), 66–92. https://doi.org/10.5465/amj.2019.0128

Eisenhardt, K. M., & Tabrizi, B. N. (1995). Accelerating adaptive processes: Product innovation in the global computer industry. *Administrative Science Quarterly, 40*(1), 84. https://doi.org/10.2307/2393701

Ettlie, J. E., & Rosenthal, S. R. (2011). Service versus manufacturing innovation. *Journal of Product Innovation Management, 28*(2), 285–299. https://doi.org/10.1111/j.1540-5885.2011.00797.x

Ferreira, J. J., Raposo, M. L., & Fernandes, C. I. (2013). Does innovativeness of knowledge-intensive business services differ from other industries? *The Service Industries Journal, 33*(7–8), 734–748. https://doi.org/10.1080/02642069.2013.740462

Ferris, G. R., Treadway, D. C., Kolodinsky, R. W., Hochwarter, W. A., Kacmar, C. J., Douglas, C., & Frink, D. D. (2005). Development and validation of the political skill inventory. *Journal of Management, 31*(1), 126–152. https://doi.org/10.1177/0149206304271386

Fink, T. M. A., Reeves, M., Palma, R., & Farr, R. S. (2017). Serendipity and strategy in rapid innovation. *Nature Communications, 8*(1), 2002. https://doi.org/10.1038/s41467-017-02042-w

Fisher, G. (2012). Effectuation, causation, and bricolage: A behavioral comparison of emerging theories in entrepreneurship research. *Entrepreneurship Theory and Practice, 36*(5), 1019–1051. https://doi.org/10.1111/j.1540-6520.2012.00537.x

Fleming, L. (2001). Recombinant uncertainty in technological search. *Management Science, 47*(1), 117–132. https://doi.org/10.1287/mnsc.47.1.117.10671

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39. https://doi.org/10.2307/3151312

Fultz, A. E., & Hmieleski, K. M. (2021). The art of discovering and exploiting unexpected opportunities: The roles of organizational improvisation and serendipity in new venture performance. *Journal of Business Venturing, 36*(4), Article 106121. https://doi.org/10.1016/j.jbusvent.2021.106121

Fultz, A. E. F., & Hmieleski, K. M. (2025). Cultivating and harnessing unexpected opportunities: How monochronic orientation fosters innovation by facilitating serendipity in new firms. *Entrepreneurship Theory and Practice, 49*(6), 1565–1596. https://doi.org/10.1177/10422587251347043

Garud, R., Gehman, J., & Giuliani, A. P. (2018). Serendipity arrangements for exapting science-based innovations. *Academy of Management Perspectives, 32*(1), 125–140. https://doi.org/10.5465/amp.2016.0138

Gaskin, J., Lim, J., & Steed, J. (2022). *Model fit measures Gaskination's StatWiki [computer software]*. Gaskination's StatWiki.

Gatignon, H., Tushman, M. L., Smith, W., & Anderson, P. (2002). A structural approach to assessing innovation: Construct development of innovation locus, type, and characteristics. *Management Science, 48*(9), 1103–1122. https://doi.org/10.1287/mnsc.48.9.1103.174

Glücksman, S. (2020). Entrepreneurial experiences from venture capital funding: Exploring two-sided information asymmetry. *Venture Capital, 22*(4), 331–354. https://doi.org/10.1080/13691066.2020.1827502

Gompers, P., & Lerner, J. (2001). The venture capital revolution. *Journal of Economic Perspectives, 15*(2), 145–168. https://doi.org/10.1257/jep.15.2.145

Govindarajan, V., & Kopalle, P. K. (2006). Disruptiveness of innovations: Measurement and an assessment of reliability and validity. *Strategic Management Journal, 27*(2), 189–199. https://doi.org/10.1002/smj.511

Grichnik, D., Brinckmann, J., Singh, L., & Manigart, S. (2014). Beyond environmental scarcity: Human and social capital as driving forces of bootstrapping activities. *Journal of Business Venturing, 29*(2), 310–326. https://doi.org/10.1016/j.jbusvent.2013.02.006

Gruber, M., MacMillan, I. C., & Thompson, J. D. (2013). Escaping the prior knowledge corridor: What shapes the number and variety of market opportunities identified before market entry of technology start-ups? *Organization Science, 24*(1), 280–300. https://doi.org/10.1287/orsc.1110.0721

Hair, J. F., Black, W. C., & Babin, B. J. (2010). *Multivariate data analysis: A global perspective* ((7th ed., global edition).). Pearson.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial least squares structural equation modeling (PLS-SEM) using R. *Springer International Publishing*. https://doi.org/10.1007/978-3-030-80519-7

Harrell, F. E. (2015). Regression modeling strategies. *Springer International Publishing*. https://doi.org/10.1007/978-3-319-19425-7

Hays, R. D., Hayashi, T., & Stewart, A. L. (1989). A five-item measure of socially desirable response set. *Educational and Psychological Measurement, 49*(3), 629–636. https://doi.org/10.1177/001316448904900315

Hellmann, T., & Puri, M. (2002). Venture capital and the professionalization of start-up firms: Empirical evidence. *The Journal of Finance, 57*(1), 169–197. https://doi.org/10.1111/1540-6261.00419

Hertel, C., Binder, J., & Fauchart, E. (2021). Getting more from many—A framework of community resourcefulness in new venture creation. *Journal of Business Venturing, 36*(3), Article 106094. https://doi.org/10.1016/j.jbusvent.2021.106094

Hill, C. W. L., & Rothaermel, F. T. (2003). The performance of incumbent firms in the face of radical technological innovation. *Academy of Management Review, 28*(2), 257–274. https://doi.org/10.5465/AMR.2003.9416161

Hilmersson, M., Johanson, M., Lundberg, H., & Papaioannou, S. (2021). Serendipitous opportunities, entry strategy and knowledge in firms' foreign market entry. *International Marketing Review, 38*(3), 585–612. https://doi.org/10.1108/IMR-01-2018-0029

Hmieleski, K. M., & Baron, R. A. (2009). Entrepreneurs' optimism and new venture performance: A social cognitive perspective. *Academy of Management Journal, 52*(3), 473–488. https://doi.org/10.5465/amj.2009.41330755

Hmieleski, K. M., Corbett, A. C., & Baron, R. A. (2013). Entrepreneurs' improvisational behavior and firm performance: A study of dispositional and environmental moderators. *Strategic Entrepreneurship Journal, 7*(2), 138–150. https://doi.org/10.1002/sej.1143

Josefy, M., Kuban, S., Ireland, R. D., & Hitt, M. A. (2015). All things great and small: Organizational size, boundaries of the firm, and a changing environment. *Academy of Management Annals, 9*(1), 715–802. https://doi.org/10.5465/19416520.2015.1027086

Kaiser, M., & Berger, E. S. C. (2021). Trust in the investor relationship marketing of startups: A systematic literature review and research agenda. *Management Review Quarterly, 71*(2), 491–517. https://doi.org/10.1007/s11301-020-00191-9

Kaplan, S. N., & Strömberg, P. E. (2004). Characteristics, contracts, and actions: Evidence from venture capitalist analyses. *The Journal of Finance, 59*(5), 2177–2210. https://doi.org/10.1111/j.1540-6261.2004.00696.x

Katila, R., & Ahuja, G. (2002). Something old, something new: A longitudinal study of search behavior and new product introduction. *Academy of Management Journal, 45*(6), 1183–1194. https://doi.org/10.5465/3069433

Kirtley, J., & O'Mahony, S. (2023). What is a pivot? Explaining when and how entrepreneurial firms decide to make strategic change and pivot. *Strategic Management Journal, 44*(1), 197–230. https://doi.org/10.1002/smj.3131

Kleinbaum, D. G., Kupper, L. L., & Muller, K. E. (1988). *Applied regression analysis and other multivariable methods* ((2nd ed.).). Duxberry Press.

Kolokas, D., Vanacker, T., Veredas, D., & Zahra, S. A. (2022). enture capital, credit, and FinTech start-up formation: A cross-country study. *Entrepreneurship Theory and Practice, 46*(5), 1198–1230. https://doi.org/10.1177/1042258720972652

Kumar, N., Stern, L. W., & Anderson, J. C. (1993). Conducting interorganizational research using key informants. *Academy of Management Journal, 36*(6), 1633–1651. https://doi.org/10.5465/256824

Lafarre, A., & Schoonbrood, I. (2023). Entrepreneurial finance. In W. Liebregts, W.-J. van den Heuvel, & A. van den Born (Eds.), *Classroom Companion: Business. Data science for entrepreneurship* (pp. 353–380). Springer International Publishing. https://doi.org/10.1007/978-3-031-19554-9_15.

Lam, L. W. (2012). Impact of competitiveness on salespeople's commitment and performance. *Journal of Business Research, 65*(9), 1328–1334. https://doi.org/10.1016/j.jbusres.2011.10.026

Lazar, M., Miron-Spektor, E., Agarwal, R., Erez, M., Goldfarb, B., & Chen, G. (2020). Entrepreneurial team formation. *Academy of Management Annals, 14*(1), 29–59. https://doi.org/10.5465/annals.2017.0131

Lee, S., & Persson, P. (2016). Financing from family and friends. *Review of Financial Studies, 29*(9), 2341–2386. https://doi.org/10.1093/rfs/hhw031

Lieberman, M. B., & Montgomery, D. B. (1988). First-mover advantages. *Strategic Management Journal, 9*(S1), 41–58. https://doi.org/10.1002/smj.4250090706

Liebregts, W., van den Heuvel, W.-J., & van den Born, A. (Eds.). (2023). *Classroom Companion: Business. Data science for entrepreneurship*. Springer International Publishing. Doi: 10.1007/978-3-031-19554-9.

Manning, S., Rauch, M., & Vavilov, S. (2024). Creating complementarities: How entrepreneurs mobilize crowdfunding and local ecosystems. *Strategic Organization, 22*(4), 734–766. https://doi.org/10.1177/14761270221094800

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science, 2*(1), 71–87. https://doi.org/10.1287/orsc.2.1.71

Merton, R. K., & Barber, E. (2011). *The travels and adventures of serendipity. Princeton University Press*. https://doi.org/10.1515/9781400841523

Meyers, M. A. (2008). Happy accidents: Serendipity in modern medical breakthroughs. *Arcade*.

Michaelis, T. L., Carr, J. C., Scheaf, D. J., & Pollack, J. M. (2020). The frugal entrepreneur: A self-regulatory perspective of resourceful entrepreneurial behavior. *Journal of Business Venturing, 35*(4), Article 105969. https://doi.org/10.1016/j.jbusvent.2019.105969

Miller, B. K., & Chiodo, B. (2009). Academic entitlement: adapting the equity preference questionnaire for a university setting. *Paper Presented at the Southern Management Association Meeting, St. Pete Beach, FL*.

Miller, D., & Friesen, P. H. (1982). Innovation in conservative and entrepreneurial firms: Two models of strategic momentum. *Strategic Management Journal, 3*(1), 1–25. https://doi.org/10.1002/smj.4250030102

Miric, M., Pagani, M., & El Sawy, O. A. (2021). When and who do platform companies acquire? Understanding the role of acquisitions in the growth of platform companies. *MIS Quarterly, 45*(4), 2159–2174. https://doi.org/10.25300/MISQ/2022/16374

Moorman, C., & Miner, A. S. (1998). Organizational improvisation and organizational memory. *Academy of Management Review, 23*(4), 698. https://doi.org/10.2307/259058

Musteen, M., Francis, J., & Datta, D. K. (2010). The influence of international networks on internationalization speed and performance: A study of Czech SMEs. *Journal of World Business, 45*(3), 197–205. https://doi.org/10.1016/j.jwb.2009.12.003

Nijssen, E. J., Hillebrand, B., Vermeulen, P. A., & Kemp, R. G. (2006). Exploring product and service innovation similarities and differences. *International Journal of Research in Marketing, 23*(3), 241–251. https://doi.org/10.1016/j.ijresmar.2006.02.001

O'Connor, G. C., & Rice, M. P. (2013). A comprehensive model of uncertainty associated with radical innovation. *Journal of Product Innovation Management, 30*(S1), 2–18. https://doi.org/10.1111/jpim.12060

Ordanini, A., & Parasuraman, A. (2011). Service innovation viewed through a service-dominant logic lens: A conceptual framework and empirical analysis. *Journal of Service Research, 14*(1), 3–23. https://doi.org/10.1177/1094670510385332

Oudeyer, P.-Y., Gottlieb, J., & Lopes, M. (2016). Intrinsic motivation, curiosity, and learning: Theory and applications in educational technologies. *Progress in Brain Research, 229*, 257–284. https://doi.org/10.1016/bs.pbr.2016.05.005

Panda, S., & Dash, S. (2016). Exploring the venture capitalist – entrepreneur relationship: Evidence from India. *Journal of Small Business and Enterprise Development, 23*(1), 64–89. https://doi.org/10.1108/JSBED-05-2013-0071

Pich, M. T., Loch, C. H., & de Meyer, A. (2002). On uncertainty, ambiguity, and complexity in project management. *Management Science, 48*(8), 1008–1023. https://doi.org/10.1287/mnsc.48.8.1008.163

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology, 63*, 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Prommer, L., Tiberius, V., & Kraus, S. (2020). Exploring the future of startup leadership development. *Journal of Business Venturing Insights, 14*, Article e00200. https://doi.org/10.1016/j.jbvi.2020.e00200

Ritala, P., & Hurmelinna-Laukkanen, P. (2013). Incremental and radical innovation in coopetition—The role of absorptive capacity and appropriability. *Journal of Product Innovation Management, 30*(1), 154–169. https://doi.org/10.1111/j.1540-5885.2012.00956.x

Robson, P. J. A., Akuetteh, C. K., Westhead, P., & Wright, M. (2012). Innovative opportunity pursuit, human capital and business ownership experience in an emerging region: Evidence from Ghana. *Small Business Economics, 39*(3), 603–625. https://doi.org/10.1007/s11187-011-9333-8

Robson, P. J. A., Haugh, H. M., & Obeng, B. A. (2009). Entrepreneurship and innovation in Ghana: Enterprising Africa. *Small Business Economics, 32*(3), 331–350. https://doi.org/10.1007/s11187-008-9121-2

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Ryff, C. D., & Keyes, C. L. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69*(4), 719–727. https://doi.org/10.1037/0022-3514.69.4.719

Salerno, M. S., Gomes, L. A. d. V., Da Silva, D. O., Bagno, R. B., & Freitas, S. L. T. U. (2015). Innovation processes: which process for which project? *Technovation, 35*, 59–70. Doi: 10.1016/j.technovation.2014.07.012.

Sarasvathy, S. D. (2025). *Effectual entrepreneurship* ((3rd ed.).). Taylor & Francis Group.

Scheaf, D. J., Loignon, A. C., Webb, J. W., & Heggestad, E. D. (2023). Nonresponse bias in survey-based entrepreneurship research: A review, investigation, and recommendations. *Strategic Entrepreneurship Journal, 17*(2), 291–321. https://doi.org/10.1002/sej.1453

Schilling, M. A. (2013). *Strategic management of technological innovation* ((4th ed.).). McGraw-Hill.

Sekaran, U., & Bougie, R. (2013). *Research methods for business: A skill-building approach* ((6. ed.).). Wiley.

Shan, P., Song, M., & Ju, X. (2016). Entrepreneurial orientation and performance: Is innovation speed a missing link? *Journal of Business Research, 69*(2), 683–690. https://doi.org/10.1016/j.jbusres.2015.08.032

Simmering, M. J., Fuller, C. M., Richardson, H. A., Ocal, Y., & Atinc, G. M. (2015). Marker variable choice, reporting, and interpretation in the detection of common method variance. *Organizational Research Methods, 18*(3), 473–511. https://doi.org/10.1177/1094428114560023

Slater, S. F., Mohr, J. J., & Sengupta, S. (2014). Radical product innovation capability: Literature review, synthesis, and illustrative research propositions. *Journal of Product Innovation Management, 31*(3), 552–566. https://doi.org/10.1111/jpim.12113

Sommer, S. C., & Loch, C. H. (2004). Selectionism and learning in projects with complexity and unforeseeable uncertainty. *Management Science, 50*(10), 1334–1347. https://doi.org/10.1287/mnsc.1040.0274

Sprong, N., Driessen, P. H., Hillebrand, B., & Molner, S. (2021). Market innovation: A literature review and new research directions. *Journal of Business Research, 123*, 450–462. https://doi.org/10.1016/j.jbusres.2020.09.057

Stefanov, Z. I., Herceg, E., Schmidt, C., Jacobson, D. M., Livingston, D., Chauvel, J. P., Chaudhary, S. K., & Christenson, C. P. (2022). Fundamentals of industrial problem solving. *Wiley*. https://doi.org/10.1002/9781119543169

Strese, S., Keller, M., Flatten, T. C., & Brettel, M. (2018). CEOs' passion for inventing and radical innovations in SMEs: The moderating effect of shared vision. *Journal of Small Business Management, 56*(3), 435–452. https://doi.org/10.1111/jsbm.12264

van Bruggen, G. H., Lilien, G. L., & Kacker, M. (2002). Informants in organizational marketing research: Why use multiple informants and how to aggregate responses. *Journal of Marketing Research, 39*(4), 469–478. https://doi.org/10.1509/jmkr.39.4.469.19117

Vera, D., & Crossan, M. (2005). Improvisation and innovative performance in teams. *Organization Science, 16*(3), 203–224. https://doi.org/10.1287/orsc.1050.0126

Wang, D., Pahnke, E. C., & McDonald, R. M. (2022). The past is prologue? Venture-capital syndicates' collaborative experience and start-up exits. *Academy of Management Journal, 65*(2), 371–402. https://doi.org/10.5465/amj.2019.1312

Winborg, J., & Landström, H. (2001). Financial bootstrapping in small businesses. *Journal of Business Venturing, 16*(3), 235–254. https://doi.org/10.1016/S0883-9026(99)00055-5

Wood, R., & [Albert] Bandura, A. (1989). Social cognitive theory of organizational management. *Academy of Management Review, 14*(3), 361. https://doi.org/10.2307/258173

Xiao, T., Makhija, M., & Karim, S. (2022). A knowledge recombination perspective of innovation: Review and new research directions. *Journal of Management, 48*(6), 1724–1777. https://doi.org/10.1177/01492063211055982

Yaqub, O. (2018). Serendipity: Towards a taxonomy and a theory. *Research Policy, 47*(1), 169–179. https://doi.org/10.1016/j.respol.2017.10.007

Zhao, H., O'Connor, G., Wu, J., & Lumpkin, G. T. (2021). Age and entrepreneurial career success: A review and a meta-analysis. *Journal of Business Venturing, 36*(1), Article 106007. https://doi.org/10.1016/j.jbusvent.2020.106007

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