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Aging and entrepreneurs' emotional exhaustion: The role of entrepreneurial strategy, psychological capital, and felt age gap

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ABSTRACT

In this paper, we draw from the theory of social and emotional aging to examine the mechanisms of age-related emotional exhaustion among entrepreneurs. Based on longitudinal data from a sample of 840 entrepreneurs in four European countries, our study shows that, with increasing biological age, entrepreneurs experience less emotional exhaustion due to their enhanced psychological capital and because they apply less entrepreneurial strategies which focus on the creation of new market opportunities and the development of new products and services. In addition, we highlight the still under-explored role of entrepreneurs' felt age gap by demonstrating that, among the same age-group, individuals who feel younger than their biological age gain well-being benefits because they possess higher levels of psychological capital and become less exhausted from the application of entrepreneurial strategies. In conclusion, our study offers two significant contributions to the literature on entrepreneurial well-being. First, we introduce the concept of the 'Hebe Effect in entrepreneurship', named after the Greek goddess of youth, which demonstrates how feeling younger than one's biological age acts as a buffer against stress and protects entrepreneurs from the strains of entrepreneurship. Second, we deepen understandings of how entrepreneurs' strategic choices evolve over their lifespan and influence their personal well-being. These insights also carry practical implications for aging societies that promote entrepreneurship across individuals' lifespans.

Executive summary: This study addresses a critical gap in the entrepreneurship literature on aging and well-being by examining how age influences emotional exhaustion among entrepreneurs. Despite significant research conducted on aging and entrepreneurship, studies have yet to explore the interplay between biological age, subjective age, and emotional exhaustion. Furthermore, the manner in which entrepreneurs subject themselves to, and protect themselves from, emotional exhaustion across their lifespans remains severely underexplored. This lacuna is particularly striking given global trends of increased life expectancy, the burgeoning number of older individuals engaging in entrepreneurship, and the risks posed by emotional exhaustion to entrepreneurial efforts and individuals' lives, as well as the societal costs related thereto.

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By using the theory of social and emotional aging (SEA), we investigate how biological age and subjective age impact entrepreneurs' emotional exhaustion. Our longitudinal study, based on data from 840 entrepreneurs across four European countries, reveals that older entrepreneurs experience less emotional exhaustion than their younger peers. This is due to their increased psychological capital and reduced engagement in strategies focused on new market opportunities and product development. Additionally, entrepreneurs who subjectively feel younger than their biological age benefit from higher psychological capital and are less affected by the emotional strain of entrepreneurial strategies.

Our research introduces the 'Hebe Effect in entrepreneurship', illustrating that feeling younger than one's biological age serves as a buffer against emotional exhaustion. This effect is mediated by enhanced psychological capital and the strategic choices made by entrepreneurs as they age. By developing and testing the novel Age-Strategy-PsyCap-Exhaustion (ASPE) model, we demonstrate how biological age and felt age gap jointly influence entrepreneurs' emotional exhaustion through psychological capital and strategic choices. The study makes significant contributions to both theory and practice. The concept of the Hebe Effect in entrepreneurship provides a new lens through which to understand how subjective age can protect entrepreneurs from emotional exhaustion. Furthermore, our ASPE model offers a comprehensive framework for explicating the mechanisms through which age-related factors impact entrepreneurial well-being. From a practical perspective, our findings suggest important policy implications for aging societies. Encouraging entrepreneurship among older adults can yield well-being benefits and enhance resilience, thus underscoring the value of an inclusive approach to entrepreneurial support. In addition, specifically tailored support mechanisms that consider both biological and subjective aging can help mitigate emotional exhaustion, thereby fostering sustainable entrepreneurial activities across all ages. In conclusion, this study advances our understanding of the complex relationship between aging and entrepreneurial well-being, offering valuable insights for both academic research and practical applications in promoting a healthy and resilient form of entrepreneurship.

1. Introduction

This study investigates how age shapes the psychological capital and strategic choices of entrepreneurs and ultimately impacts their emotional exhaustion—a precursor to burnout characterized by a profound depletion of emotional resources and energy reserves (Maslach et al., 2001). Recent entrepreneurship research emphasizes the importance of developing our understanding of the mechanisms that contribute to entrepreneurs' emotional exhaustion (Lerman et al., 2021; Obschonka et al., 2023). One factor that helps explain entrepreneurs' emotional exhaustion is aging because it can affect psychological and behavioral changes in entrepreneurs (Baron et al., 2016; Kautonen et al., 2014, 2017; Lévesque and Minniti, 2006). With increasing biological age, individuals change how they invest their resources and manage demands in their work environment (Antoniou et al., 2006; Marchand et al., 2018; Ng and Feldman, 2010), as well as maintain a balance that mitigates emotional exhaustion (Karasek, 1990; Rauch et al., 2018). Psychological and medical research has long emphasized the significant effect of age on emotional exhaustion; however, the existing evidence here is somewhat contradictory (e.g., positive: Kirkcaldy and Martin, 2000; negative: Brewer and Shapard, 2004; non-linear: Marchand et al., 2018), and this relationship remains sparsely studied and poorly understood in entrepreneurship research (Stephan et al., 2023).

The lack of attention in entrepreneurship research to the intersection of aging and emotional exhaustion is particularly striking given the global trends of increased life expectancy and rapid population aging. These trends are extending working careers worldwide and leading to a burgeoning number of individuals who pursue entrepreneurship later in life (Murmann et al., 2023; Sternberg, 2020). It stands to reason that a pressing need exists for refining our understanding of entrepreneurship across various life stages (Lévesque and Minniti, 2011; Mensmann and Zacher, 2020), including so-far overlooked individual variations in subjective aging process (Kautonen et al., 2015; Maalaoui et al., 2022). Complementing biological age with variations in subjective aging is crucial for understanding entrepreneurial behavior (Kautonen et al., 2015) and, consequently, the emotional exhaustion experienced by entrepreneurs across different life stages. Therefore, such a lacuna significantly limits our ability to address emotional exhaustion among entrepreneurs effectively, both at a societal and individual level.

In this paper our aim is to address the gap in scholarly understanding concerning those age-related mechanisms that influence entrepreneurs' emotional exhaustion. To achieve this, we turn to the theory of social and emotional aging (SEA) (Charles and Carstensen, 2010), which proffers a particularly useful theoretical framework for comprehending how aging may assist entrepreneurs in avoiding heightened levels of emotional exhaustion. SEA research suggests that as individuals age, they tend to develop enhanced psychological capacities to maintain personal well-being in uncertain and challenging situations, while also becoming more strategic in avoiding activities that could jeopardize their emotional well-being. (e.g., Carstensen et al., 2000; Charles et al., 2001; Piazza and Charles, 2006). Building on this premise, we propose that the psychological capital accumulated over a lifespan equips entrepreneurs to navigate the multifaceted demands of business venturing, while the adoption of more conservative strategic approaches shields older entrepreneurs from emotional exhaustion. Both mechanisms reduce the threat of emotional exhaustion at higher ages. We complement this focus on biological aging with literature that highlights individual variation in the aging process (Kastenbaum et al., 1972) to suggest that the subjective experience of one's age in relation to biological age—the felt age gap—also influences

entrepreneurs' psychological functioning, choice of activities, and ability to maintain their emotional well-being.

On this theoretical basis, we specify a novel Age-Strategy-PsyCap-Exhaustion (ASPE) model to explain entrepreneurs' emotional exhaustion across different ages. We test our hypotheses by way of a unique and robust longitudinal dataset comprising 840 entrepreneurs, collected in four European countries (Finland, Germany, Italy, and the UK) in 2020. Our findings draw attention to the crucial impact of both biological age and felt age gap in shaping entrepreneurs' emotional exhaustion. Initially, by focusing only on biological age we show that entrepreneurs experience less emotional exhaustion as they grow biologically older due to two mediating factors: (a) as they age biologically, entrepreneurs accumulate more psychological capital, thereby lowering their emotional exhaustion; and (b), as they age biologically, entrepreneurs apply less entrepreneurial strategies involving the constant exploration of new market opportunities and creation of new products and services, thereby similarly lowering their emotional exhaustion. Further, by taking the felt age gap into consideration, we find that feeling younger than one's biological age amplifies the indirect negative effect of biological age on emotional exhaustion because it enhances the beneficial impact of entrepreneurs' psychological capital and leaves them less severely influenced by the strain that stems from applying entrepreneurial strategies as they age biologically.

Our study makes significant contributions to the literature on age and entrepreneurial well-being by revealing mechanisms that explain entrepreneurs' capacities to protect themselves from emotional exhaustion as they grow biologically older (Kautonen et al., 2017; Stephan et al., 2023). Specifically, we introduce the 'Hebe Effect in entrepreneurship', which—named after the Greek goddess of youth—shows that feeling younger than one's biological age protects entrepreneurs of all ages from emotional exhaustion. We demonstrate the importance of individuals' subjective feeling of age in mitigating emotional exhaustion and enhancing the positive influence of biological aging on entrepreneurs' personal well-being. Moreover, we advance the literature's knowledge on how entrepreneurs' strategic choices in running their ventures impact their personal well-being (Kibler et al., 2019; Obschonka et al., 2023). We offer novel evidence on pertinent age-related differences in the choice of entrepreneurial strategies, as well as the implications thereof on personal experiences of entrepreneurship (Kautonen et al., 2015; Lévesque and Minniti, 2006; Murmann et al., 2023). Taken together, our study propels research on the age-entrepreneurship relationship forward by developing our understanding of the crucial interplay of subjective age and entrepreneurs' strategic choices in explaining emotional exhaustion across lifespans (Stephan et al., 2023).

2. Theoretical background and hypotheses

We build on the theory of social and emotional aging (SEA) to view aging as a process that influences entrepreneurs' behavioral choices and well-being through changes in physical capabilities as well as in their social and emotional lives (Charles and Carstensen, 2010). At its core, SEA theory posits that within working-age population biological aging results in physical decline yet is accompanied by specific psychological improvements. For instance, the brain's reduced cognitive functioning, which occurs in the course of biological aging, makes it more challenging for older individuals than for their younger and physically 'fitter' counterparts to cope with fast-paced and novel tasks (Charles and Piazza, 2009). At the same time, biological aging contributes to the accumulation of work and life experience, which imbues individuals with a better awareness of personal priorities and improves capacities to regulate one's emotions and feeling of exhaustion (Charles and Carstensen, 2010). As a result, SEA theory proposes that biological aging contributes positively to personal well-being because older individuals take advantage of their augmented psychological capacities and adjust their activities in accordance with their diminished physiological capabilities (Charles and Carstensen, 2010). Incorporated into the context of entrepreneurship, these theoretical arguments suggest that biological aging influences entrepreneurs' emotional exhaustion due to

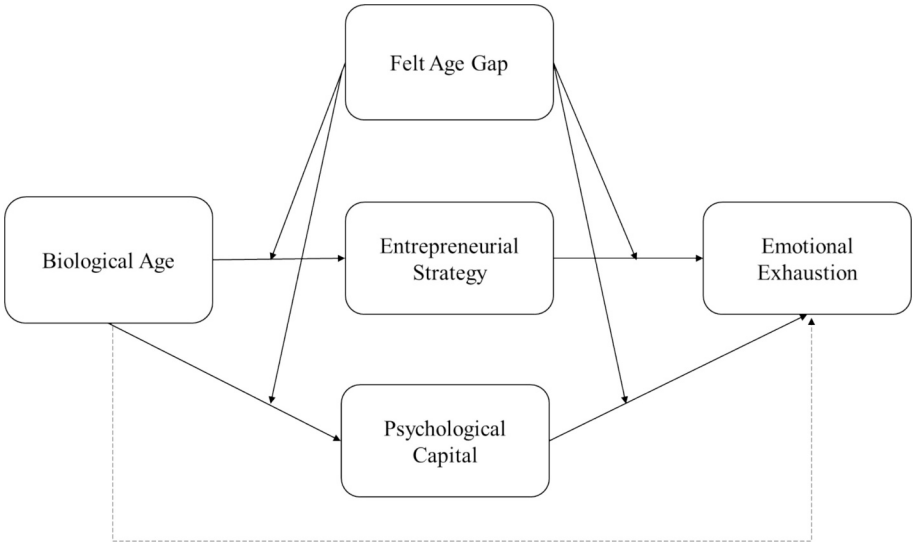

Fig. 1. Age-Strategy-PsyCap-Exhaustion (ASPE) model.

changes in their psychological capital (Luthans et al., 2007), and because entrepreneurs adapt their choice of entrepreneurial strategy (Hitt et al., 2021) in tandem with their biological aging.

Beyond the role played by biological age, aging research has also long recognized that variance exists in individuals' aging processes, which results in discrepancies between how old individuals subjectively feel in comparison to their biological age (Kastenbaum et al., 1972). We refer to this as the *felt age gap*. Here, for instance, individuals who feel younger than their biological age tend to have a 'youthful lifestyle', enjoy good health, and pursue an active social life; in turn, feeling older than one's biological age might indicate a prematurely advanced level of maturity, status, and/or physical decline (Kotter-Grühn et al., 2016).

By complementing the theory of social and emotional aging with research on subjective age, we present a novel Age-Strategy-PsyCap-Exhaustion (ASPE) model (Fig. 1), which portrays biological age, entrepreneurial strategy, psychological capital, and the felt age gap as core factors in explaining entrepreneurs' emotional exhaustion.

2.1. Entrepreneurs' biological age, psychological capital, and emotional exhaustion

Building on the SEA rationale, we first argue that entrepreneurs' biological age indirectly affects emotional exhaustion by inducing psychological changes. SEA maintains that, with increasing biological age, individuals experience higher levels of personal well-being due to specific psychological changes (Charles and Carstensen, 2010). As they biologically age individuals tend to experience negative emotions with less intensity and severity because they have learned to distance themselves from challenging social situations (Charles and Carstensen, 2007), focusing their attention instead on positive experiences in their daily lives (Mather and Carstensen, 2005) and feeling generally optimistic about people and their surrounding environment (Poulin and Cohen Silver, 2008). In terms of self-perceptions, biological aging helps individuals to exude more confidence about both their past and present decision-making (Kim et al., 2008; Pennebaker and Stone, 2003), and to view themselves as unaffected by minor setbacks or stressful situations (Charles and Almeida, 2007).

The SEA theory indicates that entrepreneurs' personal well-being is shaped by age-related changes in their psychological capital which is reflected in an individual's levels of self-efficacy, resilience, hope, and optimism (Luthans et al., 2007). Extant research indicates that psychological capital effectively reduces stress, especially among older entrepreneurs (Baron et al., 2016), and that it enhances individuals' confidence in running their businesses and coping with potential challenges, as well as their hope and optimism in finding necessary solutions and achieving positive outcomes (Hmieleski and Baron, 2008, 2009). Psychological capital thus energizes entrepreneurs (Wiklund et al., 2019) while also reducing the need to stretch the limits of one's skills (Obschonka et al., 2023). It supports entrepreneurs' personal well-being and reduces emotional exhaustion by providing them "with the mental hardiness to effectively cope with job-related demands" (Baron et al., 2016, p. 747).

Prior research indicates that greater biological age is accompanied by skills and attitudes that are beneficial to entrepreneurs (Curran and Blackburn, 2001; Singh and DeNoble, 2003). Despite potential age discrimination (Kibler et al., 2015) and variation between necessity- and opportunity-based entrepreneurs (Leporati et al., 2021; Suchart, 2017), those starting or running their ventures later on in life can efficiently turn their intentions into actions (Gielnik et al., 2018) and develop radically novel innovations (Murmann et al., 2023). We maintain that it is in this way that biological aging is associated with higher levels of psychological capital, which reflect on an individual's "ability to successfully control and have an impact on their environment" (Bakker, 2011, p. 266).

Taken together, these lines of reasoning suggest that biological age has an indirect effect on emotional exhaustion by influencing the level of psychological capital. It follows that we expect psychological capital partially to mediate the relationship between entrepreneurs' biological age and emotional exhaustion. We propose that, with increasing biological age, entrepreneurs attain greater psychological capital, which, in turn, lowers their level of emotional exhaustion.

Hypothesis 1. With increasing biological age entrepreneurs are emotionally less exhausted due to enhanced psychological capital.

2.2. Entrepreneurs' biological age, entrepreneurial strategy, and emotional exhaustion

SEA theory also provides the basis for proposing that entrepreneurs' biological age indirectly affects emotional exhaustion by influencing their entrepreneurial strategies. SEA suggests that, with increasing biological age, individuals' more profound life goals change because they conceive of time differently than at a younger biological age (Carstensen, 2006; Carstensen et al., 1999). Whereas young adults tend to view their remaining time as endless and focus their efforts on acquiring new experiences and testing various opportunities, the shorter time horizon associated with aging drives individuals to value happiness and the wish to lead a meaningful life in the present (Carstensen et al., 1999; Charles and Carstensen, 2010; Lang and Carstensen, 2002). Therefore, as they biologically age individuals become more enticed to engage in activities that help them to maintain emotional stability and avoid negative experiences and exhaustion, while a younger age is associated with a higher likelihood of pursuing career success without a pronounced concern for personal well-being (Charles, 2010). Evidently, "when people employ strategies that allow them to avoid negative emotional experiences, they experience higher levels of well-being" (Charles and Carstensen, 2010, p. 8).

SEA theory suggests that age-related differences in well-being are induced by changes in entrepreneurial behavior. Prior research provides an indication of the motivations and start-up rates that pertain at different biological age groups (Brieger et al., 2021; Kautonen and Minniti, 2014; Pilkova et al., 2014) as well as age-related changes in entrepreneurial behavior (Gielnik et al., 2018; Kautonen et al., 2015). For instance, a recent study shows that at higher biological age entrepreneurs tend to emphasize control and choose their activities more carefully, while younger individuals are eager to execute innovations quickly in order to compete in the markets (Ching et al., 2019). Concomitantly, at an older biological age, entrepreneurs introduce fewer innovations to the market, while

their younger counterparts generate a greater number of innovations so as continuously to improve their product/service offering and processes (Murmann et al., 2023). Based on this, we suggest that entrepreneurs' biological age can influence the choice of entrepreneurial strategies—defined as the extent to which they react to changes in markets, experiment with novel services/products, and pursue new opportunities for their ventures (Hitt et al., 2021; Sirmon et al., 2007). Specifically, as entrepreneurs grow older, they may lose some of the drive exhibited by younger entrepreneurs constantly to pursue future gains and willingly put themselves 'on the line' more frequently. In practice, they might apply less entrepreneurial strategies than younger entrepreneurs (Lévesque and Minniti, 2006).

Variation in such age-related choices of entrepreneurial strategy can shed light on the contradictory evidence that prevails concerning the positive-versus-negative personal implications of entrepreneurship (see Baron et al., 2016; Obschonka et al., 2023). New ventures are essentially required to develop their distinct offering so as to compete in the market (Cefis and Marsili, 2006), and failure to do so can result in venture failure and cause financial and personal suffering for an entrepreneur (Ucbasaran et al., 2013). Nevertheless, creating novel products/services to pursue new market opportunities is a demanding task and, hence, the application of entrepreneurial strategies can form a source of uncertainty and stress (Baron et al., 2016; Van Gelderen et al., 2015). Choosing to apply an entrepreneurial strategy requires substantial work effort and engagement, which can hamper personal well-being and result in emotional exhaustion should an individual be unprepared to deal with this type of professional burden (Sonnentag et al., 2022; Sonnentag and Fritz, 2015; Vallerand et al., 2010). Therefore, although opportunity-driven entrepreneurship supports personal well-being by providing independence and autonomy (Benz and Frey, 2008; Shir et al., 2019), the extensive application of entrepreneurial strategies can lower personal well-being and result in emotional exhaustion. At the same time, we acknowledge that refraining from the development of new products/services—which is often the case in mundane self-employment or the necessity-driven entrepreneurship into which individuals are 'pushed' so as to achieve adequate financial conditions—can be personally draining (Kautonen et al., 2017; Wainwright and Kibler, 2014). This notwithstanding, the ability to choose to refrain from constantly seizing new market opportunities and developing novel services/products may protect an entrepreneur from emotional exhaustion.

In sum, we suggest that biological age has an indirect effect on emotional exhaustion by influencing entrepreneurial strategies. Hence, we suggest that entrepreneurial strategies partially mediate the relationship between entrepreneurs' biological age and emotional exhaustion. We propose that, with increasing biological age, entrepreneurs apply less entrepreneurial strategies, which, in turn, lowers their level of emotional exhaustion.

Hypothesis 2. With increasing biological age entrepreneurs are emotionally less exhausted because they apply less entrepreneurial strategies.

2.3. Beyond effects of biological age: the role of an entrepreneur's felt age gap

We know from the literature on aging that, alongside biological aging, it is individuals' subjective age that shapes their behavior and psychological functioning (Kotter-Grühn et al., 2016; Kwak et al., 2018). In particular, among individuals of the same biological age, those who feel younger than their biological age—i.e., have a lower subjective age relative to their biological age—tend to enjoy better mental and physical health, and more frequently entertain vibrant social relations and act as if they were biologically young (Montepare, 2009). In contrast, within the same biological age-group, those feeling older than their biological age—i.e., have a higher subjective age relative to their biological age—are likelier to exhibit physical, social, and psychological characteristics typical to older individuals, such as lowered physiological health, a settled lifestyle, and the desire to avoid strain or conflict (Heimrich et al., 2022; Kotter-Grühn et al., 2016). On this basis, we argue that there is a need to extend the prevalent focus of entrepreneurship research on biological aging in order to comprehend more fully how the discrepancy between subjective age and biological age—what we term the 'felt age gap'—matters in entrepreneurship. We therefore complement mediation Hypotheses 1 and 2 by examining how a felt age gap moderates these mediated relationships.

2.3.1. The moderating role of the felt age gap in the mediated effect of biological age on emotional exhaustion through psychological capital

Building on the literature on subjective aging (Kastenbaum et al., 1972; Montepare, 2009), we propose that the experience of a gap between one's subjective and biological age can shape how individuals' biological age influences their psychological capacities, and how these affect their emotional exhaustion. Among the same age group, individuals who perceive themselves as older than their biological age often interpret their surroundings more negatively and feel more easily overwhelmed by future challenges. They perceive the experiences they have accumulated over their lifespan more as a burden that reminds them of challenging situations already overcome in the past, which they wish not to face again in order to maintain their health (Bachem et al., 2019; Wurm and Schüz, 2015). For these individuals, experiences gained from overcoming challenges are psychological ballast in the sense of a negative shadow upon their past rather than a reservoir for tackling future challenges (Zacher and Frese, 2009, 2011). In contrast, among the same age group, individuals who feel younger than their biological age—that is, those who are subjectively juvenescent—are more likely to view themselves and their surroundings positively, to feel more confident, and to consider themselves well-equipped to cope with potential problems (Aftab et al., 2022; Mirucka et al., 2016), chiefly because they view the psychological capacities they have accumulated over their lives as beneficial for tackling future challenges (Zacher and Frese, 2009, 2011). This view is reflected in an enhanced appreciation of such individuals' psychological capital (Luthans et al., 2007).

Effectively using one's capacities requires their holder to interpret them as beneficial for addressing a given challenge (Blanchard-Fields et al., 1997). Because individuals who feel older than their biological age interpret their psychological capacities more negatively than others in the same age group, they use these less effectively to buffer stress and protect them from stress effects, such as

emotional exhaustion (Baumeister et al., 2001; Cameron, 2008). For them a reservoir of psychological capital is less useful for reducing emotional exhaustion than it is for individuals of the same biological age who feel younger. Because those who feel younger than their biological age perceive their psychological capital as instrumental in mastering future challenges (Youssef-Morgan and Dahms, 2017), they use their psychological capital to buffer stress and reduce emotional exhaustion more effectively than others of the same biological age who feel older.

Based on these arguments, we propose that a larger felt age gap, in terms of feeling younger than one's biological age, strengthens the indirect effect of biological age on emotional exhaustion through psychological capital.

Hypothesis 3. The felt age gap moderates the indirect negative effect of biological age on emotional exhaustion through psychological capital, such that the indirect negative effect on emotional exhaustion becomes stronger as the felt age gap increases in terms of feeling younger than one's biological age.

2.3.2. The moderating role of the felt age gap in the mediated effect of biological age on emotional exhaustion through entrepreneurial strategy

Moreover, we suggest that a felt age gap can shape the effect of biological age on the application of entrepreneurial strategies and the degree to which the application of entrepreneurial strategies affects emotional exhaustion. Analogously to our arguments above, we build on the observation that subjective age impacts how individuals interpret, and hence react to, challenges. In the same age group, those who feel older than their biological age focus on protecting the status quo rather than embarking on risky new ventures which could harm their personal well-being (Baltes and Baltes, 1990; Ebner et al., 2006; Kooij et al., 2013). Higher subjective age has also been found to be associated with smaller volumes of regional gray matter in the brain and older predicted brain age, thus implying a lower neurocognitive capacity for creative tasks (Kwak et al., 2018). Alongside biological aging, the older that individuals feel in comparison to their biological age, the less their behavior is shaped by a desire to grow and develop, and the more relevant it becomes to protect their property and health (Baltes and Baltes, 1990; Ebner et al., 2006; Kooij et al., 2013). It follows that individuals who feel older than they are biologically may avoid the risk and creative challenges involved in implementing entrepreneurial strategies, thus shaping the way in which their biological aging leads to behavioral changes that carry consequences for their well-being. In contrast, those who feel younger than their biological age embrace new opportunities more commonly than peers in their biological age-group (Maalaoui et al., 2022) because they believe that plenty of energy and time remain available to them (Kautonen et al., 2015; Zacher and Frese, 2009, 2011), as well as because they possess the 'cognitive flexibility' necessary for rapid decision-making when implementing an entrepreneurial strategy (Baron et al., 2011; Hatak and Zhou, 2021).

Furthermore, the older that individuals feel compared to their biological age, the worse their physical and mental functioning (Aftab et al., 2022). An inability to meet the physical and cognitive demands inherent in the pursuit of entrepreneurial strategies overtaxes such individuals, who eventually develop emotional exhaustion as a reaction to stress (Bakker and Demerouti, 2007; Rauch et al., 2018). Hence, those who feel older than their biological age will be more emotionally exhausted when pursuing entrepreneurial strategies than their peers of the same biological age who feel younger. In contrast, due to its physical, mental, and social benefits, a lower subjective age helps entrepreneurs to cope well with stress and burdensome tasks (Wettstein et al., 2021). Consequently, among individuals of the same biological age, those who feel younger are better equipped to manage the strain and work demands induced by the application of an entrepreneurial strategy (Hatak and Zhou, 2021).

Taken together, we therefore argue that a larger felt age gap in terms of feeling younger than one's biological age strengthens the indirect negative impact of biological age on emotional exhaustion through the application of entrepreneurial strategies.

Hypothesis 4. The felt age gap moderates the indirect negative effect of biological age on emotional exhaustion through entrepreneurial strategy, such that the indirect negative effect on emotional exhaustion becomes stronger as the felt age gap increases in terms of feeling younger than one's biological age.

3. Methods

3.1. Data and sample

We test our Age-Strategy-PsyCap-Exhaustion (ASPE) model through data collected via online surveys in four European countries—Finland, Germany, Italy, and the UK, all of which are experiencing rapid population aging (United Nations, 2017)—over three waves in three-month intervals during 2020.

The data were gathered by using the data collection and management company Bilendi and their proprietary panel, which is representative of the entire adult population in those countries. The Bilendi Panel has been used in several prior entrepreneurship studies (e.g., Kibler et al., 2019; Obschonka et al., 2023). The first survey targeted a total of 4000 individuals randomly selected by Bilendi from those identified ex ante as being entrepreneurs within their panel (1000 entrepreneurs per country). We also confirmed the eligibility of survey participants by inquiring about their current business ownership status and whether they exerted executive decision-making power in their business.

The first wave of the survey was conducted in May 2020 with a total of 2057 participants (504 from Finland, 518 from Germany, 512 from Italy, and 523 from the UK). This represents a response rate of 51.4 % of the 4000 entrepreneurs initially contacted for the study. The second wave targeted all 2057 participants from the first wave and was conducted in August 2020. We received responses from a total of 1326 entrepreneurs (302 from Finland, 359 from Germany, 320 from Italy, and 345 from the UK), yielding a total response rate of 64.5 %. The third wave, collected in November 2020, targeted those entrepreneurs who had responded in Wave Two. We received responses from a total of 1000 entrepreneurs (242 from Finland, 226 from Germany, 256 from Italy, and 276 from the

UK), yielding a total response rate of 75.4 %. To qualify for inclusion in our study, in each wave we ensured that entrepreneurs were still operating the same business and that the same respondent was replying. After applying this criterion and accounting for missing values we rendered 840 qualifying responses (206 from Finland, 197 from Germany, 217 from Italy, and 220 from the UK), which thus forms our final sample. Among the entrepreneurs in our final sample, 65.60 % identified as male and 34.40 % as female, and over half of the participants (55.71 %) held a university degree. The average age in our sample was 49.52 years (SD = 11.75), with a minimum age of 19 years and maximum age of 82 years. Of the respondents 13.10 % belong to the youngest age group (under 35 years of age), 25.83 % to the age group 35–45 years of age, 26.90 % to the age group 46–55 years of age, and 34.17 % to the oldest age group (over 55 years of age).

We examined potential attrition bias (Lynn, 2009; Taris and Kompier, 2014) in terms of our outcome variable of emotional exhaustion and our control variable of firm performance, as more emotionally exhausted entrepreneurs or poorly performing firms may have dropped out from the survey. We compared the mean values of emotional exhaustion and firm performance for those who participated in Waves 2 and 3 of the survey with the mean values of emotional exhaustion and firm performance for those who participated only in the second wave. The differences in the means of emotional exhaustion and firm performance between these groups are minor and not statistically significant (emotional exhaustion: t-statistic: −1.505, p = .133; firm performance: t-statistic: 0.191, p = .849).

3.2. Measures

To test our hypotheses, we used data from different waves. Biological age and majority of the control variables stem from Wave 1. Concentrating the data collection of the respondents' demographics to Wave 1 allowed us to limit the length of the survey during each wave of data collection and to support maximum participation. The moderators and mediators of our model, i.e., felt age gap, entrepreneurial strategy, and psychological capital, stem from Wave 2, and the dependent variable of emotional exhaustion stems from Wave 3. We followed the research guideline that the time lag should fit the process under observation (Podsakoff et al., 2003). We chose a time lag of three months between the waves, based on insights from experimental studies and neuro-science research that characterizes psychological capital as a resource that can change in relatively short periods of time (Dello Russo and Stoykova, 2015; Ertosun et al., 2015; Luthans et al., 2010, 2015; Peterson et al., 2008). Youssef-Morgan (2014) explicitly recommends a time lag of six months or less for studies on psychological capital.

Biological age (independent variable from Wave 1).

To measure entrepreneurs' biological age, we asked for their year of birth and from this calculated their age in years.

Felt age gap (moderator from Wave 2).

We assessed entrepreneurs' felt age gap by first asking the entrepreneurs' subjective age in years (“Please, indicate in years the age that most closely corresponds to the age you generally feel”) (Kastenbaum et al., 1972), and subtracted this value from their biological age (Chen et al., 2018; Kautonen et al., 2017). Positive values mean that respondents feel younger than their biological age, while negative values mean that respondents feel older than their biological age.

Entrepreneurial strategy (mediator from Wave 2).

We measured entrepreneurial strategy by using Hitt et al.'s (2021) three-item entrepreneurial strategy scale, which captures a firm's strategic actions to create new market opportunities and, thereby, deliver superior value to customers. Specifically, respondents were questioned about the extent to which they currently (1) “highlight commitment to producing new products/services”; (2) “focus on creating new products/services and/or new markets”; and (3) “let the creation of new markets and/or new products drive competitive actions”. Participants' responses ranged from 1 (‘apply not at all’) to 7 (‘fully apply’). The Cronbach's alpha for this measure is 0.89.

Psychological capital (mediator from Wave 2).

We assessed psychological capital by using Luthans et al.'s (2007) short 12-item scale, which—measuring an individual's current self-efficacy, hope, resilience, and optimism—was specifically developed for self-assessment and has been previously applied in entrepreneurship research (Baron et al., 2016). The seven-point Likert scale ranged from 1 (‘strongly disagree’) to 7 (‘strongly agree’). We adapted the wording of the scale to the entrepreneurship context. Sample items here include: “I feel confident representing my business in meetings with business partners”, and “I feel confident in deciding on my business strategy” (for self-efficacy); “Right now, I see myself as being pretty successful at work”, and “Should I have too much work, I could think of many ways to get out of it” (for hope); “I can get through difficult times at work because I have experienced difficulties before”, and “I usually take stressful things at work easy” (for resilience); and “I always look on the bright side of things regarding my business”, and “I am optimistic about what will happen to my business in the future” (for optimism). The Cronbach's alpha for this measure is 0.90.

Emotional exhaustion (dependent variable from Wave 3).

Table 1
Correlations and descriptive statistics.

	Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Emotional exhaustion	2.52	0.86	1.00																			
2	Entrepreneurial strategy	4.42	1.45	0.11	1.00																		
3	Psychological capital	5.09	0.92	−0.28	0.28	1.00																	
4	Biological age	49.52	11.75	−0.25	−0.25	0.09	1.00																
5	Felt age gap	7.51	10.94	−0.21	0.03	0.19	0.32	1.00															
6	Gender	1.34	0.48	0.18	0.01	−0.10	−0.15	−0.02	1.00														
7	Education	1.44	0.50	0.01	−0.09	−0.06	0.12	0.00	−0.05	1.00													
8	Emotional exhaustion (T3-T2)	−0.02	0.58	0.39	0.01	0.00	−0.05	0.04	−0.04	0.02	1.00												
9	Firm age	22.87	16.24	−0.12	−0.01	0.09	0.33	0.11	−0.13	−0.02	−0.06	1.00											
10	Firm size	488.09	4866.29	0.02	0.03	−0.01	−0.03	−0.01	−0.02	−0.07	0.00	0.07	1.00										
11	Type of business: product	0.16	0.37	0.07	0.14	0.00	−0.12	−0.03	−0.04	−0.02	−0.01	0.04	−0.02	1.00									
12	Type of business: service	0.58	0.49	0.00	−0.11	−0.04	0.05	0.01	0.05	−0.09	−0.05	−0.06	0.05	−0.52	1.00								
13	Type of business: trade	0.18	0.39	−0.06	0.03	0.06	0.01	−0.01	−0.05	0.13	0.04	0.01	−0.03	−0.21	−0.56	1.00							
14	Type of business: other	0.07	0.26	−0.01	−0.03	−0.02	0.06	0.04	0.03	0.01	0.05	0.04	−0.02	−0.12	−0.33	−0.13	1.00						
15	Firm performance	2.09	0.51	−0.16	0.12	0.31	0.00	0.12	−0.04	0.03	0.07	0.09	0.08	0.07	−0.06	0.02	−0.02	1.00					
16	Country: Finland	0.25	0.43	−0.05	0.00	−0.11	−0.01	−0.01	−0.01	0.09	0.00	−0.17	−0.04	−0.02	0.02	−0.04	0.05	−0.04	1.00				
17	Country: Germany	0.23	0.42	−0.10	−0.04	0.22	−0.03	0.02	0.01	−0.11	0.02	0.09	0.09	−0.05	0.06	−0.01	−0.04	0.08	−0.32	1.00			
18	Country: Italy	0.26	0.44	0.04	0.15	−0.08	−0.04	−0.01	−0.02	0.07	−0.05	0.10	−0.02	0.10	−0.10	0.07	−0.06	0.05	−0.34	−0.33	1.00		
19	Country: UK	0.26	0.44	0.10	−0.11	−0.02	0.07	0.00	0.01	−0.05	0.03	−0.03	−0.03	−0.03	0.02	−0.02	0.04	−0.08	−0.34	−0.33	−0.35	1.00	
20	Growth intentions	4.06	1.17	−0.13	0.07	0.15	0.06	0.11	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	−0.01	0.22	−0.01	−0.04	0.10	−0.05	1.00
21	Environmental uncertainty	4.24	1.44	−0.21	0.09	0.45	−0.02	0.15	−0.02	0.00	0.04	0.05	0.01	0.09	−0.10	0.02	0.03	0.32	0.01	0.17	−0.12	−0.05	0.17

$n = 840$.
Correlations greater than ±0.07 are statistically significant at $p < .05$, two-tailed.
Gender: 1 = Male, 2 = Female.
Education: 1 = University degree, 2 = No university degree.

Table 2
Regression results.

Variables	Emotional exhaustion						Psychological capital			Entrepreneurial strategy		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Gender: woman	0.33***	0.29***	0.27***	0.28***	0.29***	0.30***	−0.18**	−0.16**	−0.16**	0.04	−0.05	−0.06
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.10)	(0.10)	(0.10)
Education: no university degree	0.05	0.10	0.08	0.07	0.11*	0.10*	−0.11*	−0.13*	−0.14*	−0.32**	−0.23*	−0.22*
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.10)	(0.10)	(0.10)
Emotional exhaustion (T3-T2)	0.35***	0.35***	0.34***	0.35***	0.35***	0.35***	−0.03	−0.02	−0.03	0.02	0.01	−0.00
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)
Firm age	−0.06*	0.00	0.00	0.00	−0.00	−0.00	0.03	0.00	0.00	−0.05	0.07	0.07
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)
Firm size	0.04	0.03	0.02	0.02	0.03	0.02	−0.04	−0.04	−0.04	0.03	0.02	0.02
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)
Type of business: product	0.28*	0.20	0.20	0.19	0.18	0.16	−0.02	0.01	0.04	0.48*	0.33	0.34
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)	(0.22)	(0.21)	(0.21)
Type of business: service	0.08	0.06	0.07	0.07	0.06	0.06	0.07	0.08	0.09	−0.01	−0.04	−0.03
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)	(0.11)	(0.11)	(0.19)	(0.19)	(0.19)
Type of business: trade	−0.03	−0.07	−0.04	−0.05	−0.07	−0.09	0.18	0.20	0.22	0.22	0.16	0.17
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)	(0.21)	(0.21)	(0.21)
Firm performance	−0.17**	−0.18***	−0.14**	−0.13*	−0.19***	−0.18***	0.30***	0.31***	0.31***	0.25*	0.23*	0.21*
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.10)	(0.10)	(0.10)
Country: Finland	−0.19**	−0.21**	−0.23**	−0.23**	−0.22**	−0.24***	−0.17*	−0.17*	−0.19*	0.27	0.24	0.24
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.14)	(0.13)	(0.13)
Country: Germany	−0.21**	−0.24***	−0.21**	−0.22**	−0.24***	−0.25***	0.21**	0.22**	0.22**	0.06	−0.01	−0.01
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.14)	(0.14)	(0.14)
Country: Italy	−0.03	−0.07	−0.08	−0.08	−0.10	−0.10	−0.10	−0.08	−0.08	0.58***	0.49***	0.48***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.08)	(0.14)	(0.13)	(0.13)
Growth intentions	−0.07**	−0.06*	−0.05*	−0.05	−0.06*	−0.06*	0.06*	0.06*	0.05	0.03	0.06	0.05
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)
Environmental uncertainty	−0.14***	−0.15***	−0.10***	−0.10***	−0.15***	−0.14***	0.34***	0.34***	0.32***	0.10	0.08	0.07
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)
Biological age		−0.18***	−0.17***	−0.14***	−0.16***	−0.13***		0.08**	0.06		−0.36***	−0.41***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)		(0.03)	(0.03)		(0.05)	(0.06)
Psychological capital			−0.12***	−0.12***								
			(0.03)	(0.03)								
Entrepreneurial strategy					0.08**	0.07**						
					(0.03)	(0.03)						
Felt age gap				−0.10***		−0.11***			0.08**			0.15**
				(0.03)		(0.03)			(0.03)			(0.05)
Biological age × felt age gap									0.08**			−0.01
									(0.03)			(0.05)
Psychological capital × felt age gap				0.04								
				(0.02)								
Entrepreneurial strategy × felt age gap						0.07**						
						(0.02)						
Model F-statistics	23.68	26.07	26.09	24.47	25.21	24.70	22.99	22.08	20.83	4.66	7.60	7.21
R-squared	0.287	0.322	0.337	0.349	0.329	0.351	0.281	0.287	0.301	0.073	0.122	0.130
Adj R-squared	0.275	0.310	0.324	0.335	0.316	0.337	0.268	0.274	0.287	0.058	0.106	0.112

Note: n = 840 in all models; the table reports standardized regression coefficients (β) with standard errors in parentheses. ***p < .001, **p < .01, *p < .05. Two-tailed tests. Reference category for "Type of business" is "Other". Reference category for "Country" is "UK".

We measured emotional exhaustion with Maslach et al.'s (2001) five-item scale. On a scale ranging from 1 ('never') to 5 ('always') participants reported on how often they currently experienced "being tired", "being wiped out", "feeling run-down", "feeling rejected", and "being exhausted". This scale also has good reliability, with a Cronbach's alpha of 0.90.

Control variables (from Wave 1 if not otherwise mentioned).

At the individual level, the tendency to experience emotional exhaustion might differ depending on gender (Purvanova and Muros, 2010) or education (Schaufeli et al., 2017). Therefore, we controlled for these possible effects by asking entrepreneurs to indicate their gender (which we coded '1' for male and '2' for female) and whether they hold a university degree (which we coded '1' for university degree and '2' for no university degree). Similar to prior studies on emotional exhaustion (e.g., Lin et al., 2019), we controlled for the prior level of an entrepreneur's emotional exhaustion as a baseline. To avoid issues caused by multicollinearity (i.e., the values from Wave 2 and Wave 3 are highly correlated), we used the difference score calculated as an entrepreneur's emotional exhaustion at Wave 2 subtracted from their emotional exhaustion at Wave 3 (labeled as "Emotional exhaustion T3-T2").

At the firm level, we controlled for the firm's age by asking for the year in which the business was founded and calculated firm age in years from this, as well as for the firm's size measured by the number of employees. We also controlled for the type of business; here, options for answers were: production, provision of services, trade, and other (all coded as dummy variables). We further controlled for firm performance in Wave 2 by asking respondents to indicate how their firm had performed during the last three months vis-à-vis their most important competitor (Lubatkin et al., 2006). Options for answers were: worse (coded as '1'), similar (coded as '2'), and better (coded as '3'). We also controlled for a respondent's country; here, options for answers were: Finland, Germany, Italy, and the UK (all coded as dummy variables). In addition, we controlled for a firm's growth intentions by asking in Wave 2 about the entrepreneur's growth plans for the business in the next three months. Participants reported their growth intensions ranging from 1 ('substantially shrink my business') to 7 ('substantially grow my business'). Finally, we controlled for the perceived uncertainty of the market environment in Wave 2 by asking the entrepreneur to evaluate how they perceive the environment for running their business. Participants reported perceived environmental uncertainty ranging from 1 ('extremely uncertain') to 7 ('extremely certain').

4. Results

Table 1 provides descriptive statistics and bivariate correlations. We standardized all nonbinary variables before creating interaction terms and included all consecutive terms in our regression equations (Brambor et al., 2006). To assess multicollinearity, we calculated variance inflation factor (VIF) scores. All VIFs are well below the conservative cut-off value of 5.0 (Studenmund and Cassidy, 1992): the highest VIF is 1.57 for model means and 3.84 for individual variables, thus suggesting that multicollinearity does not affect the results.

We tested our hypotheses in combination with ordinary least-squares (OLS) regressions by using Stata 18.0 and Hayes' (2022) PROCESS version 4.3. We report the results of the regression analysis in Table 2. Models 1, 7, and 10 report the baseline models with only control variables included. Model 2 includes the direct effect of an entrepreneur's biological age on emotional exhaustion, which is negative and significant ($\beta = -0.18$, $p < .001$), indicating that with higher biological age entrepreneurs become less emotionally exhausted.

We test Hypothesis 1, which predicted that with increasing biological age entrepreneurs are emotionally less exhausted due to enhanced psychological capital, in Models 8 and 3. Model 8 shows that an entrepreneur's biological age has a positive significant relationship with psychological capital (Model 8: $\beta = 0.08$, $p < .01$), and Model 3 shows that psychological capital has a significant negative relationship with emotional exhaustion once biological age is controlled for (Model 3: $\beta = -0.12$, $p < .001$). To further test the indirect effects, we employed PROCESS mediation model 4. The indirect effect of biological age on emotional exhaustion via psychological capital is −0.011. The bias-corrected bootstrapped (10,000 samples) confidence intervals (95 %) for the indirect effects do not contain zero (LLCI: −0.228, ULCI: −0.118), which indicates that the indirect effect is significant. Of the total effect 5.98 % is mediated through psychological capital. Thus, we find a partial mediation, which supports Hypothesis 1.

We test Hypothesis 2, which predicted that with increasing biological age entrepreneurs are emotionally less exhausted because they apply less entrepreneurial strategies, in Models 11 and 5. Model 11 shows that an entrepreneur's biological age has a significant negative relationship with entrepreneurial strategy (Model 11: $\beta = -0.36$, $p < .001$), and Model 5 shows that entrepreneurial strategy has a significant positive relationship with emotional exhaustion once biological age is controlled for (Model 5: $\beta = 0.08$, $p < .01$). To further test the indirect effects, we again employed PROCESS mediation model 4. The indirect effect of biological age on emotional exhaustion via entrepreneurial strategy is −0.019. The bootstrapped (10,000 samples) confidence intervals (95 %) for the indirect effects do not contain zero (LLCI: −0.035, ULCI: −0.062), indicating that the indirect effect is significant. Of the total effect 10.5 % is mediated through entrepreneurial strategy, indicating a partial mediation. Thus, Hypothesis 2 is supported.

Prior to addressing our moderated mediation hypothesis, we explored how felt age gap affects each of the separate relationships within our Age-Strategy-PsyCap-Exhaustion (ASPE) model. While felt age gap moderates the relationship between an entrepreneur's biological age and psychological capital (Model 9: $\beta = 0.08$, $p < .01$), it does not moderate the relationship between psychological capital and emotional exhaustion (Model 4: $\beta = 0.04$, $p = .114$). Furthermore, although felt age gap does not moderate the relationship between biological age and entrepreneurial strategy (Model 12: $\beta = -0.01$, $p = .885$), it does moderate the relationship between entrepreneurial strategy and emotional exhaustion (Model 6: $\beta = 0.07$, $p < .01$). These findings suggest the potential occurrence of moderated mediation, which we explore next.

Hypothesis 3 predicted that felt age gap moderates the indirect negative effect of biological age on emotional exhaustion via

psychological capital. The results were tested with PROCESS model 58, with felt age gap moderating the path from biological age to psychological capital and from psychological capital to emotional exhaustion. The bootstrapped confidence intervals (95 %) show that when entrepreneurs feel older than their biological age, the indirect effect of biological age on emotional exhaustion is not significant (−2 SD: c = 0.022, LLCI: −0.006, ULCI: 0.066 and −1 SD: c = 0.004, LLCI: −0.011, ULCI: 0.022, respectively). When entrepreneurs feel younger than their biological age, the indirect effect is negative and significant (1 SD: c = −0.012, LLCI: −0.028, ULCI: −0.000). This means that feeling younger amplifies the beneficial impact of psychological capital in reducing emotional exhaustion as entrepreneur age biologically. However, when entrepreneurs feel much younger than their biological age the indirect effect becomes non-significant (2 SD: c = −0.010, LLCI: −0.043, ULCI: 0.020). Fig. 2 plots these indirect conditional effects. Taken together, these results partially support Hypothesis 3.

Hypothesis 4 predicted that felt age gap moderates the indirect negative effect of biological age on emotional exhaustion via entrepreneurial strategy. The results were also tested with PROCESS model 58, with felt age gap moderating both paths, that is, the path from biological age to entrepreneurial strategy and from entrepreneurial strategy to emotional exhaustion. The bootstrapped confidence intervals (95 %) show that when entrepreneurs feel older than their biological age, the indirect effect of biological age on emotional exhaustion is not significant (−2 SD: c = 0.020, LLCI: −0.015, ULCI: 0.068 and −1 SD: c = −0.001, LLCI: −0.023, ULCI: 0.024, respectively). In contrast, the indirect effect of biological age on emotional exhaustion via entrepreneurial strategy is negative and significant when entrepreneurs feel younger than their biological age (1 SD: c = −0.043, LLCI: −0.069, ULCI: −0.020 and 2 SD: c = −0.066, LLCI: −0.113, ULCI: −0.022, respectively). This means that feeling younger amplifies the beneficial impact of applying less entrepreneurial strategies in reducing emotional exhaustion as entrepreneur age biologically. Fig. 3 plots these indirect conditional effects. Taken together, these results provide support for Hypothesis 4.

Finally, we test the moderated mediation model (PROCESS model 58 with two mediators) by simultaneously including all of the estimated relationships in one model, i.e., the two mediators and the four interaction terms. The results confirm what we found for Hypotheses 3 and 4, with the sole exception that the indirect effect of biological age on emotional exhaustion via psychological capital becomes significant also when entrepreneurs feel much younger than their biological age (2 SD: *c* = −0.029, LLCI: −0.069, ULCI: −0.001), thus providing even stronger support for Hypothesis 3.

4.1. Additional analyses

We conducted three additional analyses as robustness tests of our main results. First, we tested our full ASPE model with an alternative measure of subjective age: a ratio measure, where we divided the felt age gap measure by individuals' biological age (Chen et al., 2018; Kautonen et al., 2017). The results confirm our main findings: the felt age gap ratio moderates the mediated relationship from biological age to emotional exhaustion via psychological capital when entrepreneurs feel younger than their biological age (1 SD: c = −0.023, LLCI: −0.048, ULCI: −0.008); the felt age gap ratio also moderates the mediated relationship from biological age to emotional exhaustion via entrepreneurial strategy when entrepreneurs feel younger than their biological age (1 SD: c = −0.048, LLCI: −0.080, ULCI: −0.023 and 2 SD: c = −0.060, LLCI: −0.119, ULCI: −0.018, respectively).

Second, we explored the possibility of a non-linear relationship between biological age and emotional exhaustion. Previous research in entrepreneurship often reveals an inverse curvilinear relationship between age and entrepreneurial engagement (Kautonen et al., 2014). Similarly, organizational studies commonly identify a curvilinear relationship between an employee's biological age and their level of emotional exhaustion (Zacher et al., 2014). Bearing this in mind, we examined the direct relationship between biological

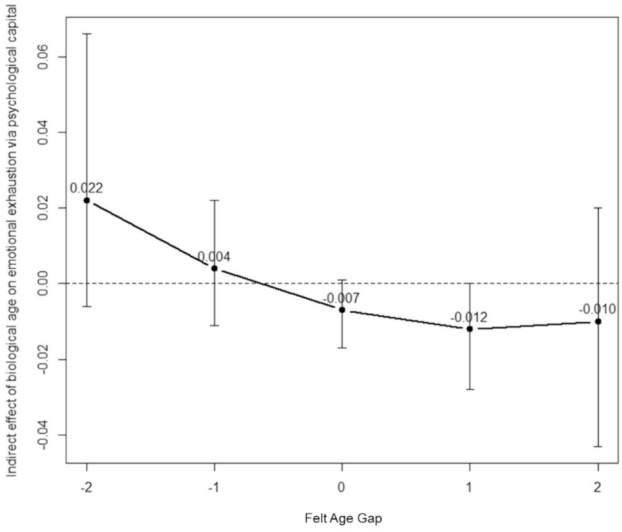

Fig. 2. Conditional indirect effects via psychological capital at different levels of felt age gap.

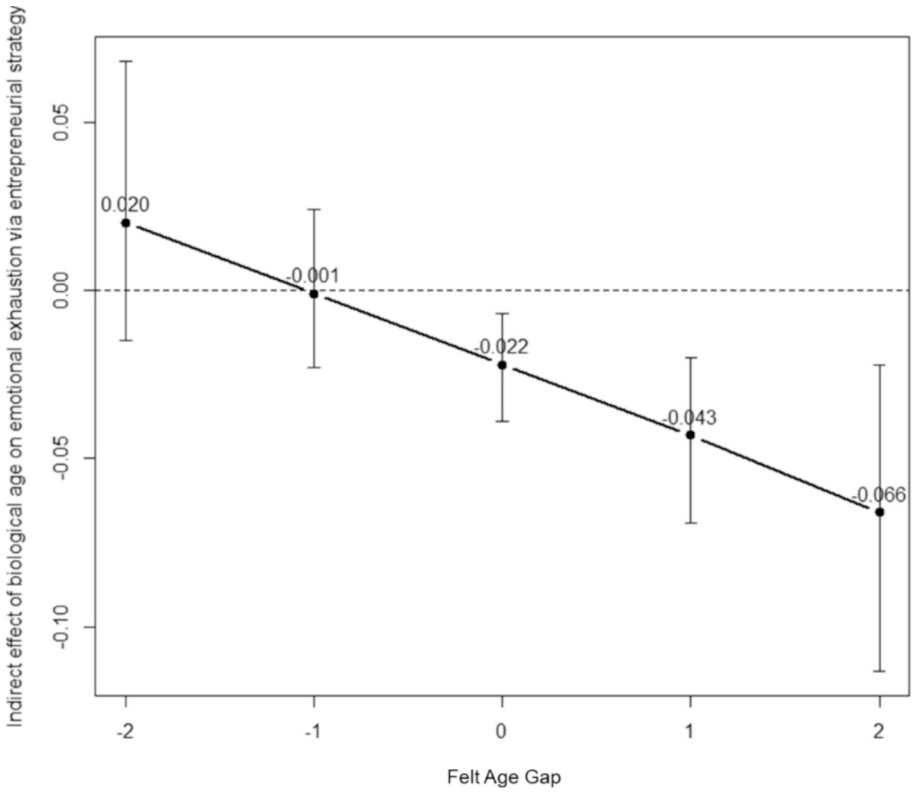

Fig. 3. Conditional indirect effects via entrepreneurial strategy at different levels of felt age gap.

age and emotional exhaustion, treating biological age as a non-linear term. However, the coefficient for the non-linear terms was found to be insignificant ($\beta = -0.03$, $p = .270$).

Third, because our data collection period overlapped with the SARS-CoV-2 pandemic, we examined whether shifts in revenue between survey waves might affect our findings (Klyver et al., 2023). To do this, we devised a variable to track changes in firm revenues as reported by entrepreneurs. This was done by calculating the difference in Euros between revenues from Wave 2 and Wave 3; we then incorporated this variable into all of our models for analysis. Despite its inclusion, the variable remained insignificant in every model, leaving the significance and direction of our findings unchanged. Therefore, we infer that SARS-CoV-2 did not substantially influence the outcomes of our research.

5. Discussion and implications

In this study, we expand knowledge on entrepreneurship practiced across individuals' lifespans by examining the age-related mechanisms that contribute to entrepreneurs' emotional exhaustion. Our findings show that at a higher biological age entrepreneurs experience less emotional exhaustion due to their accumulated psychological capital, and because they apply less entrepreneurial strategies that provoke exhaustion. We further show that, within the same age group, entrepreneurs who feel younger than their biological age benefit from higher levels of psychological capital and are less influenced by the strain caused by entrepreneurial strategies. These findings offer two key contributions to the literature on aging and entrepreneurial well-being (Kautonen et al., 2017; Stephan et al., 2023) by highlighting the influence of the individual aging process on experienced emotional exhaustion, and by showing how entrepreneurs' strategic choices in running their ventures shape their personal well-being across their lifespan.

5.1. Individual aging and entrepreneurial well-being

Despite waxing interest in aging and entrepreneurship, especially later on in life (Curran and Blackburn, 2001; Kautonen et al., 2017; Murmann et al., 2023), to date there has been scant entrepreneurship research that goes beyond perceiving age as a merely biological fact and addresses individual perceptions of age. A small number of exceptions here have focused on the implications of subjective feelings of age on entrepreneurial start-up behavior (Kautonen et al., 2015; Maalaoui et al., 2022). We complement these studies by drawing from the theory of social and emotional aging (SEA) (Charles and Carstensen, 2010) and the extant literature on individual aging processes (Chen et al., 2018; Kastenbaum et al., 1972; Wettstein et al., 2021) to theorize on the important interplay between biological and subjective aging in influencing entrepreneurs' well-being. On this basis, we provide a nuanced understanding of

the role played by age on entrepreneurs' emotional exhaustion across their lifespan by introducing and testing the novel ASPE model, which—to the best of our knowledge—represents the first attempt to examine how biological and subjective age jointly shape entrepreneurs' emotional exhaustion.

Based on our findings, we introduce the 'Hebe Effect in entrepreneurship', which—named in reference to the Greek goddess of youth—is generated when one subjectively feels younger than one's biological age and which mitigates entrepreneurs' emotional exhaustion in two distinct ways. First, while biological aging is accompanied by the accumulation of psychological capital, which is beneficial for entrepreneurs' personal well-being, feeling younger than one's biological age amplifies this relationship by better mobilizing higher levels of psychological capital. Second, although the application of entrepreneurial strategies adds to entrepreneurs' emotional exhaustion, choosing such strategies becomes less typical with increasing biological age and the emotional strain they induce is less severe if the entrepreneur feels younger than their biological age. We find that subjective juvenescence is highly beneficial for entrepreneurs' well-being, because the Hebe Effect protects entrepreneurs from emotional exhaustion across their entire lifespan. Yet we also find that searching for the 'fountain of youth' has its limits; specifically, we note that when entrepreneurs feel much younger than their biological age, their psychological capital does not generate additional well-being benefits compared to entrepreneurs of the same biological age.

The notion of Hebe Effect illustrates that both biological and subjective age are crucial in explaining the levels of emotional exhaustion among entrepreneurs. It thus offers an important step forward for the extant literature, which hitherto has detected little variation in entrepreneurs' personal well-being across age groups (Lerman et al., 2021; Rauch et al., 2018; Stephan et al., 2023). More specifically, our study adds to the prior research examining the effects of age on entrepreneurs' psychological capital and well-being (Baron et al., 2016). The study by Baron et al. (2016) indicates that older entrepreneurs make better use of their psychological capital, meaning that the stress-reducing effects of psychological capital are stronger among older than younger entrepreneurs. We complement this picture by showing that, in fact, psychological capital increases with biological age; and we further identify that its effect in reducing entrepreneurs' emotional exhaustion is stronger among those individuals who feel younger than their biological age.

5.2. Strategy choices and entrepreneurial well-being across lifespans

With the burgeoning interest in entrepreneurship and aging, a number of studies have examined age-related variation in entrepreneurial behavior and outcomes by examining how an entrepreneur's age affects entrepreneurial activities, such as the venture creation process (Gielnik et al., 2018; Kautonen and Minniti, 2014; Kautonen et al., 2015), and the implications this generates for entrepreneurs, especially in terms of their financial situation and life satisfaction (Kautonen et al., 2017; Minniti et al., 2017; Zhao et al., 2021). We complement this body of research in two distinct ways.

First, while the extant research has significantly advanced our knowledge on how aging influences entrepreneurship and entrepreneurs, it has not yet examined how entrepreneurs' personal well-being may be induced by the age-related behavioral changes which they undergo. In this study, we extend research in this direction by showing how entrepreneurs' personal engagement with their ventures influences their emotional exhaustion (Kibler et al., 2019; Obschonka et al., 2023). Specifically, we provide initial and robust evidence showing that, later on in life, entrepreneurs apply less entrepreneurial strategies when running their businesses, thus helping them to safeguard their emotional well-being. This finding complements Lévesque and Minniti's (2006) theoretical proposition that, due to different life conditions in later as opposed to earlier stages of life, individuals adjust the time and energy invested into entrepreneurial efforts so as to maximize personal well-being.

Second, our study contributes to our understanding of the link between age and entrepreneurial behavior. Our findings suggest that earlier on in life, entrepreneurs are more eager to create new services and products as well as continuously expand into new markets, whereas with increasing biological age entrepreneurs engage less in these types of entrepreneurial strategies. This insight resonates with, and provides further nuance to, recent studies which show that biological aging shapes innovation behavior in such a way that younger entrepreneurs bring innovations to markets more quickly and introduce a higher number of innovations than older entrepreneurs, while aging imbues entrepreneurs with more patience and focus in refining their innovations (Ching et al., 2019; Murmann et al., 2023).

Strikingly, our findings show that the relationship between biological age and entrepreneurial strategy choices does not depend on the felt age gap, which depicts how old an individual subjectively feels compared to their biological age. The importance of biological age indicates that entrepreneurial strategy choices are linked with factors that generally accumulate and change across an individual's lifespan, rather than with factors related to individual variation in the aging process. For instance, the length of life experience, number of years spent in labor markets, and proximity of retirement, as well as generational effects (such as changes in technology and socio-economic environment)—all of which evidently accumulate with biological aging—appear to influence entrepreneurs' willingness and ability to create new products/services continuously and explore new market areas irrespective of their subjective perceptions of their own 'youthfulness'.

5.3. Practical implications

The chief practical relevance of our research lies in demonstrating the mechanisms by which entrepreneurs subject themselves to, and can protect themselves from, emotional exhaustion. While there is an acute need to extend working careers, including in entrepreneurship (Burton et al., 2016), emotional exhaustion may severely hamper entrepreneurial efforts to offer creative solutions and, instead, exacerbate personal suffering and societal costs (Obschonka et al., 2023). Understanding the relationship between aging and entrepreneurs' emotional exhaustion is thus of especial importance in the numerous Western countries experiencing population aging

as well as difficulties in funding their social and health obligations (Kulik et al., 2014; OECD, 2021).

Our study shows that taking care of one's personal well-being is particularly important for younger individuals, who are more vulnerable to emotional exhaustion due to lower levels of psychological capital and a greater tendency to rely on entrepreneurial strategies when running their ventures. These findings call for both personal-level caution and the importance of the availability of support once initial symptoms of burnout accrue.

At the same time, our study shows that biological aging helps entrepreneurs to avoid emotional exhaustion. This accentuates entrepreneurship as a potential career choice also at later stages of life, possibly by transitioning from employment into entrepreneurship. Societies can foster a more inclusive and age-diverse entrepreneurial landscape by promoting the clear strengths of older entrepreneurs. In this context, specifically tailored entrepreneurship support programs and tax and social security regimes can become advantageous.

Finally, our study highlights the personal well-being benefits that result from maintaining a younger subjective feeling of age. Entrepreneurs who feel younger than their biological age can take advantage of their psychological capital in managing their entrepreneurial ventures and be assured that they are likely to be affected less severely by the use of entrepreneurial strategies. To maintain a younger feeling of subjective age, it becomes necessary to invest in supporting entrepreneurs' social and physical well-being across their entire lifespan so that they can cope more adequately with the job demands intrinsic to entrepreneurship.

5.4. Limitations and directions of future research

Our work opens several avenues for further research that can enrich our examinations of age and well-being. First, despite revealing important mechanisms underpinning entrepreneurs' emotional exhaustion, our study remains limited by focusing on the sole aspect of personal well-being. However, entrepreneurial well-being is a multifaceted phenomenon, which can also be assessed by focusing, for instance, on hedonic or eudemonic well-being measures (Stephan et al., 2023; Wiklund et al., 2019). Furthermore, we acknowledge that emotional exhaustion develops over time and can be influenced by life outside of professional contexts. The study at hand addresses developments over time by collecting data in several waves in three-month intervals; however, we encourage further research to delve deeper into the process through which emotional exhaustion develops among entrepreneurs over shorter and longer periods (Youssef-Morgan, 2014), as well as to examine its potential unfolding in relation to specific life events (Rauch and Hulsink, 2023). Along these lines, our study could also be extended by assessing the further implications of emotional exhaustion in terms of its effect on entrepreneurs' (age-based) self-perceptions, career paths, and the choices they make when running their businesses (Stephan, 2018). Moreover, while entrepreneurial strategy has adverse personal consequences for entrepreneurs, its impact on work culture and employees has yet to be explored.

Second, our study provides evidence of the influence of biological and subjective age on entrepreneurial well-being and draws attention to the felt age gap. With this in mind, we call for further research to examine the influence of aging in entrepreneurship by acknowledging the complexity of the notion of ‘age’ and utilizing measures that take into account physiological, personal, and social perceptions of entrepreneurs' age (Kastenbaum et al., 1972). To understand entrepreneurs' well-being across the entirety of their lifespan, it would be intriguing to study, for instance, how various family obligations and day-to-day forms of behavior may facilitate a larger felt age gap and impact entrepreneurial activities and well-being. Stimulating research avenues may also arise from studying how prior entrepreneurial experience and venture performance contribute to entrepreneurs' subjective feelings of age, and how this (recursively) shapes their strategic choices and emotional exhaustion. Specifically here, while our work has focused on understanding the personal well-being benefits that accrue from ‘feeling young’, much space remains for examining how such founder characteristics shape venture performance.

Third, as is typical in studies on aging, our study assesses entrepreneurs of different ages during a period of only six months. Consequently, our findings are influenced by the prevailing macro-economic and political conditions of the day, and our sample comprises individuals from various generations. At the time of our study, the surveyed countries were grappling with the Covid-19 pandemic (Kuckertz et al., 2020), and we implemented control measures to mitigate its potential impact on entrepreneurs' emotional exhaustion. However, our study could be replicated at different times and in diverse geographical locations, and further enriched by longitudinal research approaches. Such research could also track individuals and their entrepreneurial careers over their lifespan to explore how their felt age gap evolves over time, thereby revealing nuanced variations in the mechanisms underlying emotional exhaustion. Moreover, intriguing research opportunities lie in examining fluctuations in subjective feelings of age over shorter periods so as to comprehend more clearly how entrepreneurs' felt age influences, and is influenced by, their everyday activities and business decisions. For instance, the recent diary study conducted by Wach et al. (2021) offers a valuable methodological approach that provides nuanced insights into the everyday mechanisms underpinning subjective age and well-being.

Finally, we propose the importance of further research that builds on our findings regarding the effect of age on entrepreneurial behavior and well-being. Admittedly, our study remains limited in terms of measuring entrepreneurial strategy as the creation of novel products, services, and markets (Hitt et al., 2021), and, hence, it could fruitfully be complemented with more versatile measurements of strategizing approaches. Furthermore, acknowledging the need for entrepreneurs to compete continuously in the markets, it would be intriguing to address the type of entrepreneurial strategies which are best positioned to respond to market opportunities while simultaneously allowing entrepreneurs to maintain their personal well-being, or to examine factors that—similarly to the Hebe Effect—lower entrepreneurs' experienced emotional exhaustion even as they engage in entrepreneurial strategies. Here, research evidence shows that drivers to engage in necessity- and opportunity-driven entrepreneurship vary across different age groups (Leporati et al., 2021; Suchart, 2017). It stands to reason that promising avenues for research also lie in studying age-related variation in entrepreneurial behavior and emotional exhaustion by incorporating opportunity vs. necessity-driven entrepreneurs into the study

design.

CRediT authorship contribution statement

Ewald Kibler: Writing – review & editing, Writing – original draft, Resources, Project administration, Investigation, Funding acquisition, Data curation, Conceptualization. **Charlotta Sirén:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Daniela Maresch:** Writing – review & editing, Writing – original draft, Project administration, Funding acquisition, Data curation, Conceptualization. **Virva Salmivaara:** Writing – review & editing, Writing – original draft, Conceptualization. **Matthias Fink:** Writing – review & editing, Writing – original draft, Resources, Investigation, Funding acquisition, Data curation, Conceptualization.

Data availability

The authors do not have permission to share data.

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