Linking entrepreneurial passion and innovation under the dynamic influence of entrepreneurs’ age: the case of Vietnamese SMEs

Article (Accepted Version)


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and indirectly via two mediators: entrepreneurial alertness and self-efficacy. Furthermore, the findings reveal that entrepreneurs’ age has a U-shaped moderating effect on the link between entrepreneurial passion and self-efficacy, and a positive moderating effect on the link between passion and alertness. This study is among the few to explore the impact of entrepreneurial passion as an entrepreneur-level emotion on a critical firm-level business outcome. Besides, it contributes to the innovation literature by examining the mediating mechanisms through which entrepreneurial passion turns into improvements in firm-level innovation performance. Finally, the research extends the entrepreneurship literature by confirming how these mediating mechanisms differ at different stages of an entrepreneur’s lifecycle.
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Abstract

Drawing upon the broaden-and-build theory of positive emotions, this research focuses on examining two mediating mechanisms linking entrepreneurial passion and firm-level innovation performance under the dynamic influence of entrepreneurs’ age. The study uses a survey with a sample of 186 entrepreneurs who were owners or founders of small and medium enterprises (SMEs) in Vietnam. The empirical study shows that entrepreneurial passion directly improves firms’ innovation performance, and indirectly via two mediators: entrepreneurial alertness and self-efficacy. Furthermore, the findings reveal that entrepreneurs’ age has a U-shaped moderating effect on the link between entrepreneurial passion and self-efficacy, and a positive moderating effect on the link between passion and alertness. This study is among the few to explore the impact of entrepreneurial passion as an entrepreneur-level emotion on a critical firm-level business outcome. Besides, it contributes to the innovation literature by examining the mediating mechanisms through which entrepreneurial passion turns into improvements in firm-level innovation performance. Finally, the research extends the entrepreneurship literature by confirming how these mediating mechanisms differ at different stages of an entrepreneur’s lifecycle.

Keywords: Entrepreneurial passion, Alertness, Self-efficacy, Innovation performance, Age
Introduction

In recent years, investigating the impact of entrepreneurial emotions, including entrepreneurial passion, is attracting more research in the entrepreneurship literature (Cardon et al., 2012; Luu and Nguyen, 2021; Stenholm and Nielsen, 2019). Entrepreneurial passion refers to “consciously accessible intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful and salient to the self-identity of the entrepreneur” (Cardon et al., 2009: 517). Under the lens of the broaden-and-build theory of positive emotions, researchers argue entrepreneurial emotions to not only act as a direct input for firms’ business performance, but also have an indirect effect on firms’ business performance by influencing numerous entrepreneurial cognitive processes, e.g., attention capturing, information processing, memory recording, and information retrieving (Baron, 2008). This raises the questions about the direct and indirect link between entrepreneurial passion and a firm-level vital outcome, innovation performance, and the mechanisms that mediate such links. Innovation performance refers to “the percentage of sales of new product innovations and the relative frequency of introducing innovations compared with competitors” (Atuahene-Gima, 2005: 65).

According to the extensive line of literature on innovation idea generation and identification, innovation is mostly about having ideas generated and successfully implemented (Van den Ende et al., 2015). In other words, being sensitive, i.e., alert, to new ideas, and having the belief to be able to adopt those ideas, i.e., self-efficacy, can be among the most influential cognitive processes on firm-level innovation performance. Alertness has been found to be a significant mediating factor connecting entrepreneurial characteristics, such as regulatory modes, and firms’ business success (Amato et al.,...
2017). Therefore, in this research, it is important to examine the potential effects of entrepreneurial passion on firms’ innovation performance, directly and indirectly via two important cognitive factors, self-efficacy and alertness. Entrepreneurial alertness is defined as entrepreneurs’ ability to identify opportunities that are overlooked by others (Ma and Huang, 2016), while entrepreneurial self-efficacy is defined as individuals’ confidence in their ability to successfully perform entrepreneurial roles and tasks (Zhao et al., 2005).

Although age has long been acknowledged as a potential factor influencing entrepreneurial process, its role and theoretical contribution are rarely explicated (Isaacowitz and Riediger, 2011; Zhao et al., 2021). Meanwhile, previous research has argued how emotions such as passion can influence cognitive factors differently between individuals of different age groups as they can have different levels of emotional regulation and attention (Isaacowitz and Riediger, 2011). Collewaert et al. (2016) also confirmed that entrepreneurial passion for founding changes over time due to the fading of intense positive feelings over time. Despite such evidence about the link between age and passion, there is little research into the temporal variability of the effects of passion on entrepreneurs’ attitude and behaviours. Such a literature gap highlights the need to examine how the links between entrepreneurial passion and entrepreneurial alertness and self-efficacy can differ under the moderating influence of entrepreneurs’ age. Furthermore, inconsistent empirical findings on the role of age suggest that entrepreneurs’ age may have a more-than-linear impact on entrepreneurial process (Zhao et al., 2021).

To address the above literature gaps, we explore three research questions. First, to what extent does entrepreneurial self-efficacy mediate the link between passion and firm-level innovation performance? Second, how does entrepreneurial passion affect firm-
level innovation performance indirectly via entrepreneurial alertness? Third, to what extent does an entrepreneur’s age influence the effects of entrepreneurial passion on these two entrepreneurs’ cognitive factors, self-efficacy and alertness?

This research offers several theoretical contributions. The main contribution of the paper to the entrepreneurial emotion literature is to show two mediating mechanisms connecting entrepreneurial passion, a critical individual-level entrepreneurial characteristic, and a firm-level business outcome. Entrepreneurs create firms (North, 1994); therefore, their personal characteristics can be strongly associated with their firms’ business outcomes (Fuentelsaz et al., 2018; Ling et al., 2007). Firm-level innovation performance has been of the focal interest of researchers and managers for decades as many attempt to find out how to improve this important outcome (Crossan and Apaydin, 2010). This study is among the few studies to demonstrate that entrepreneurial passion may not only directly and positively affect firm-level innovation performance, but also indirectly do so via two mediating pathways. This research provides a partial answer to a big question in the entrepreneurship literature: why some firms and entrepreneurs possess a higher level of innovativeness than others? Finally, the study will contribute to the entrepreneurship literature by examining the nonlinear moderating impact of entrepreneurs’ age on the way their passion affects entrepreneurial self-efficacy and alertness. Such findings from this study are becoming more important when late-career entrepreneurship is being promoted in the context of aging population in many economies (Kautonen et al., 2017).

To address the research questions, our article proceeds as follows. In the next section, we theorise a model linking entrepreneurial passion and firm’s innovation performance via alertness and self-efficacy, moderated by entrepreneurs’ age. Following this, we
describe our methods and present our empirical results. Finally, we discuss the theoretical and practical implications of our study.

**Theory and development of hypotheses**

When examining the influential factors in the entrepreneurial process, researchers have traditionally only examined entrepreneurial cognitions (Mitchell et al., 2007). Baron (2008) built up the model of the role of affect in entrepreneurship by arguing that entrepreneurial emotions, e.g., entrepreneurial passion, are critical in the entrepreneurial process because they exert a significant impact on many cognitive processes, such as perception, judgements, and decision, and so on. The model of Baron (2008) fits our research purposes as we investigate how entrepreneurial passion as an intense state of positive emotion influences firm-level innovation performance through two cognitive dimensions: entrepreneurial self-efficacy and alertness. Figure 1 displays our hypothesized model.
Entrepreneurial passion and firm’s innovation performance

The broaden-and-build theory of positive emotions argues that the micro-level entrepreneurial passion, as a strong positive feeling, can have a positive effect on the firm-level innovation performance for two reasons (Fredrickson, 2001). First, entrepreneurial passion fosters entrepreneurs’ commitment and ability to support innovation ideas with conviction. It equips entrepreneurs with energy to move their innovation ideas through a long and challenging innovation development process, such as opportunity identification, new product design, testing, improving, and implementation (Baron et al., 2012). Second, firms are founded and managed by entrepreneurs (North, 1994); therefore, their positive
emotions, potentially as valuable resources, are critical to their firms’ innovation performance (Ling et al., 2007). As passionate entrepreneurs derive pleasure from their entrepreneurial activities, they are more open to experiences and experiments; therefore, they will be more willing to pursue risky innovation projects (Stroe et al., 2018). Moreover, according to the emotional contagion theory (Hatfield et al., 1993), entrepreneurial passion can widely spread from one individual to another, among entrepreneurs, employees and other stakeholders. Consequently, passionate entrepreneurs may positively influence their colleagues’ emotional states and many related aspects of innovation performance, such as creativity and analytical performance.

**Mediating effect of entrepreneurial self-efficacy**

Entrepreneurial self-efficacy is driven by four processes: “(a) enactive mastery, (b) role modelling and vicarious experience, (c) social persuasion, and (d) judgements of one’s own physiological states such as arousal and anxiety” (Zhao et al., 2005: 1265). Despite being instrumental in the entrepreneurial process (Baron, 2008), there have been very few studies empirically examining the impacts of entrepreneurs’ personal emotions, including entrepreneurial passion, on entrepreneurial self-efficacy. This study expects that entrepreneurial passion can significantly influence entrepreneurial self-efficacy and indirectly influence firm-level innovation performance. Entrepreneurial passion can positively influence entrepreneurial self-efficacy via three out of four processes above (Zhao et al., 2005). First, as entrepreneurial passion is an intensive positive emotion, we expect that entrepreneurial passion can improve an entrepreneur’s persisting efforts to achieve excellence, resulting in the “enactive mastery” process (the first entrepreneurial self-efficacy process) (Cardon and Kirk, 2015). Second, the broaden-and-build theory of positive emotions argues that highly passionate individuals can communicate better with
others because the positive emotions can broaden the entrepreneur’s resource repertoires and encourage adaption process, which may facilitate “social persuasion”, which is the second process of entrepreneurial self-efficacy (Fredrickson, 2001). Third, since entrepreneurial passion is conceptualized as intensive positive feeling (Cardon et al., 2009), we predict that entrepreneurial passion can have a strong effect on entrepreneur’s physiological state process of self-efficacy. For three above reasons, we expect entrepreneurial passion to positively influence entrepreneurial self-efficacy.

In this research, we expect entrepreneurial self-efficacy to positively influence a critical aspect of the overall firm performance, which is innovation performance. Self-efficacy helps entrepreneurs overcome perceptions of risk and fear of failure; hence, they are more likely to pursue innovated ideas (Hmieleski and Baron, 2008; Van der Westhuizen and Goyayi, 2020). Furthermore, entrepreneurs who have strong confidence in their ability tend to develop comprehensive strategic plans to lead their firms (Forbes, 2005), improve their firms’ competitiveness (Alikhani and Shahriari, 2022) and innovation performance in both short and long terms (Baum et al., 2001). The above arguments concerning the likely relationships (1) between entrepreneurial passion and entrepreneurial self-efficacy, and (2) between entrepreneurial self-efficacy and firm-level innovation performance suggest the following hypothesis:

Hypothesis 1: Entrepreneurial self-efficacy mediates the positive effect of entrepreneurial passion on firm-level innovation performance.

Mediating effect of entrepreneurial alertness

Researchers conceptualize entrepreneurial alertness as a three-dimensional construct, including scanning and searching for information, integrating information, and evaluating
the existence of profitable business opportunities (Tang et al., 2012). So far, they have considered entrepreneurial alertness to be solely driven by cognitive factors such as entrepreneurial experience (Gielenk et al., 2014) or prior knowledge (Shane, 2000), while completely ignoring entrepreneurial emotions. According to the broaden-and-build theory of positive emotions, entrepreneurial passion, as a dimension of entrepreneurial motivation, will raise business opportunity recognition (Santos et al., 2010) and may enhance entrepreneurial information search and information integration processes (Chen et al., 2009; Fredrickson, 2001), which are the two dimensions of entrepreneurial alertness. First, similarly to other positive emotions, entrepreneurial passion has been found to foster various entrepreneurs’ cognitive processes, such as attention (Foo et al., 2015), working memory (Kensinger and Schacter, 2008), and entrepreneurial sensitivity to changes and opportunities in the external environment (Gaglio and Katz, 2001). Therefore, we expect that entrepreneurial passion improves entrepreneurial alertness by broadening the scope and vigour of information search. Second, entrepreneurial passion promotes entrepreneurial creativity (Amabile et al., 2005), flexibility in information categorization and the propensity to make unique associations among separate information (Kaufmann, 2015). Consequently, entrepreneurial passion enhances entrepreneurial information integration process and eventually entrepreneurial alertness.

All three dimensions of entrepreneurial alertness can positively influence firm-level innovation performance for several reasons. The first two dimensions, searching for information and integrating information, highlight entrepreneurs’ proactive approach in identifying valuable information, their flexibility and originality in the sensemaking process of various pieces of information, which are all critical determinants of firm-level innovation performance (Crossan and Apaydin, 2010; Hansen et al., 2016). Furthermore,
the third dimension of entrepreneurial alertness, evaluating the existence of profitable business opportunities, requires entrepreneurs to make their own judgements of the potential profitability of the ideas, which helps them reduce the risks associated with the innovation process and positively influences their firms’ innovation performance (Fuentelsaz et al., 2018).

Hypothesis 2: Entrepreneurial alertness mediates the positive effect of entrepreneurial passion on firm-level innovation performance.

The moderating impact of the entrepreneur’s age

Age has long been considered as a potential factor that influences entrepreneurial process (Zhao et al., 2021). Several studies found that people older than 40 will become more entrepreneurial (Shane and Khurana, 2003) and older entrepreneurs are more satisfied with their life quality when their psychology needs for self-realization, autonomy, control and pleasure are better satisfied (Kautonen et al., 2017). Besides, age-related factors such as health, wealth, and human capital may influence entrepreneurial success in different directions (Hurst and Lusardi, 2004). Despite being acknowledged as an influential factor, the theoretical attention paid to entrepreneurs’ age is inadequate, which results in inconsistent empirical findings on its role (Zhao et al., 2021). Zhao et al. (2021) found a significant and complicated impact of age on entrepreneurship when age and entrepreneurial success have a negative relationship among younger samples but have a positive relationship among older samples. This U-shaped result highlights the need for more research on the nonlinear role of age in entrepreneurship.

Previous studies have confirmed the dynamic changes of positive emotions across adult life span (Mikels et al., 2014); however, how such positive emotions as passion in the entrepreneurship context vary across entrepreneurs’ age differences remains ignored.
In previous studies, aging often entails accumulating life experience or knowledge. Entrepreneurs when maturing from young to middle adulthood have much to learn and prepare for long futures ahead, which results in the suppression of emotional well-being (Carstensen et al., 2000) and the decline in positive affect from their entrepreneurial work. Especially, the more entrepreneurs reach the middle adulthood, the more overwhelmed they may feel with the amount of knowledge and life experience they need to learn while coping with the need for work life balance (Emslie and Hunt, 2009). Therefore, such negative emotions dampen the impact of their positive emotions such as passion on entrepreneurs’ confidence in their abilities to develop the ventures, or the positive relationship between entrepreneurial passion and self-efficacy will be weakened.

On the other hand, when entrepreneurs pass middle age and mature into old age, they have accumulated substantial life experience and knowledge and become less financially constrained and better at emotion regulation (Mikels et al., 2014). Being equipped with both the passion their ventures and the accumulated knowledge, entrepreneurs will have more confidence in their ability to successfully do entrepreneurial tasks. In other words, entrepreneurs’ age strengthens the relationship between entrepreneurial passion and self-efficacy. Also, with more well-being stability (Mikels et al., 2014), the more passion they have for the ventures, the more likely they are to regulate this positive emotion to their advantage by motivating them or developing their self-efficacy. Therefore, the relationship between entrepreneurial passion and self-efficacy is strengthened among entrepreneurs of middle to old age.

Hypothesis 3a: Entrepreneur’s age has a U-shaped moderating effect on the association between entrepreneurial passion and self-efficacy.
In addition to knowledge and life experience, age can also relate to the social and business network entrepreneurs can build as it takes time to develop high quality networks that can help entrepreneurs be more alert and quicker in detecting new opportunities (Aartsen et al., 2004). When entrepreneurs mature from young to middle age, the association between entrepreneurial passion and alertness is more positive as entrepreneurs can gradually develop substantial social networks for their work and have the ability to manage this network. Therefore, the more passionate they are about their ventures, the more information they can obtain to get alert about business opportunities.

On the other hand, when entrepreneurs pass middle to old age, the relationship between passion and alertness is weakened. Entrepreneurs of middle to old age are more reluctant to take advice or ask for information from their networks (Robinson and Stubberud, 2013). Therefore, even when they have positive emotions such as passion, their limited access to information will reduce their alertness to new business opportunities. Furthermore, when entrepreneurs enter middle to old age, their network declines in quality when their network members who may also be at middle to old age become less active in information searching and sharing. Therefore, when passion for the ventures increases, alertness to business opportunities rises to a smaller extent to entrepreneurs of middle to old age with limited information network. We hypothesize that:

*Hypothesis 3b: Entrepreneur’s age has an inverted U-shaped moderating effect on the association between entrepreneurial passion and alertness.*
**Methods**

**Sample and data collection**

The study had surveys conducted in Vietnam with entrepreneurs as the unit of analysis. According to Fuentelsaz et al. (2018), the impact of entrepreneur-level characteristics on innovation may vary, depending on the context in which they operate. Vietnam, as a transitional, collectivist economy, provides an interesting institutional context to examine the direct and indirect effects of entrepreneurs’ individual-level characteristics on firm-level innovation performance (Global Entrepreneurship Monitor, 2016). Following previous studies (Tyagi and Sawhney, 2010; Zhang et al., 2019), we hired a leading market research company to manage data collection. We targeted respondents who were entrepreneurs (founders and/or owners) who participated in their own firms’ start-up process. Their firms should have been set up for at least 3 years and their sizes should have been between 10 and 50 employees. The market research firm distributed the questionnaire to 312 entrepreneurs and received responses from 200 respondents. After deleting 14 questionnaires with incomplete responses for our constructs of interest and eligibility of respondents, we had the final sample of 186 responses, making the response rate of 59.6%. Compared to the similar sample sizes in previous studies (Cheng and Yang, 2017; Liu and Wei, 2021), such a sample size is adequate for valid results. For data equivalence, we had the survey translated from English to Vietnamese and from Vietnamese backward to English by two different professional translation companies (Luu and Ngo, 2018).

All informants in the survey had the titles of chief executive officers or general managers and were the founders of their firms. Of 186 respondents, 74.2% were male and 25.8% were female. On average, respondents were 37.8 years old, worked in the industry
for 11 years and worked for their firms for 7 years. Of 186 respondents, 19.4% had the education level of less than 4-year college degree, 62.9% were 4-year college graduate, and 17.7% had beyond 4-year college education. On average, firms in the sample had operated in their industries for 7 years and had 20 full-time equivalent employees. Participating firms were from various sectors such as manufacturing (66.7%), services (25.3%) and retailing (54.3%).

**Measures**

We adopted existing tested scales from the literature to measure all constructs in this study. We measured entrepreneurial passion with four items adapted from Cardon et al. (2013), entrepreneurial self-efficacy with four items adapted from Zhao et al. (2005), entrepreneurial alertness with three items adapted from Ma and Huang (2016), and firms’ innovation performance with three items adapted from Baker et al. (2016). Objectives measures of innovation performance, such as the number of patents or sales generated by new products or services, are difficult to obtain in Vietnam because of the limited data publication by the government and owners’ reluctance to disclose any actual data. Therefore, we used the self-reported measure of innovation performance in the context of Vietnam. We used the entrepreneur’s age at the time of the survey as the moderating variable. For all models, we included some control variables such as the entrepreneur’s personal characteristics (gender, marital status, children status, education level and industry experience) and their firm’s characteristics (firm age, firm size, sales volume of last year, main serving market, and industries). For models with entrepreneurial self-efficacy and entrepreneurial alertness as dependent variables (DVs), we also included work satisfaction as one of the control variables using one-item scale from Bowling et al.
(2006) (Generally speaking, I am very satisfied with my work). Table 1 below lists the measurement items for all constructs in this study.

**Results and robustness check**

**Reliability, validity, and descriptive statistics**

To validate the measurement model, the study conducted a confirmatory factor analysis which yielded the composite reliabilities (CRs), Cronbach alphas, loadings, average variances extracted (AVEs) in Table 1. The measurement model displayed a satisfactory data fit ($\chi^2 = 94.491$, $d.f. = 57$, Root mean square error of approximation (RMSEA) = 0.060, Non-normal fit index (NNFI) = 0.914, Comparative fit index (CFI) = 0.937, Incremental Fit Index (IFI) = 0.940) (Gerbing and Anderson, 1992). The model had satisfactory reliability when most item loadings, except two loadings, in the measurement model were over 0.70. All items were significant and the CRs of all constructs exceeded 0.70 (Fornell and Larcker, 1981).

**Table 1** Measurement items

<table>
<thead>
<tr>
<th>Measurement items</th>
<th>Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entrepreneurial passion</strong> (1 = Strongly disagree, 5 = Strongly agree) (Cardon et al., 2013)</td>
<td></td>
</tr>
<tr>
<td>$\alpha = 0.751$, CR = 0.842, AVE = 0.573</td>
<td></td>
</tr>
<tr>
<td>1. I really like finding the right people to market my product/service to.</td>
<td>0.675</td>
</tr>
<tr>
<td>2. Assembling the right people to work for my business is exciting.</td>
<td>0.781</td>
</tr>
<tr>
<td>3. Pushing my employees and myself to make our company better motivates me.</td>
<td>0.820</td>
</tr>
<tr>
<td>4. Nurturing and growing companies is an important part of who I am</td>
<td>0.745</td>
</tr>
</tbody>
</table>
Entrepreneurial self-efficacy (1 = No confidence, 5 = Complete confidence) (Zhao et al., 2005)

\[ \alpha = 0.597, \ CR = 0.787, \ AVE = 0.553 \]

Please indicate how confident you are in successfully…

1. … identifying new business opportunities 0.723
2. … creating new products 0.737
4. … commercializing an idea or new development 0.769

Entrepreneurial alertness (1 = Strongly disagree, 7 = Strongly agree) (Ma and Huang, 2016)

\[ \alpha = 0.681, \ CR = 0.811, \ AVE = 0.565 \]

1. While going about day-to-day activities, I see potential new ideas for new product, new market, and new way of organizing firms all around me. 0.886
2. I have a special alertness or sensitivity toward new opportunities for new product, new market, and new way of organizing the firm. 0.803
3. Seeing potential new opportunities comes very naturally to me. 0.596

Firms’ innovation performance (Baker et al., 2016)

\[ \alpha = 0.655, \ CR = 0.813, \ AVE = 0.592 \]

1. Percentage of sales generated by new products or services in your firm relative to major competitors is… (1 = Low, 7 = High) 0.702

Think about your business unit over the past three years. How frequently did new product or service offerings fall into the category of innovations that:

(1 = Never, 7 = Always)

2. … Represented new ways of satisfying customer needs 0.796
3. … Went beyond merely improving products/services 0.806
Fit statistics: $\chi^2 = 94.491$, $d.f. = 57$, RMSEA = 0.060, NNFI = 0.914, CFI = 0.937, IFI = 0.940

Furthermore, the model had good discriminant validity as the square roots of all AVEs in Table 2 were greater than the off-diagonal correlations. Finally, its convergent validity was also confirmed when we found AVEs over 0.50 for all constructs (Fornell and Larcker, 1981).

**Table 2** Means, Standard deviations (SDs), Square-roots of AVEs, and correlations

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Alertness</th>
<th>Innovation</th>
<th>Self-efficacy</th>
<th>Passion</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alertness</td>
<td>5.529</td>
<td>0.970</td>
<td>0.771</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>5.335</td>
<td>0.980</td>
<td>0.359**</td>
<td>0.770</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>4.152</td>
<td>0.618</td>
<td>0.500**</td>
<td>0.463**</td>
<td>0.743</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passion</td>
<td>4.436</td>
<td>0.588</td>
<td>0.258**</td>
<td>0.321**</td>
<td>0.510**</td>
<td>0.754</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>37.850</td>
<td>6.722</td>
<td>-0.106</td>
<td>-0.083</td>
<td>-0.076</td>
<td>0.043</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: ** $p < 0.01$; Numbers shown in the diagonal denote the square roots of AVEs.

**Results**

To test our hypotheses, hierarchical linear regression as well as the moderation technique was conducted, as suggested by Aiken and West (1991). The empirical results of those models with entrepreneurial self-efficacy, entrepreneurial alertness and firm’s innovation performance as dependent variables are reported in Table 3. In Model 1, examining the direct effect of entrepreneurial passion on firm-level innovation performance, we found that sales volume was the only control variable that was significantly and positively associated with the firm’s innovation performance ($\beta = 0.157$, $p < 0.05$). Entrepreneurial
passion had a significant and positive impact on firm-level innovation performance ($\beta = 0.439, p < 0.001$).

Model 2 examining the effect of entrepreneurial passion on the mediator, entrepreneurial self-efficacy, yielded $R$-square = 0.328. Two control variables, work satisfaction ($\beta = 0.115, p < 0.010$) and firm size ($\beta = 0.083, p < 0.100$), had significant coefficients, and the result confirmed the significant relationship between entrepreneurial passion and entrepreneurial self-efficacy ($\beta = 0.402, p < 0.001$). Meanwhile, Model 3 with entrepreneurial alertness as the dependent variable found significant impacts of entrepreneurial passion ($\beta = 0.250, p < 0.010$) and two control variables, work satisfaction ($\beta = 0.310, p < 0.001$) and firm size ($\beta = -0.178, p < 0.05$).

Model 4 included entrepreneurial passion, both mediators (entrepreneurial self-efficacy and entrepreneurial alertness), and control variables to examine their impacts on firm-level innovation performance. Both entrepreneurial self-efficacy ($\beta = 0.449, p < 0.001$) and entrepreneurial alertness ($\beta = 0.203, p < 0.05$) had significant impacts on firm-level innovation performance, while entrepreneurial passion no longer significantly influenced firm-level innovation performance in this model ($\beta = 0.154, p > 0.10$). It also found that two control variables, children status ($\beta = 0.174, p < 0.10$) and sales volume ($\beta = 0.158, p < 0.05$), significantly influenced firm-level innovation performance in Model 4.
### Table 3 Regression results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main effects</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial passion</td>
<td>0.439***</td>
<td>0.402***</td>
<td>0.250**</td>
<td>0.154</td>
<td>0.297***</td>
<td>0.178</td>
</tr>
<tr>
<td></td>
<td>(4.656)</td>
<td>(7.449)</td>
<td>(2.711)</td>
<td>(1.516)</td>
<td>(4.612)</td>
<td>(1.584)</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.449***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.870)</td>
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<tr>
<td>Alertness</td>
<td>0.203*</td>
<td></td>
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<tr>
<td></td>
<td>(2.069)</td>
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<tr>
<td>Moderating effects</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.157**</td>
<td>-0.178*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-2.763)</td>
<td>(-1.796)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age squared</td>
<td>0.039</td>
<td>0.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.170)</td>
<td>(0.083)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Entrepreneurial passion*Age</td>
<td>0.056</td>
<td>0.210*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.830)</td>
<td>(1.772)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial passion*Age squared</td>
<td>0.117*</td>
<td>0.042</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.023)</td>
<td>(0.421)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneur’s personal characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.007</td>
<td>0.054</td>
<td>-0.013</td>
<td>-0.034</td>
<td>0.056</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>(0.091)</td>
<td>(1.345)</td>
<td>(-0.195)</td>
<td>(-0.515)</td>
<td>(1.414)</td>
<td>(-0.191)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.095</td>
<td>0.028</td>
<td>0.053</td>
<td>-0.135</td>
<td>0.116*</td>
<td>0.117</td>
</tr>
</tbody>
</table>
Because the associations between the independent variable, entrepreneurial passion, and the proposed mediators, entrepreneurial self-efficacy and alertness, and the associations between these mediators and the dependent variable, firm-level innovation
performance, were both significant, we followed Oo et al. (2018) to run mediation tests. We tested the significance of the indirect effects of entrepreneurial self-efficacy and entrepreneurial alertness as multiple mediators with a bias-corrected bootstrapping procedure using 10,000 bootstrap samples (Preacher and Hayes, 2008). First, according to Table 4, the indirect effect of entrepreneurial passion on innovation performance via self-efficacy was positive and significant (indirect effect = 0.231, 90% confidence interval (CI) = [0.104, 0.377]). Second, the indirect effect of entrepreneurial passion on innovation performance via entrepreneurial alertness was also positive and significant (indirect effect = 0.054, 90% CI = [0.006, 0.144]). These findings again confirmed Hypothesis 1 and 2 suggesting the mediating roles of entrepreneurial self-efficacy and entrepreneurial alertness. Furthermore, comparing bootstrapping indirect effects of entrepreneurial self-efficacy and entrepreneurial alertness, the analysis revealed that the indirect effect of entrepreneurial self-efficacy (Effect = 0.231) was larger than that of entrepreneurial alertness (Effect = 0.045) (Preacher and Hayes, 2008). The study also found that the total indirect effect of entrepreneurial passion via these two mediators on firm-level innovation performance (0.285) was smaller than its direct effect (0.439).
Table 4 Indirect effects of entrepreneurial passion via entrepreneurial alertness and entrepreneurial self-efficacy on a firm’s innovation performance

<table>
<thead>
<tr>
<th>Hypothesized mediation paths</th>
<th>Bootstrap-indirect effect</th>
<th>SE&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>90% CI&lt;sup&gt;b&lt;/sup&gt;</th>
<th>90% CI&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurial passion → Self-efficacy → Innovation performance</td>
<td>0.231</td>
<td>0.083</td>
<td>0.104</td>
<td>0.377</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial passion → Alertness → Innovation performance</td>
<td>0.054</td>
<td>0.045</td>
<td>0.006</td>
<td>0.144</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 186. <sup>a</sup>standard error, <sup>b</sup>CIs are bias-corrected based on 10,000 bootstrap samples. Controls included as covariates in model, not reported for parsimony.

Model 5 in Table 3 examining the moderating role of entrepreneurs’ age showed that age had a significantly U-shaped moderating effect on the relationship between entrepreneurial passion and self-efficacy when the interaction term between entrepreneurial passion and squared age was positive and significant (β = 0.117, p < 0.05). Figure 2 shows that when entrepreneurs are at young to middle age, the positive relationship between passion and self-efficacy is weakened and then strengthened when entrepreneurs are at middle to old age. Meanwhile, according to Model 6, entrepreneurs’ age did not have a significant inverted U-shaped moderating effect on the relationship between entrepreneurial passion and alertness when the interaction term between entrepreneurial passion and squared age was positive but not significant (β = 0.042, p > 0.10). However, the interaction term between entrepreneurial passion and age was positive and significant, which suggested a linear and positive moderating effect of age on the relationship between entrepreneurial passion and alertness (β = 0.210, p < 0.10). These results provided support for Hypothesis 3a, but not for Hypothesis 3b.
Robustness check

As high firm-level innovation performance can make entrepreneurs more passionate about their businesses, for robustness check, we conducted Durbin-Wu-Hausman test to examine the potential endogeneity problem. We employed the two-stage least squares procedure in STATA 17, using `ivregress` command. The prior literature suggests that work passion is closely associated with work-life conflict (Chummar et al., 2019). Moreover, there has been little evidence for the direct effect of entrepreneurs’ work-life conflict on firm-level innovation performance. As a result, we employed a measure of entrepreneurs’ work-life conflict, adopted from Boswell and Olson-Buchanan (2007), as an instrumental variable. The null hypothesis of Durbin-Wu-Hausman test states that the tested variable is exogenous. The results of Durbin-Wu-Hausman test indicated that we failed to reject this null hypothesis at the conventional levels ($\chi^2(1) = 0.287, p =$
0.592; Wu-Hausman $F(1,174) = 0.269, p = 0.604$) (Wooldridge, 2009). In other words, our findings confirmed that endogeneity was not a problem in this study.

**Discussion**

The study fills in an important literature gap on entrepreneurship by investigating the effect of entrepreneurial passion, a frequently observed micro-level phenomenon (Chen et al., 2009), on firm-level innovation performance. The results suggest that entrepreneurial passion directly and indirectly influences firm-level innovation performance through entrepreneurial self-efficacy and entrepreneurial alertness. Interestingly, as the total indirect effect appears to be smaller than the direct effect, it is important to consider both direct and indirect effects to have good understanding of the real effect of entrepreneurial passion on firm-level innovation performance.

**Theoretical contributions**

The paper contributes to the entrepreneurship literature in several ways. First, the impact of entrepreneurial emotions in the entrepreneurial process is attracting more attention in the entrepreneurship literature (Cardon et al., 2012; Collewaert et al., 2016; Luu and Nguyen, 2021). However, only a few studies have investigated the impact of entrepreneurial passion on firm-level factors (Drnovsek et al., 2016; Luu and Nguyen, 2021) and this research is among the few studies to demonstrate that entrepreneurial passion, an entrepreneurial-level personal characteristic, can have a significant positive effect on a firm-level business outcome.

Second, although passion has been such a frequently observed emotional state of entrepreneurs, researchers have mostly overlooked its potential role in the firm-level innovation performance (Drnovsek et al., 2016). So far two studies attempted to learn the
role of entrepreneurial emotions in innovation performance, including Ngah and Salleh (2015) and Baron and Tang (2011). This research extends the innovation literature by showing that entrepreneurial passion can be critical to firm-level innovation performance. As an intense state of positive emotion, it positively influences firm-level innovation performance directly and indirectly through entrepreneurial self-efficacy and entrepreneurial alertness. Interestingly, the indirect effect can be smaller than the direct one, and the mediation effect via entrepreneurial self-efficacy is larger than that via entrepreneurial alertness.

Third, this research extends the entrepreneurial passion literature by confirming that entrepreneurial passion is a significant driver of entrepreneurial alertness. Traditionally, researchers conceptualize entrepreneurial alertness as a cognitive process facilitated only by cognitive factors (Frese and Gielnik, 2014), such as divergent thinking (Gielnik et al., 2014) or prior knowledge (Shane, 2000). Building on broaden-and-build theory of positive emotions (Fredrickson, 2001), the study empirically found entrepreneurial passion to be positively associated with entrepreneurial alertness.

Fourth, we contribute to the literature on the role of age in entrepreneurship by confirming that entrepreneurs’ age has a more than linear influence on how entrepreneurial passion is related to entrepreneurs’ adoption (self-efficacy) of innovated ideas. This research provides more evidence for previous research about the difference in entrepreneurs’ motives at different lifecycle (Baù et al., 2017). When entrepreneurs are at young and middle age, the excessive process of experiencing and accumulating knowledge can badly influence their well-being and hinder the positive impact of such positive affect as passion on entrepreneurial self-efficacy. However, when entrepreneurs are at middle and old age, passionate entrepreneurs will feel the increasingly confident in
their abilities to develop their ventures with their accumulated knowledge and life experience. Furthermore, the empirical results also confirm that age positively moderates the relationship between entrepreneurial passion and alertness. As an entrepreneur gets older and gains more life experience, more passion for the firm will motivate them to identify more innovation opportunities.

**Managerial contributions**

The research provides entrepreneurs with several practical implications. First, being able to identify the sources to firm-level innovation performance is an aspiration of many entrepreneurs. We show that entrepreneurial passion is indeed vital for firm-level innovation performance. It is not only directly associated with firm-level innovation performance, but it also can enhance other cognitive dimensions such as entrepreneurial self-efficacy and entrepreneurial alertness. Therefore, to improve their firms’ innovation performance, it would be beneficial that entrepreneurs maintain the passion about their business. Second, it is a popular belief that entrepreneurs must be alert to potential business opportunities for their firms to have high innovation performance (Chamorro-Premuzic, 2013). This study confirms that while entrepreneurial alertness is indeed important, entrepreneurs should be aware that their self-efficacy is even more important to their firms’ innovation performance. In other words, being able to identify good ideas is important. However, it would be more important for the entrepreneurs to have self-confidence that they can implement these ideas to further improve their firms’ innovation performance. Finally, this research suggests that entrepreneurs of young and old age particularly should nurture their passion for developing their firms to be more confident in performing entrepreneurial tasks. At these life stages, the relationship between passion and self-efficacy is more intensified than at the middle life stage. Entrepreneurs are also
encouraged to nurture their passion as they mature to be more alert to new business opportunities.

**Limitations and conclusion**

While our study offers a number of contributions, it has several limitations, which can suggest additional avenues for future research. First, this research uses a data set collected in only one country, Vietnam. In such a collectivist culture as Vietnam, the individual emotion like passion is less valued; therefore, the effect of entrepreneurial passion would be stronger in individualist cultures than in Vietnam (Curran et al., 2015). A future study can extend this research by using data collected in multiple countries with varying cultural factors. Second, future research can extend this study by exploring other factors that can differently moderate the mediating effects of entrepreneurial alertness and self-efficacy on the entrepreneurial passion – firms’ innovation performance link. Finally, as this study only includes firms founded for over 3 years, future studies may look into the roles of entrepreneurial passion, using a sample of more newly founded firms to explore whether entrepreneurial passion plays an even more crucial role in the early stages of the entrepreneurial process.

In conclusion, this study confirms entrepreneurial self-efficacy and alertness to be two mechanisms mediating the link between entrepreneurial passion and their firm’s innovation performance. Furthermore, it examines how an entrepreneur’s age has a more-than-linear moderating influence on the link between entrepreneurial passion and self-efficacy. These findings yield implications for entrepreneurs about how to turn their passion into improvements in their firm’s innovation performance at different stages of their lifecycle.
References


