

## Article

# Insomnia: An Important Antecedent Impacting Entrepreneurs' Health

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**Abstract:** Insomnia (and sleep deprivation) has an important impact on multiple outcomes such as individuals' cognitive abilities, decision-making, and affect. In this paper, drawing from sleep research, we focus on entrepreneurs' insomnia–health relationship and test a serial mediation model that considers entrepreneurs' insomnia as an important predictor of their poor health. More specifically, we hypothesize that insomnia heightens entrepreneurs' stress, which leads to increased negative affect, which ultimately undermines their health conditions. Using a sample of 152 Iranian entrepreneurs, we found support for our hypotheses as our results suggest that insomnia has a positive (and detrimental) effect on poor health (via more stress and negative affect). Contrary to research calls focused on stress reduction as one performance improvement mechanism, our results suggest sleep quality as a more effective mechanism for entrepreneurs to reduce their stress and to improve their health. Theoretical and practical implications, limitations, and directions for future research are also discussed.

**Keywords:** insomnia; stress; negative affect; health; entrepreneurs

## 1. Introduction

Recent research in management has started to place more emphasis on positive employee outcomes such health and happiness (Huang et al. 2016; Skakon et al. 2010). Insomnia is a particular health problem that is of increasing concern to public health professionals and firms alike. Insomnia is defined as the “difficulty falling asleep and staying asleep” (Barber et al. 2013, p. 616) and has generated substantial research interest in various disciplines. For example, extensive reviews and meta-analyses have been published on the impact of insomnia (and sleep deprivation) on organizational work (e.g., Barnes 2012; Guarana and Barnes 2017), cognitive abilities (e.g., Lim and Dinges 2010), decision-making (e.g., Harrison and Horne 2000), and affect (e.g., Pilcher and Huffcutt 1996). Moreover, in entrepreneurship research, entrepreneurs' health and well-being has also attracted substantial attention (e.g., Buttner 1992; Cardon and Patel 2015; Stephan 2018; Torrès and Thurik 2018; Uy et al. 2013).

Although previous research has indirectly highlighted the impact of sleep restriction on psychological strain, such as stress (Barber et al. 2010; Barber and Munz 2011; Dinges et al. 1997) and

affect (Franzen et al. 2008), as well as the impact of stress and affect on entrepreneurs' health problems (Buttner 1992; Cardon and Patel 2015), entrepreneurship research itself has yet to investigate thoroughly how and through what mechanisms insomnia impacts entrepreneurs' health conditions. The answer seems obvious because the long hours entrepreneurs work (e.g., Gunia 2018; Patzelt and Shepherd 2011; Torrès and Thurik 2018) (1) makes their recovery time (for example, during sleep) more important; and (2) prompts them to be more vulnerable to higher levels of stress (Hessels et al. 2017) and depression. Taken together, this could lead to higher health problems, such as burnout (Buttner 1992; Spivack and McKelvie 2018), for entrepreneurs.

In this paper, we attempt to address the following research question: *How and through what mechanisms does entrepreneurs' insomnia impact their health conditions?* With a sample of 152 Iranian entrepreneurs, we found that entrepreneurs' insomnia increases their stress levels, which, in turn, intensifies their negative affect, which eventually results in poorer health conditions. In doing this research, we make several contributions to the entrepreneurship literature. First, we add to the burgeoning research that identifies sleep as an antecedent of entrepreneurial motives and means (e.g., Gunia 2018) by offering important insights on how insomnia impacts entrepreneurs' health. This is particularly important given conflicting results related to the insomnia–burnout relationship (e.g., Armon et al. 2008). Second, by focusing on stress, negative affect, and poor health, we answer recent calls for entrepreneurial wellbeing research that examines the role of emotions and wellbeing for entrepreneurs (Li 2011). We contribute to this research by highlighting how entrepreneurs' negative affect and emotions lead to their poor health and that entrepreneurs' dark side can lead to a *dark* outcome (Hessels et al. 2018; Rauch et al. 2018). Third, by focusing on entrepreneurs' perceived stress–negative affect–poor health relationships, we address recent calls conveying the idea that “[r]esearch can make important contributions to the literature by theorizing and empirically testing mediators and moderators of the stress–health relationship in the entrepreneurial context” (Shepherd and Patzelt 2015, p. 24). Finally, prior research has shed light on how entrepreneurs' negative affect may influence their alertness which plays a crucial role in various aspects of the entrepreneurship process, such as opportunity recognition, opportunity exploitation, innovation, and firm growth (Tang et al. 2012). The current study extends this line of research by identifying the root cause of negative emotions (i.e., insomnia), hence the root of the problem that hinders the entrepreneurial process. Given the importance of entrepreneurship to the growth of firms and economies, adding to the understanding of the factors that may hinder entrepreneurship and industrial development is increasingly salient in the current competitive landscape (Ahlstrom 2010; Alvarez et al. 2015; Tomizawa et al. 2019).

## 2. Theoretical Background and Hypotheses

Employee well-being is an important line of research in management and organizational psychology (Huang et al. 2016; Skakon et al. 2010). A key aspect of this research is on sleep or a lack thereof. A lack of sleep (visible through sleep deprivation and insomnia)<sup>1</sup> has attracted much attention in recent years from multiple disciplines. For example, in a meta-analysis on the link between sleep and cognitive abilities, Lim and Dinges (2010) identified outcomes including simple attention, complex attention, processing speed, working memory, short-term memory, and reasoning as important results of sleep deprivation. Complementarily, prior research in organizational psychology and management has investigated the impact of sleep on self-regulation (Barnes 2012), leadership styles (Barnes et al. 2016), and abusive supervision (Barnes et al. 2015), to name just a few. However, in the field of entrepreneurship, scholars seem to have missed the opportunity to build upon this rich literature to explore how insomnia precisely influences entrepreneurs' health conditions, resulting in confounding insomnia and non-insomnia situations.

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<sup>1</sup> Indeed, sleep deprivation (e.g., going to bed two hours later or waking up two hours earlier) and insomnia (e.g., falling asleep two hours later or not being able to stay asleep for two additional hours) have the same outcome: a two-hour sleep debt.

In the current paper, we explore these relationships and propose that entrepreneurs' insomnia will influence their health conditions through the mediating mechanisms of stress and negative affect. We first hypothesize that entrepreneurs' insomnia will lead to increased level of perceived stress. Due to insufficient sleep, insomniac entrepreneurs will not be able to adequately manage the multiple environmental demands (Lazarus and Folkman 1984), which will create tensions and stress (Barber et al. 2010). Moreover, drawing upon a large number of studies that have shed light on the relationship between sleep deprivation and higher stress (e.g., Barber and Munz 2011; Barber et al. 2010; Chuah et al. 2010; Dinges et al. 1997; Fortier-Brochu and Morin 2014), we argue that this relationship is particularly salient in the context of entrepreneurship because the long hours during which entrepreneurs work to create and grow their own ventures (e.g., Gunia 2018; Patzelt and Shepherd 2011) will expose them to numerous potentially stressful situations, resulting in higher levels of stress (e.g., Buttner 1992; Cardon and Patel 2015; Harris et al. 1999; Jamal 1997; Stephan 2018; Torrès and Thurik 2018; Vedula and Kim 2018). Therefore, we hypothesize:

**Hypothesis 1.** *Entrepreneurs' insomnia is positively related to their perceived stress.*

Although scholars have primarily focused on the direct relationship between sleep deprivation and affect (e.g., Franzen et al. 2008; Pilcher and Huffcutt 1996; Scott and Judge 2006; Sonnentag et al. 2008) and entrepreneurship researchers have looked more at positive affect (e.g., Baron 2008; Baron and Tang 2011; Baron et al. 2011), we focus on entrepreneurs' negative affect, seen here as a direct consequence of their perceived stress. Previous research suggests that when people are stressed, they are more likely to experience negative affect and emotions. In particular, helplessness theory (e.g., Baum et al. 1986) posits that when encountering stressful situations, individuals may develop inadequate responses such as depression or negative affect (Zimbardo and Boyd 1999). Empirically, prior studies have offered evidence for a positive relationship between stress and negative affect. For example, using a sample of Korean immigrants, Kim (2002) found a positive relationship between stressful circumstances and distress. Relatedly, Shin et al. (2007) found that stress is an important predictor of depression. Hellgren and Sverke (2003) found a positive correlation between job insecurity (a generator of economic stress) at time 1 and mental health complaints (i.e., depression) at time 2. Similarly, Pollack et al. (2012, p. 800) found that "entrepreneurs [...] who reported relatively more economic stress also reported relatively more depressed affect."

Based on the reasoning and evidence above, we contend that when entrepreneurs experience higher levels of perceived stress, they will experience higher levels of negative affect. Therefore:

**Hypothesis 2.** *Entrepreneurs' perceived stress is positively related to their negative affect.*

We further hypothesize that entrepreneurs' negative affect is positively related to their poor health. Indeed, when individuals experience negative affect, they tend to ruminate (Querstret and Cropley 2012). Higher levels of rumination will lead to fatigue (Querstret and Cropley 2012) and exhaustion (especially visible due to long working hours; (Cardon and Patel 2015; Gunia 2018; Patzelt and Shepherd 2011; Torrès and Thurik 2018; van Yperen and Janssen 2002)), which will have a direct influence on poor health. For example, Lechat and Torrès (2016) found a link between a large number of negative affective events and the risk to experience poor health syndrome (e.g., burnout) for French owner-managers of small and medium-sized enterprises (SMEs). In addition, Cardon and Patel (2015) found a negative correlation between entrepreneurs' depressed affect and personal health. Based on the reasoning and evidence above, we hypothesize:

**Hypothesis 3.** *Entrepreneurs' negative affect is positively related to their poor health.*

As posited in Hypotheses 1 and 2 above, we expect that entrepreneurs' insomnia influences their perceived stress and that this perceived stress influences their negative affect. Integrating Hypotheses 1 and 2 indicates that entrepreneurs' insomnia will increase negative affect through the mediating mechanism of stress. As posited in Hypothesis 3, we also hypothesize that negative affect increases

health problems for entrepreneurs. Therefore, we propose a “processual” perspective and expect two levels of serial mediation such that the effects of entrepreneurs’ insomnia are transmitted to their poor health first through their (1) stress and then, through (2) negative affect. Although previous research has examined direct relationships such as the insomnia–negative affect–fatigue relationship (e.g., Scott and Judge 2006), entrepreneurs’ depressed affect–health relationship (e.g., Cardon and Patel 2015), and entrepreneurs’ stress–health problems relationship (e.g., Buttner 1992; Fernet et al. 2016), it has missed the opportunity to develop an integrated and comprehensive perspective of how and through which mechanisms entrepreneurs’ insomnia would impact their health conditions. In sum, we hypothesize:

**Hypothesis 4.** *Entrepreneurs’ stress and negative affect serially mediate the relationship between insomnia and poor health.*

### 3. Method

#### 3.1. Sample and Data Collection

Survey data with entrepreneurs were gathered from different industries in the Central Asian country of Iran to investigate the associations among insomnia, perceived stress, negative affect, and entrepreneurs’ health. Gaining access to business databases in Iran is extremely difficult (Shultz et al. 2014) and existing databases are unreliable in most cases. In addition, it is almost impossible to persuade businessmen to participate in a study by someone who is unknown to them. Further, due to the collectivist culture in Iran (Hofstede and Hofstede 2005), people tend to trust those in their own social networks rather than out-group strangers. Therefore, we employed a snowball sampling technique (Beauchemin and González-Ferrer 2011) as snowballing seems to be an acceptable technique to gain access to respondents who may be inaccessible otherwise (Tepper 1995). In particular, we used personal networks to access entrepreneurs and obtained 90 responses in three months’ time. One of the respondents introduced us to a forum of entrepreneurs which held monthly meetings for networking, educational, and consulting purposes. We further obtained 62 responses from members of this forum. We had no unusable cases, due to the nature of our data collection which was based on face-to-face structured interviews. Overall, we reached over 420 entrepreneurs and our final sample consisted of 152 complete responses, reflecting a response rate of 36%.

Our respondents came from a large variety of industries, including trade, tools, transportation, construction, and agriculture, which represent Iran’s major industries. In our final sample, 75% of our respondents were founders of current businesses and 25% were top executives of current businesses with previous start-up experience. In addition, 64% were married; 1% had high school education, 8% had an associate degree, 28% had a bachelor’s degree, and 63% had graduate education. Further, 26% were less than 30 years old, 43% were between 30 and 40, 22% were between 40 and 50, and 9% were above 50. A total of 17% of the firms were older than 20 years old.

We employed the following techniques to build trust and encourage respondents to answer all survey items properly. First, we promised to provide a written report of our results with managerial implications. Second, by assuring the confidentiality and anonymity of responses, we encouraged entrepreneurs to provide their responses without any reservation (Sills and Song 2002). Third, one-on-one interviews with respondents assured the proper understanding of all items (Im and Rai 2008).

The original survey was developed in English and was then translated to Farsi, which is the main official language of Iran. The Farsi version was then back translated to English to ensure accuracy and equivalence (Brislin 1970). We tested the face validity of all items by inviting three Iranian scholars in business and three practitioners to review the initial items to ensure the readability of these items for Iranian respondents (Hardesty and Bearden 2004). Minor modifications were made to improve the face validity (Unger and Kernan 1983). Next, we pre-tested the instruments by collecting data with 20 respondents from the target population (who were excluded from the final sample). We further improved the readability of the survey items and ensured that all the items were understood properly, which in turn decreased the response time.

### 3.2. Addressing Common Method Variance

To avoid the risk of common method bias, we employed both *ex-ante* and *ex-post* techniques by following Podsakoff et al.'s (2012) suggestions. First, by conducting one-on-one interviews with respondents and utilizing different response anchors, we decreased the risk of careless answers (Meade and Craig 2012). Second, we interviewed each respondent two different times on the same day to prevent them from seeking consistency among the items. By doing so, the criterion and predictor variables were temporally spaced (Christian and Ellis 2011). Also, scales related to the current study were located in a comprehensive survey with other unrelated measures, which made it almost impossible for respondents to identify the study hypotheses and to answer accordingly. Further, the ultimate dependent variable in our study (i.e., health) was collected two weeks later. Third, we controlled for respondents' social desirability (Strahan and Gerbasi 1972). In addition, we assured the confidentiality and anonymity of the responses to demotivate respondents from providing socially desirable answers.

With regards to *ex-post* techniques to further address common method variance, we first conducted Harman's single factor analysis. As a result, 10 factors emerged, with the first factor accounting for 18.77% of the total variance, implying that no single factor can explain the majority of the variance among the survey items. We further employed Williams et al.'s (1989) approach to determine the extent to which common method bias might exist in our research (Simmering et al. 2015). First, we estimated a full measurement model with all of our substantive constructs. Then, we re-estimated the same measurement model by adding an uncorrelated method factor. We did this to check if the model fit improved significantly by the addition of the method factor. According to Williams et al. (1989), if the method factor model improves fit indices significantly, the common method bias may be an issue. Employing AMOS, we found that the fit indices for the method factor model (RMSEA = 0.073, CFI = 0.67, SRMR = 0.88, Chi-Square/df = 1.80) did not significantly improve compared to the fit indices for the full measurement model (RMSEA = 0.075, CFI = 0.76, SRMR = 0.09, Chi-Square/df = 1.84). In order to determine the extent of the impact of common method bias, we calculated the explained variance of the method factor by squaring and summing the loadings of each item. As a result, the total variation due to the method factor was 12%, considerably less than the suggested threshold (25%) (Williams et al. 1989). Therefore, Common Method Variance should not be a major threat to our data and analyses.

### 3.3. Measures

**Insomnia.** The measure for insomnia was adopted from Greenberg (2006). It asked the respondents to indicate the extent to which they experienced the following symptoms in general: (1) difficulty falling asleep; (2) waking up several times; (3) difficulty staying asleep (including waking up too early); and (4) waking up feeling tired and worn out after your usual amount of sleep ("1" = "never" and "7" = "very often").

**Perceived Stress.** In order to gauge entrepreneurs' perceived stress, we adopted the 14-item measure developed by Cohen et al. (1983). A sample item was: "How often have you been upset because of something that happened unexpectedly" ("1" = "never" and "5" = "very often")?

**Negative Affect.** Negative affect was measured with the 10 items from the PANAS developed by Watson et al. (1988) ("1" = "very slightly or not at all" and "5" = "extremely").

**Health Perception.** We adopted the 5-item measure developed by Stewart et al. (1988) to gauge health perception. A sample item is: "In general, would you say your health is" ("1" = "excellent" and "5" = "very poor"). Higher ratings indicate poor health.

**Control Variables.** *Religiosity* was controlled due to its critical importance in Iranian culture (Ghorbani and Watson 2006). Religiosity is present in almost all aspects of Iranian life, contributing to people's psychological well-being and health perception. We employed Jamal and Sharifuddin's (2015) scale to measure the religiosity of the respondents. A sample item is: "It is important to me to spend periods of time in private religious thought and prayer" ("1" = "not true" and "7" = "very true"). We also controlled entrepreneurs' demographic variables due to their potential impact on our model (Koellinger 2008; Ross and Wu 1995). *Entrepreneurs' age* was measured with the following

categories: with “1” representing those younger than 30 years old; “2” representing those between 30 and 40; “3” representing those between 40 and 50; and “4” representing those more than 50. *Marital status* was measured with “2” representing “married” and “1” “otherwise.” *Education* was measured with “1” representing high school degree, “2” representing associate degree, “3” representing bachelor degree, and “4” representing graduate degree. Finally, for *founders*, “1” represents those who founded the current business and “2” represents top executives of current businesses with previous start-up experience.

### 3.4. Analysis and Results

To investigate the association between entrepreneur insomnia, perceived stress, and negative affect as well as their impact on entrepreneur health, we estimated measurement and structural models using the Partial Least Squares (PLS) technique. PLS models adopt a variance-based structural equation modeling (SEM) approach. We adopted PLS models due to the exploratory nature of our study (Hair et al. 2013) as well as the modest size of our sample (Doz et al. 2000; Hair et al. 2013). In addition, PLS requires minimal demands on distributional assumptions and measurement scales (Wold 1982), which is suitable for our snowball sampling method. SmartPLS 3 software was used to analyze the data. Table 1 provides the descriptive statistics of all variables.

### 3.5. The Measurement Model

We started with the measurement model to assess the validity and reliability of our scales. First, we tested item loadings to their respective constructs to ensure that constructs share more variance with their respective items than their variance with errors. Results showed no cross loadings. Also, items of the substantive constructs have loadings well above the suggested threshold of 0.7 (Hulland 1999). Second, we conducted the composite reliability test to assess the internal consistency of the scales. The composite reliability of all measures were above the accepted threshold of 0.7 (Hair et al. 2013). Third, we calculated the average variance extracted (AVE) to check how well our items explained the variance of our constructs to ensure convergent validity (Fornell and Larcker 1981). The AVE of all variables was higher than the established threshold of 0.5 (Hulland 1999). Furthermore, we calculated the square root of the AVE (presented in parentheses in Table 1) to further assess the discriminant validity of our measures. All of these values were higher than the values in the corresponding columns and rows, which suggested adequate discriminant validity of the constructs (Birkenshaw et al. 1995).

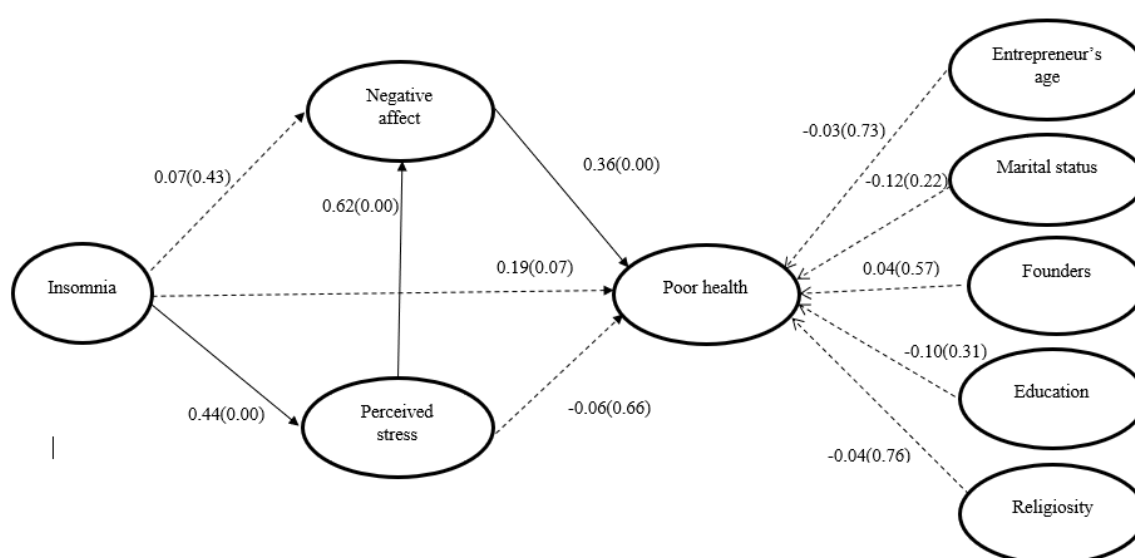
**Table 1.** Means, Standard Deviations, and Correlations.

Variable	Composite Reliability	AVE	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1. Entrepreneur's age	-	-	2.13	0.91										
2. Marital status	-	-	1.64	0.48	0.23 **									
3. Founders	-	-	1.27	0.49	0.06	0.11								
4. Education	-	-	3.52	0.70	-0.17 *	-0.15	0.05							
5. Religiosity	0.94	0.65	3.74	1.70	0.12	0.09	-0.03	-0.08	(0.81)					
6. Insomnia	0.81	0.52	2.68	1.10	0.08	-0.03	0.22 **	0.15	-0.11	(0.72)				
7. Perceived stress	0.89	0.54	2.73	0.55	-0.20 *	-0.30 **	0.10	0.02	-0.11	0.39 **	(0.73)			
8. Negative affect	0.88	0.52	2.12	0.65	-0.08	-0.07	0.04	-0.05	-0.22 **	0.20 *	0.52 **	(0.72)		
9. Poor health	0.85	0.54	2.25	0.66	-0.05	-0.08	0.07	-0.04	-0.00	0.27 **	0.29 **	0.27 **	(0.83)	
10. Marker	0.87	0.69	2.51	0.99	0.12	-0.09	0.01	-0.08	0.14	0.05	-0.05	-0.06	0.11	

AVE: average variance extracted. \* Correlation is significant at the 0.05 level. \*\* Correlation is significant at the 0.01 level. Two-tailed test.

### 3.6. The Structural Model

We used the structural model to test the hypotheses by examining the size and significance of the modeled structural paths and the related explained variances. We used the bootstrap technique (500 sub-samples which is commonly accepted for PLS models) as an algorithm setting to run supplementary procedures (Hair et al. 2013). Bootstrapping is a nonparametric technique for assessing the precision of paths in structural models (Efron and Tibshirani 1993). The explained variance ( $R^2$ ) for our endogenous variables were as follows: .19 for perceived stress, 0.43 for negative affect, and 0.20 for poor health. Overall, the structural model provided a good fit for the data (Chi-Square/df = 1.84, SRMR = 0.078; (Hu and Bentler 1998)). Figure 1 presents the structural model with standardized parameter estimates. It is worth noting that although we reported the commonly-suggested criteria for model fit with SmartPLS above, these criteria may not be useful for PLS-SEM and should be employed with great caution (Hair et al. 2013). In addition, “these criteria are in their very early stage of research and are not fully understood (e.g., the critical threshold values).”<sup>2</sup>



**Figure 1.** The Structural Equation Model (Standardized Parameter Estimates Are Shown with  $p$  Values in Parentheses).

Hypothesis 1 proposed a positive relationship between entrepreneurs' insomnia and their perceived stress. The hypothesized path is significant and positive ( $\beta = 0.44$ ,  $t = 6.94$ ,  $p < 0.05$ ), supporting H1. Hypothesis 2 that entrepreneurs' perceived stress is positively related to their negative affect, is supported ( $\beta = 0.62$ ,  $t = 8.62$ ,  $p < 0.05$ ). Hypothesis 3 predicted that entrepreneurs' negative affect is positively related to their poor health, and is also supported ( $\beta = 0.36$ ,  $t = 3.45$ ,  $p < 0.05$ ).

Hypothesis 4 proposed that entrepreneurs' stress and negative affect serially mediate the relationship between insomnia and poor health. According to Baron and Kenny (1986), in order to have a full mediation relationship, three conditions need to be met: (a) the independent variable should significantly predict both the mediator and the dependent variable, (b) the mediator should significantly predict the dependent variable, and (c) after the mediator is added to the model, the association between the independent variable and the dependent variable should not be significant. Our results indicate that there is a significant association between insomnia and poor health ( $\beta = 0.30$ ,  $t = 3.81$ ,  $p < 0.05$ ). The relationship between insomnia and perceived stress ( $\beta = 0.46$ ,  $t = 7.89$ ,  $p < 0.05$ ) as well as the relationship between insomnia and negative effect ( $\beta = 0.36$ ,  $t = 5.64$ ,  $p < 0.05$ ) was highly significant as well. Results also show that perceived stress has a significant association with both poor

<sup>2</sup> <https://www.smartpls.com/documentation/functionalities/model-fit>.

health ( $\beta = 0.31$ ,  $t = 4.10$ ,  $p < 0.05$ ) and negative affect ( $\beta = 0.65$ ,  $t = 13.96$ ,  $p < 0.05$ ), and that negative affect has a significant association with poor health ( $\beta = 0.40$ ,  $t = 5.90$ ,  $p < 0.05$ ). These results fulfill the first two conditions for mediation.

We also found that the relationship between entrepreneurs' insomnia and negative affect is not significant ( $\beta = 0.07$ ,  $t = 0.090$ , *n.s.*) when stress is added, whereas the direct impact of insomnia on stress ( $\beta = 0.45$ ,  $t = 7.08$ ,  $p < 0.05$ ) as well as from stress on negative affect ( $\beta = 0.62$ ,  $t = 9.15$ ,  $p < 0.05$ ) remains significant. Similarly, the association between entrepreneurs' perceived stress and poor health ( $\beta = 0.03$ ,  $t = 0.22$ , *n.s.*) is not significant when negative affect is added, whereas the path between perceived stress and negative affect ( $\beta = 0.65$ ,  $t = 14.01$ ,  $p < 0.05$ ), as well as between negative affect and poor health ( $\beta = 0.38$ ,  $t = 3.60$ ,  $p < 0.05$ ), remains significant. Finally, there is no significant association between entrepreneurs' insomnia and poor health ( $\beta = 0.19$ ,  $t = 1.73$ , *n.s.*) when stress and negative affect were included in the model. These results suggest a full serial mediation model, thus providing support for H4.

## 4. Discussion

### 4.1. Theory and Policy Contributions

For more than two decades, research has shed light on the harmful impact of sleep deprivation on stress (e.g., Dinges et al. 1997). This bears even more importance for entrepreneurs as research has reported that entrepreneurs exhibit higher levels of stress (e.g., Buttner 1992; Cardon and Patel 2015; Harris et al. 1999; Jamal 1997; Torrès and Thurik 2018; Vedula and Kim 2018) and health problems (e.g., Buttner 1992). Drawing from these previous works, our study provides interesting empirical evidence that insomnia leads to entrepreneurs' poor health (through its effects on perceived stress and negative affect). Our research also provides a better understanding of the antecedental role of insomnia on entrepreneurs' poor health and highlights that the root of this problem is the lack of high quality sleep. Therefore, one important theoretical consequence is that, while most research calls for mechanisms to reduce stress to improve individual performance, sleep quality is a potentially more effective way to reduce entrepreneurs' stress and eventually improve their health. Consequentially, insomnia plays a crucial antecedental role for *entrepreneurs* and offers, we believe, some valuable theoretical insights in the specific context of *entrepreneurship*. For example, it would be interesting to explicate, theoretically and empirically, how, and through which mechanisms, insomnia precisely impacts the cognitive abilities that lead entrepreneurs to recognize or perceive opportunities (e.g., Tang 2010).

Our results also shed light on entrepreneurs' affect research. Although the topic of entrepreneurs' positive affect has been well-documented (e.g., Baron 2008; Baron et al. 2011), our focus on the less-considered role of negative affect and emotions in entrepreneurship provides evidence and highlights that, besides positive affect, *negative* affect and emotions also play an important role for entrepreneurs (e.g., Ucbasaran et al. 2013), especially entrepreneurs' health conditions. It would be fruitful for future research to investigate, theoretically (and then empirically), how and under which (boundary) conditions entrepreneurs' confidence (e.g., Ucbasaran et al. 2013) enters in our insomnia–stress–negative affect model and “transforms” this initial negative affect into positive affect.

Our results have important implications for scholars researching entrepreneurs' stress. Although previous research provides empirical support that entrepreneurs experience high levels of stress (e.g., Buttner 1992; Cardon and Patel 2015; Harris et al. 1999; Jamal 1997; Stephan 2018; Torrès and Thurik 2018; Vedula and Kim 2018), these results are inconclusive as recent studies have also reported that entrepreneurs often experience *low* levels of stress (e.g., Baron et al. 2016; Hessels et al. 2017; Stephan and Roesler 2010). Putting the debate whether entrepreneurs experience overall high or low stress aside, our focus on entrepreneurs' perceived stress provides evidence and highlights that perceived stress mediates the relationship between insomnia and negative affect, which ultimately leads to poor health for entrepreneurs. Therefore, a high level of stress can lead to detrimental outcomes (negative affect and poor health), not beneficial outcomes (e.g., Hessels et al.

2018; Rauch et al. 2018). Future research is warranted to further our model by investigating how coping behaviors and strategies (e.g., Patzelt and Shepherd 2011; Uy et al. 2013) could potentially moderate these relationships and explicate under what circumstances *higher* levels of negative emotions and stress would be potentially helpful for entrepreneurs.

Finally, given the importance of entrepreneurship to economies (Alvarez et al. 2015; Tomizawa et al. 2019), policymakers should be concerned with these results and how to help entrepreneurs with health problems such as insomnia. Notably, through the insomnia-negative affect positive relationship, the results here highlight the importance for governments to consider entrepreneurs' insomnia and emotions and their resulting effect. As economic policies and public sponsorship (e.g., Jourdan and Kivleniece 2017) can have an important impact on insomnia and sleep patterns of entrepreneurs, governments can help reduce entrepreneurs' insomnia and negative emotions by implementing economic policies that lower barriers to start-up financing or policies that facilitate the administrative and regulative process for new venture creation (e.g., Benz and Frey 2004). Particularly in Iran, the second largest economy in the Middle East (MacBride 2016), the Iranian government has initiated large-scale economic reforms which have led to 6% growth in GDP (World Bank 2017). Iranian entrepreneurs have played a crucial role in this development (Amiri et al. 2013). Therefore, government policy-makers should also pay special attention to entrepreneurs' health which may hinder or facilitate their entrepreneurial endeavors (cf. Wang et al. 2008). We call for future research to more rigorously investigate the relationship between policies, entrepreneurs' health, and economic growth.

#### 4.2. Practical Implications for Entrepreneurs

Our study offers several practical implications as well. First, our research finds that negative affect plays an important role in entrepreneurs' poor health. Despite research advances on affect in entrepreneurship (e.g., Baron 2008; Baron et al. 2011), our understanding of this relationship is still limited. One of the reasons for our limited understanding is perhaps due to the previous focus on positive affect (e.g., Baron and Tang 2011; Baron et al. 2011) and to the difficulties for entrepreneurs to conceive negative affect and (then to) improve it not only within themselves, however also inside their firms. This is unfortunate, given that strategies for developing an emotionally healthy organization have been well described (e.g., Ashkanasy and Daus 2002). Thus, we hope that entrepreneurs will take this opportunity to develop strategies to deal with negative affect, both within themselves and within their firms.

Second, our research also finds that perceived stress mediates the insomnia–negative affect relationship. However, our understanding of entrepreneurs' stress is still limited. One of the reasons for our limited understanding is perhaps due to researchers' focus on entrepreneurs' well-being and the "bright side" of entrepreneurship (e.g., Uy et al. 2013; for exceptions, see Spivack and McKelvie 2018). This is problematic, given that (1) conflicting research results on entrepreneurial stress continue to exist (e.g., Baron et al. 2016; Buttner 1992; Cardon and Patel 2015; Hessels et al. 2017; Stephan 2018; Stephan and Roesler 2010) and (2) practical strategies for dealing with stress have been well documented (e.g., Baron 2013). Thus, we hope that entrepreneurs will take this opportunity to focus on stress, seen here as an important antecedent of their negative affect and, *in fine*, their poor health.

#### 4.3. Limitations and Suggestions for Future Research

As with all studies, our study bears several limitations. First, although we temporally spaced the variables by collecting them over two different times on the same day and by collecting the ultimate dependent variable (poor health) two weeks later, our data were cross-sectional in nature. Since entrepreneurs' perceived stress and affect may change as their businesses develop, collecting longitudinal data can help us better understand the association between the key constructs of our study. Furthermore, as our data were collected through a snowball sampling approach, our sample may not be representative of the entrepreneur population in Iran. As Table 1 indicates, the majority of our respondents were between 30 and 40 years old and had college and above degrees. These

entrepreneurs were keen to participate in surveys and share their thoughts, providing us with the opportunity to reach out to them for our research. Given the difficulty to collect primary data in Iran (Shultz et al. 2014), this was the best solution to access a decent sample of practicing entrepreneurs. As a major oil producer and the second largest economy in the Middle East, Iran is playing a crucial role in the international business arena. We urge future research to continue efforts to replicate our results and test other entrepreneurship theories with a more representative sample in Iran.

Given these limitations, however, our research offers several avenues for future research. We specifically propose several cross-disciplinary and mixed-methods (e.g., Creswell and Plano Clark 2007) directions for future insomnia research. For example, entrepreneurship scholars interested in sociology (anthropology) could quantitatively (i.e., related to “how much” research questions) and qualitatively (i.e., related to “how/why” research questions) investigate the links between social context variables (e.g., institutions; Acs et al. 2008; Stenholm et al. 2013), cultural context variables (e.g., cultural values or practices; (Stephan and Pathak 2016) or pace of life; (Vedula and Kim 2018)), insomnia, and opportunity recognition-related outcomes such as alertness (e.g., Obschonka et al. 2017; Tang et al. 2012). Last, entrepreneurship scholars interested in political science and public policy could investigate the links between environmental conditions, insomnia, entrepreneurial alertness, and levels of entrepreneurial activity (Acs et al. 2008) by taking into consideration the moderating role of the various policy options (Audretsch 2015).

Moreover, highlighting the importance of the entrepreneurial mindset (e.g., Obschonka 2016; Obschonka et al. 2017), entrepreneurship scholars interested in organizational behavior could also quantitatively and qualitatively investigate the links between insomnia and entrepreneurial cognition (e.g., Yang et al. 2018). For example, future research could investigate the relationships between insomnia and effectuation and causation logics (Yang et al. 2018). Herein, potential moderators could include geographical locations. Future research could also investigate the impact (if any) of cognitive biases such as overconfidence (e.g., Busenitz and Barney 1997) on entrepreneurs’ insomnia–health processual relationship. It might be particularly interesting to examine under which specific conditions for nascent *versus* established entrepreneurs such cognitive biases can turn this “negative” process into a “positive” one. Last, entrepreneurship scholars could quantitatively and qualitatively investigate the links between insomnia and thinking processes and compare these dynamics in samples of disabled *versus* not disabled entrepreneurs. In sum, we encourage future research to pursue more cross-disciplinary and mixed-methods research on relationships between entrepreneurs’ insomnia and diverse entrepreneurial outcomes.

## 5. Conclusions

Research on the factors that impel and constrain entrepreneurship is very important to the development of industrial sectors and economies (Ahlstrom and Ding 2014; Alvarez et al. 2015). In the current research, we offer insights that may help improve entrepreneurial performance through a key component of well-being (Huang et al. 2016), that is, the impact of insomnia on entrepreneurs’ health. Using a sample of 152 entrepreneurs in Iran, this research provides evidence that entrepreneurs’ insomnia, through its effect on perceived stress and negative affect, will result in worse health. We believe that our results are important because they offer an alternative view to the current research focus which is mostly on entrepreneurs’ positive affect (e.g., Baron and Tang 2011; Baron et al. 2011) and entrepreneurs’ well-being and, more globally, to the “bright side” of entrepreneurship (e.g., Stephan 2018; Uy et al. 2013). Contrary to research focused on stress reduction as one performance improvement mechanism, our results suggest that enhanced sleep quality could also be an effective mechanism for entrepreneurs to reduce their stress and to improve their health. The resulting outcomes on entrepreneurial performance require further research, however they are quite likely to be positive. Something as (seemingly) simple as sleep improvement could prove to be a major contributor to performance in the entrepreneurial sector as this is already the case in other key fields, from medicine to transportation (Pink 2018).

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