

Is Stress Worth it? Stress-Related Health and Wealth Trade-Offs for Entrepreneurs

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Occupational stress is associated with numerous health problems that cost organisations considerable resources. We explore whether the detrimental effects of stress on individual health are accompanied by productive effects on individual performance for self-employed people, thereby making stress somewhat “worth it” for this occupational group. Given that positive affect can serve as a stress-buffering resource, we also examine the potential for positive affect (PA) to moderate these relationships. Our hypotheses are tested using data from the NHANES I Epidemiologic Follow-up Study (NHEFS) that incorporated extensive demographic, medical history, nutritional, clinical, and laboratory data representative of the non-institutionalised civilian US population. From this dataset we created a longitudinal matched sample of 688 self-employed individuals and 688 employees, incorporating self-reported and physiological measures of stress and health. Our findings indicate that (controlling for past income and prior health) self-employed people experience greater stress than employees, and they experience a positive impact of stress on income despite a negative impact on physical health. These relationships are moderated by positive affectivity, where PA accentuates the positive effect of stress on personal income and mitigates the negative effect of stress on physical health.

INTRODUCTION

Considered to be the “health epidemic of 21st century” by the World Health Organization, stress is estimated to cost US business \$300 billion or \$5,000 per employee per year. Different occupational groups experience different levels of stress (Narayanan, Menon, & Spector, 1999), and self-employment has been argued to be one of the most stressful occupational choices, such that the idea that entrepreneurship is stressful is “ubiquitous” (Uy, Foo, &

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Song, 2013). “The drawbacks of self-employment are well established. Self-employment is stressful and requires hard work, long hours, emotional energy, heightened job stress, role ambiguity, and above all, risk (Buttner, 1992; Eden, 1975; Kaufmann, 1999; Lewin-Epstein & Yuchtman-Yar, 1991; Min, 1990)” (Bradley & Roberts, 2004, p. 39). While other occupations can also be stressful, entrepreneurs lack resources, often work alone, lack support from colleagues, and must bear the cost of their mistakes while fulfilling lots of diverse roles such as recruiter, spokesperson, salesman, and boss (Buttner, 1992). Stress is not necessarily due to entrepreneurs doing more work than non-entrepreneurs, but instead is due to the significance of the decisions they make, the nature of the tasks and diversity of contexts they operate in, and the level of responsibility they bear for ensuring that those decisions are the right ones for their businesses and for themselves (Buttner, 1992, p. 10).

The experience of such extreme levels of stress has clearly been shown to have deleterious effects on one’s physical and mental health (Bond, Thompson, Galinsky, & Prottas, 2002; Jex & Beehr, 1991; Prottas & Thompson, 2006). Potential negative effects of stress include illness (Ivancevich & Matteson, 1980), exhaustion and fatigue (Van Yperen & Janssen, 2002), difficulties falling asleep, restless nights, radical changes in appetite, and irritability (Brody, 1981; Brody, Preut, Schommer, & Schurmeyer, 2002).

Why do entrepreneurs tolerate high levels of stress and the resultant dysfunctional impact on their personal health? There is some confusion in the literature concerning the trade-offs anticipated between a motivation to enter self-employment in order to increase one’s income and knowledge that the resulting stress levels will be high and potentially harmful to one’s physical health. While a common claim in the literature is that people often choose to become entrepreneurs when or because it adds to their wealth, power, or prestige (Baumol, 1990), a finding that holds across countries and cultures (Benzing, Chu, & Kara, 2009), some findings “[throw] doubt on the suggestion that people choose self-employment as a means of gaining higher income than they could attain as employees” (Douglas & Shepherd, 2002, p. 88). Instead, entrepreneurs might take into consideration other factors, such as the desire for autonomy or independence (Bradley & Roberts, 2004), and the utility they expect to derive from the working conditions of employment versus self-employment alternatives (Eisenhauer, 1995; Levesque, Shepherd, & Douglas, 2002). To our knowledge the trade-offs between income and one’s physical health have not been examined to date. This is important because although entrepreneurs may realise that self-employment involves significantly more work hours and effort, they may not understand the additional stress and strain self-employment puts on them, nor the potentially serious physical health consequences such

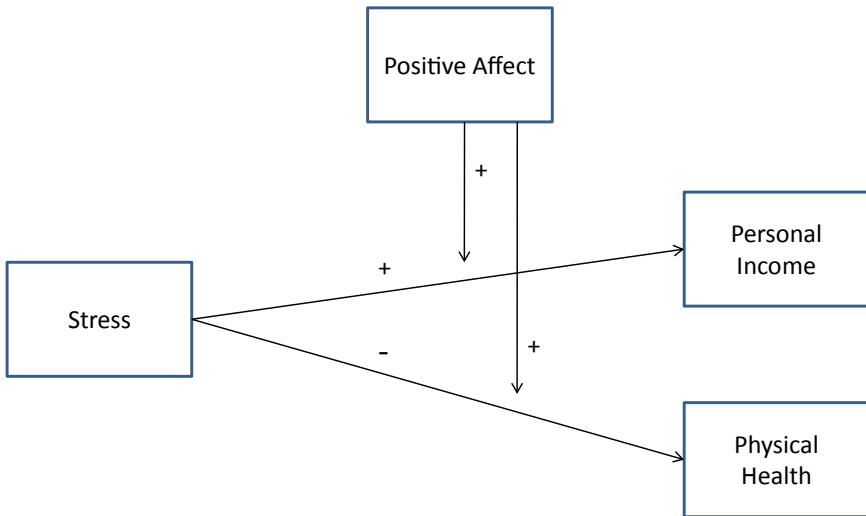


FIGURE 1. Conceptual model.

stress can lead to. We add to the literature on self-employment by directly examining the potential for greater levels of stress and the direct impact that stress has on one's personal income and one's physical health. Our conceptual model is in Figure 1.

By integrating literature on stress, self-employment, health, and positive affect, we provide a model of the consequences stress creates for self-employed individuals. We then test that model on a matched sample of 688 self-employed individuals and 688 employees. Our study makes several contributions to the literature on stress and entrepreneurship. First, while many scholars have argued that entrepreneurship involves considerable stress (Buttner, 1992; Harris, Saltstone, & Fraboni, 1999) and some have found evidence that entrepreneurs experience greater stress than non-entrepreneurs (Harris et al., 1999; Jamal & Badawi, 1995; Rahim, 1996), the focus has been on the existence of such stress and its antecedents (e.g. role ambiguity, long working hours, environmental uncertainty) rather than on its effects. We instead focus on the outcomes of stress for self-employed people, looking at potential positive and negative effects of stress. We suggest that a better understanding of both the functional and dysfunctional effects of heightened stress among self-employed people will help focus the scholarly and practical conversation to help them manage stress to enhance its functionality and mitigate its dysfunctionality.

Second, we suggest a positively moderating impact of dispositional positive affect. Given the negative impact of stress, scholars have looked at a

wide variety of factors that may help protect individuals from experienced stress including dispositional resources (Hobfoll & Shirom, 2000; Zellars, Perrewé, Hochwarter, & Anderson, 2006), job-factors such as greater control or autonomy (Meier, Semmer, Elfering, & Jacobshagen, 2008), and stress recovery programs (Hahn, Binnewies, Sonnentag, & Mojza, 2011; Richardson & Rothstein, 2008). We focus on one specific dispositional resource, one's level of dispositional positive affect, which has been theoretically argued to have important implications for entrepreneurial stress management (Baron, 2008). This is an important contribution because while studies in the medical field have suggested positive stress-buffering effects of positive affect, there is a limited understanding of how self-employed people leverage positive affect to not just mitigate negative health outcomes, but also to accentuate their financial reward. Although related findings from medicine on stress among employees in an organisation could potentially be extended to entrepreneurship, the underlying occupational differences between self-employed and employed individuals are significant. Entrepreneurs differ from managers in many key aspects (Busenitz & Barney, 1997), and also differ from the general population (Brockhaus, 1980). And, although entrepreneurship scholars have suggested that positive affect can provide a buffering effect for stress (Baron, 2008), empirical support for this argument is not yet evident in the literature.

Third, a smaller but important contribution is that this is one of the first studies in entrepreneurship to measure stress using both self-reported stress and physiological stress measures, despite a call for such research several years ago (Rahim, 1996) as well as more recently (Heaphy & Dutton, 2008). This lets us test the effects of stress using both subjective and objective measures, which is important given that self-reported stress and self-reported health measures can contribute explanatory power over and above medical measures (Anda, Williamson, Escobedo, Remington, Mast, & Madans, 1992; Idler, Russell, & Davis, 2000). While the topic of stress has been previously researched with the database we use (NHEFS), these studies have examined causes of stress (Farmer, Locke, Moscicki, Dannenberg, Larson, & Radloff, 1988; Istvan, Zavela, & Weidner, 1992; Vargas, Ingram, & Gillum, 2000) and the relationship between stress and medical outcomes, such as coronary disease and peptic ulcer disease (Anda et al., 1992; Thurston, Kubzansky, Kawachi, & Berkman, 2006). Our study makes a distinctive contribution over this prior research since (1) none of the prior studies using NHEFS have looked at a comparison of self-employed and employed people, and (2) none of the prior studies have examined the relationship between stress and income, nor (3) the moderating influence of positive affect on the relationships between stress and physical health or stress and income, as we do in this paper.

ENTREPRENEURIAL STRESS

Stress occurs when an individual is in a situation that is “relevant to his or her well-being and in which the person’s resources are taxed or exceeded” (Folkman & Lazarus, 1985, p. 152), typically by factors external to the individual (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). High job demands and low resources cause stress—a reaction that involves disruption in a person’s cognitive-emotional-environmental system (Demerouti et al., 2001; Lazarus & Folkman, 1984) or a state of heightened arousal (Ganster, 2005)—which then leads to strains such as anxiety, exhaustion, frustration, health complaints, and burnout (e.g. Jex, 1998).

Being an entrepreneur is a stressful experience (Boyd & Gumpert, 1983; Buttner, 1992; Rahim, 1996). There are many obstacles and demands, uncertainty in outcomes, intense competition, lack of resources (Baron, 1998), and more personal factors such as loneliness and lack of support from colleagues, all of which make the experience highly stressful (Akande, 1992; Buttner, 1992; Rahim, 1996). Entrepreneurship is associated with risk taking, uncertainty, intense work effort, and considerable responsibility (Aldrich & Martinez, 2001; Boyd & Gumpert, 1983; Covin & Slevin, 1991). Driven by a high need for achievement (Brockhaus & Horwitz, 1986; McClelland, 1961), entrepreneurs place pressure on themselves to perform well (Hambrick, Finkelstein, & Mooney, 2005). They typically experience a sense of personal responsibility for venture outcomes (Thompson, Kopelman, & Schriesheim, 1992), and bear the cost of their mistakes and those of their employees (Goldsby, Kuratko, & Bishop, 2005). Because of this, self-employed individuals work longer hours compared to employees (Eden, 1975; Lewin-Epstein & Yuchtman-Yar, 1991), and such a large commitment of time and energy is often at the expense of family and social activities (Kuratko & Hodgetts, 2004). The resulting time demands and high work load further increase stress (Harris et al., 1999; Jamal & Badawi, 1995).

Entrepreneurial stress may also be due to role ambiguity (Buttner, 1992). Entrepreneurs typically perform a variety of tasks such as “business opportunity recognition, business planning, resource acquisition, hiring, managing, and leading employees, creative problem solving, and quick decision making in uncertain and ambiguous situations (Douglas & Shepherd, 2000; Patzelt & Shepherd, 2011)” (Uy et al., 2013, p. 584). Entrepreneurs fulfill a multitude of roles, such as recruiter, spokesperson, and negotiator, often as part of their boundary spanning activities, which involve interactions with a variety of internal and external stakeholders such as employees, customers, suppliers, regulators, lawyers, and investors, which is also a source of stress (Goldsby et al., 2005). While entrepreneurs do have some resources to their advantage, such as autonomy and job control (Eden, 1975; Hundley, 2001; Tetric, Slack, Da Silva, & Sinclair, 2000), they lack other resources such as

performance feedback from supervisors, social support (Baron, 2010), and sufficient resources needed to implement their plans and strategies (Baron, 2008). Their organisations also often lack legitimacy (Stinchcombe, 1965), which can increase the feeling of stress (Hambrick et al., 2005).

In short, stress is a major aspect of being an entrepreneur (Alstete, 2008). While many studies have focused on the source of entrepreneurial stress, as Goldsby et al. (2005, p. 81) suggest, “a more complete picture of entrepreneurship incorporates an understanding of why people continue to pursue self-employment in light of the sacrifices, stresses, and demands it entails”. Such a picture requires establishing a baseline from which to build our conceptual model. This is especially important since some studies that have tested the difference in stress levels between entrepreneurs and non-entrepreneurs survey completely independent and unrelated samples using different sampling frames rather than providing a direct matched comparison (e.g. Buttner, 1992), as we do. Taken together, the literature suggests our baseline, that:

H1: Entrepreneurs will experience greater levels of stress than employees.

Entrepreneurial Stress and Health

The focus of stress research is often on the negative impact of stress on an individual’s health. Heavy job demands have a deleterious effect on physical health and psychological well-being (Bond et al., 2002; Jex & Beehr, 1991; Prottas & Thompson, 2006). Stress, especially unrelenting stress, can wear a person down and lead to illness (Ivancevich & Matteson, 1980), exhaustion and fatigue (Van Yperen & Janssen, 2002), as well as behavioral problems such as absenteeism (Darr & Johns, 2008). More specifically, stress is known to cause health-related problems such as high blood pressure, weight gain, and dysfunctional coping through smoking or drinking. Heightened levels of stress found in entrepreneurs can exacerbate these problems (e.g. Baron, 1998). As entrepreneurs work harder and longer in order to accomplish their goals, they often neglect basic health needs such as exercise and a balanced diet (Goldsby et al., 2005), and cope with stress in unhealthy ways (Mannheim & Schiffrin, 1984) by eating unhealthy foods, smoking, or drinking.

We expect that the negative impact of stress on personal health will be particularly problematic for entrepreneurs, due to their strong identity connection with their ventures (Cardon, Wincent, Singh, & Drnovsek, 2009; Murnieks, 2007) such that they have difficulty in separating their work selves from their personal selves (Cardon, Zietsma, Saporito, Matherne, & Davis, 2005). Entrepreneurs often work many more hours than non-entrepreneurs (Akande, 1992), and many of them come home from work too tired to pursue personal interests (Kuratko & Hodgetts, 2004) and also have difficulty relaxing (Stoner, Hartman, & Arora, 1990). The anxiety involved in owning a

business and trying to manage the inherent risk of failure (Alstete, 2008) also leads to strain (Jamal & Badawi, 1995; Thompson et al., 1992) that further deteriorates health (LePine, Podsakoff, & LePine, 2005). Therefore, we propose:

H2: Stress will be negatively related to physical health for entrepreneurs.

Entrepreneurial Stress and Income

Despite the bleak predictions concerning stress and physical health, there may be a more positive impact of stress on individual and business performance. High arousal from stress leads to “increased efficiency of information processing and task completion” (Ganster, 2005, p. 497). Stress increases an individual’s adrenaline (Dienstbier, 1989) and often leads to heightened performance levels, such as better test performance among college students (O’Hanlon & Beatty, 1976), better technical competence and jump performance for paratroopers (Ellertsen, Johnsen, & Ursin, 1978), and better athletic performance among elite athletes (Goodman, 2008). It also leads to better job performance for employees with higher organisational commitment (Hunter & Thatcher, 2007). In addition, repeated exposure to stress “toughens up” people (Gould & Udry, 1994; Miller, 1980) and increases their tolerance for stress; not only behaviorally, but also physiologically (Dienstbier, 1989; Goodman, 2008). In short, when stress is present, at least up to a certain point, hormones such as cortisol enhance learning, memory, and performance (Goodman, 2008; Kim & Diamond, 2002). These trends have been observed in a wide variety of human and animal samples (Goodman, 2008), and we posit that they also apply to entrepreneurs.

Stress can force entrepreneurs to work harder, longer, or better (Akande, 1992), and leads to peak performance under difficult conditions (Schindehutte, Morris, & Allen, 2006). Stress arouses people to action and stimulates motivation and achievement (Akande, 1992; Goodman, 2008). It can force people to be more efficient with their time under higher work load and role demands. The pressures of competition and responsibility for the fate of the firm often heighten the business owner’s intensity and focus during work, and can “spur efficiency and improve performance” (Ivancevich & Matteson, 1980), suggesting a positive relationship between stress and income for entrepreneurs. There is a direct connection between individual and firm performance for entrepreneurs, and because entrepreneurs are residual claimants for any profits generated by the firm, better firm performance should more directly translate to personal income. Therefore, we suggest the following:

H3: Stress will be positively related to personal income for entrepreneurs.

Moderation of Trait Positive Affect

Positive affect may help entrepreneurs harness the productive aspects and mitigate the unproductive aspects of stress. Positive affect (PA) is “the dispositional tendency to experience positive emotions across situations and time (Perrewé & Spector, 2002; Zellars et al., 2006)” that helps individuals to be “lively, sociable and often in a positive mood” (Weiss & Cropanzano, 1996, p. 8). This is a stable individual difference in one’s affective tone (Kaplan, Bradley, Luchman, & Haynes, 2009), and in general, increases in PA are associated with decreases in strain and increases in health and well-being (Diener, 2000; Zellars et al., 2006). People who experience positive affect are healthier than those who experience negative affect (Lyubomirsky, King, & Diener, 2005), and can cope better with intense and persistent stress (Carver & Scheier, 2001; Moskowitz, Epel, & Acree, 2008). Entrepreneurs have been found to be very high in dispositional positive affect; higher than all other tested groups (Baron & Tang, 2011). For this reason, PA should be particularly relevant for understanding stress among entrepreneurs (Baron, 2008).

Stress, Positive Affect, and Health. Positive affect involves a trait where one experiences high energy, pleasurable engagement, and alertness (Watson, Clark, & Tellegen, 1988). In contrast, moroseness, lethargy, and calmness all characterise low positive affect (Permuth-Levine, 2007; Watson et al., 1988). Research in the medical field has clearly demonstrated that positive affect has the potential to act as a stress-buffering resource as it applies to one’s physical health (e.g. Moskowitz et al., 2008), for several reasons.

First, positive affect can help individuals to effectively deal with illness, leading people to address their illness directly such as by maintaining proper body weight for those with diabetes (Moskowitz et al., 2008). Positive affect can also lead to more effective strategies for managing stress (Baron, 2008), such as directly addressing and solving a problem (Carver & Scheier, 2001) or seeking out social support (e.g. Rahim, 1996), rather than relying on less effective strategies such as avoidance, denial, or reliance on alcohol or drugs (Fredrickson & Joiner, 2002). Adapting one’s behavior by adopting effective strategies increases cognitive and social resources that increase entrepreneurs’ personal tolerance for stress (Baron, 1998; Foo, Uy, & Baron, 2009; Uy et al., 2013).

Positive affect may also serve as a physiological stress-buffering resource by influencing stress-sensitive metabolic hormones (Moskowitz et al., 2008) and creating an improved attitude and cognition towards stress. Positive affect can promote efficient functioning of the immune system (Petrie, Fontanilla, Thomas, Booth, & Pennebaker, 2004), which can increase an individual’s capacity to tolerate stress. More generally, research

demonstrates that people who frequently experience positive affect enjoy better personal health than people who experience negative affect (Lyubomirsky et al., 2005). Therefore, positive affect should help entrepreneurs cope with stressors and thus help mitigate or limit the detrimental effects of stress on their health. Therefore, we propose the following:

H4: The negative relationship between stress and personal health will be moderated by positive affect, such that this relationship will be weaker in the presence of high positive affect than in the presence of low positive affect.

Stress, Positive Affect, and Income. Positive affect may also moderate the relationship between stress and performance, helping accentuate this relationship (LePine et al., 2005), for several reasons. First, positive affect can increase one's self-efficacy. Akande (1992) suggests that even positive affirmations such as those found through meditation or notes left to bolster one's spirit (e.g. "There's nothing to worry about" or "My business is prospering") can decrease the negative thoughts associated with stress and help entrepreneurs focus on the positive potential of their business and themselves. Further, positive affect can help individuals broaden the range of ideas they have for their business and help them actively problem-solve to address the sources of their stress, leading to better performance outcomes (Folkman & Moskowitz, 2000; Fredrickson, 1998). When decision-makers face high cognitive demands, as entrepreneurs frequently do, their judgments typically become more dependent on affect (e.g. Finucane, Alhakami, Slovic, & Johnson, 2000), and aspects of positive trait affect, such as optimism, enhance entrepreneurial job performance (e.g. Hmieleski & Baron, 2009). Positive affect can lead people to make decisions that demand creativity and generative and flexible thinking (Amabile, 1997), which is known to improve performance (Ward, 2004). Therefore, we propose:

H5: The relationship between stress and personal income will be moderated by positive affect, such that this relationship will be stronger in the presence of high positive affect than in the presence of low positive affect.

METHOD

Sample

We test our hypotheses using a sample of entrepreneurs from the NHANES I Epidemiologic Follow-up Study (NHEFS) (CDC, 2013; USDHHS, CDC, AND NCHS, 1992), which is a follow-up study to the First National Health and Nutrition Examination Survey (NHANES I). NHANES I was a multistage, stratified sampling survey focused on collecting extensive demographic, medical history, nutritional, clinical, and laboratory data rep-

representative of the civilian US population. The NHEFS initial population includes the 14,407 participants who were 25 to 74 years of age when first examined in NHANES I. More than 98 per cent of those in the initial NHANES I cohort responded to the NHEFS. In addition to tracking 14,407 individuals over different cohorts and gathering social, demographic, work, and family-related data, NHEFS also measures biological markers such as pulse rate, weight, and blood pressure of surviving participants. NHANES I and NHEFS are specifically appealing not only due to longitudinal follow-up of participants, but more importantly due to measurement of biological markers which are rarely explored in organisational studies. After NHANES I was conducted between 1982 and 1984, the follow-up study, NHEFS, was conducted in three follow-up waves: 1986, 1987, and 1992–93.

We start our initial sampling frame with the 1982–84 wave, and use outcome data from the 1987 wave (the 1986 wave included only individuals older than 65). In the 1982–84 wave, respondents were asked if they considered themselves (a) self-employed or (b) an employee. Of the 783 participants who indicated that they were self-employed, 31 did not respond for the 1987 wave. Of the remaining 752 self-employed, three died and 12 had stopped working. Finally, of the remaining 737 self-employed, 49 had switched from self-employment to employment.¹ Our final sample consisted of 688 self-employed people followed over the 1982–84 and 1987 waves. Although the data are relatively older than in typical organisational studies, NHANES I has been widely used in recent years in leading medical journals (Axon, Zhao, & Egede, 2009; Karlamangla, Sarkisian, Kado, Dedes, Liao, Kim, Reuben, Greendale, & Moore, 2008).

Given the complex sampling design, all of the preliminary analysis was carried out in the SUDAAN software package as suggested by the National Institute of Health (NIH). SUDAAN is a statistical software package used for analysis of complex sample surveys involving experimental and clustered data. It is particularly useful in large surveys such as NHEFS for computing estimates in accord with sample design, and provides more precise estimates by accommodating weights in the data. Because NHEFS is a complex, multistage, probability sampling database aimed at surveying the civilian, non-institutionalised US population, the Center for Disease Control (CDC) recommends using SUDAAN for analyses of NHEFS. For this analysis we developed consistent weight estimation routines based on NIH guidelines, to

¹ We conducted *t*-tests to assess whether those who switched were different from those who continued with self-employment in 1987. We compared them on dimensions of age ($t = 0.366$), sex ($t = 0.249$), education ($t = 1.020$), income in 1982–84 ($t = 1.129$), and their poverty index in 1982–84 ($t = 0.852$), and did not find significant differences between the two groups.

ensure consistency across estimations. To avoid biases resulting from the presence of a “third variable”, and to limit the effects of reverse causality, we cross-lag income and personal health from the previous wave, effectively controlling for past income and past health on the relationships under examination.

Measures of Outcome Variables

Income. In line with large-scale national studies, to ensure confidentiality, NHEFS did not measure exact income, but measured it on an ordinal scale (Kondo, Sembajwe, Kawachi, van Dam, Subramanian, & Yamagata, 2009). Respondents were asked to indicate their annual personal income (exclusive of all other payments and benefits derived from other sources) on a 14-point one-item ordinal scale ranging from 1 = < \$3,000 to 14 = over \$100,000.

Physical Health. Following Heaphy and Dutton (2008) and Semmer, Grebner, and Elfering (2004), we couple physiological data with self-report measures of stress and health. Because no single physical test can be an exhaustive indicator of a person’s physical health, we use a series of proxies outlined in the literature to assess respondents’ health (e.g. Rasmussen, Scheier, & Greenhouse, 2009). We use five indicators of personal health—alcohol use, smoking, physical activity, weight gain (Kivimäki, Head, Ferrie, Shipley, Brunner, Vahtera, & Marmot, 2006) and a subjective health assessment (Ruggiero, Armstadter, Acierno, Kilpatrick, Resnick, Tracy, & Galea, 2009). The measurement properties are listed in Table A.1(a) in Appendix 1.

Consistent with other alcohol-related studies (Greenfield & Kerr, 2008), *alcohol use* was measured based on the quantity and frequency of alcoholic beverage consumption (beer, wine or liquor) in a given time period, including (a) number of drinks per week and (b) frequency of drinks per week. For *smoking*, we use two indicators of the quantity and frequency of smoking (Dierker, Donny, Tiffany, Colby, Perrine, & Clayton, 2007). *Physical activity* is a reflective measure of the extent to which a person is physically active, including: (i) “In things you do for recreation, for example, sports, hiking, dancing, etc., do you get much exercise, moderate exercise, little or no exercise?” (reverse coded), (ii) “In your usual day, aside from recreation, are you physically very active, moderately active, or quite inactive?” (reverse coded), and (iii) “Do you follow a regular program of physical exercise?” (Yes/No). This measure of physical activity has been widely used in sociology (Pickett, Kelly, Brunner, Lobstein, & Wilkinson, 2005), medicine (Haskell & Lee, 2007), and economics (Auld, 2005).

Weight gain is measured based on weight gain in kilograms between waves. For the 1982–84 period we take the difference between the 1972 NHEFS baseline survey and the 1982–84 wave. For the 1987 measure, we take the difference in weight between 1982–84 and 1987.

Subjective health was assessed using a one-item 5-point scale asking the respondent “Would you say that your health in general is excellent, very good, good, fair or poor?” (reverse coded). Subjective health assessment has been widely used in psychology (Carletto & Zezza, 2006) and management (e.g. Heaphy & Dutton, 2008). Furthermore, others have found a positive relationship between reported health and actual health (for a review, see Ruggiero et al., 2009). The second-order construct of three personal health constructs shows acceptable fit (Table A.1(b)(i)).

Measures of Independent Variables

Stress. We use subjective and objective measures of stress (Table A.1(a)). In 1982–84 three biological markers were measured as a proxy for stress—(i) systolic blood pressure (mmHg), (ii) diastolic blood pressure (mmHg), and (iii) doctor diagnosed hypertension (Yes/No). *Blood pressure* has been used as a physiological measure of stress in many management studies (e.g. Boyatzis, Smith, & Blaize, 2006; Heaphy & Dutton, 2008; Perrewé et al., 2004). High levels of both systolic and diastolic blood pressure indicate stress and coronary-disease risk (Steffy & Jones, 1988).

In addition, we use a three-item subjective measure of stress based on the General Well-Being Schedule (Fazio, 1977). Subjective stress measures have been used regularly in the management literature (e.g. Boyatzis et al., 2006; Hunter & Thatcher, 2007; Perrewé et al., 2004). The item details and reliability and loadings, as shown in Table A.1(a), are satisfactory. The biological and self-reported stress measures have a correlation of 0.38 ($p < .001$, two-tailed). We conducted further analyses, reported in Table A.1(b)(ii), which suggested that the two measures of stress are best modeled as a second-order factor, rather than as two correlated or uncorrelated factors. Our subsequent analyses therefore use this second-order measure of stress, which combines the three physiological markers and standardised scores of the subjective measures of stress collected.

Positive Affect. We measured positive affect using the positive affect sub-scale of the CES-D (The Center for Epidemiological Studies-Depression Scale) sub-scale, a widely used measure (Moskowitz et al., 2008; Steptoe, O’Donnell, Badrick, Kumari, & Marmot, 2008). CES-D is a 20-item scale developed by the National Institute of Mental Health for

epidemiological research. The 20-item Likert scale (0—rarely or none of the time (less than 1 day) to 3—almost or all of the time (5–7 days)) consists of four separate sub-scales: depressive affect, somatic symptoms, positive affect, and interpersonal relations. The 1982–84 wave respondents were asked to report the extent to which they feel a certain affect, including positive affect sub-scale items of: happy, good, hopeful, and joyful. Exploratory factor analysis further confirmed the four sub-scales (Sheehan, Fifield, Reisine, & Tennen, 1995). In our model, we use the positive affect sub-scale as an independent variable and control for the three other sub-scales.

Exploratory Factor Analysis (Table A.1(c)) showed separate item loadings for positive affect and stress measures. Furthermore, average variance extracted (AVE) for positive affect (AVE = 0.762) and subjective stress (AVE = 0.650) was above the recommended cut-off of 0.5. The difference in chi-square for constrained-unconstrained models was significant ($\Delta\chi^2 = 6.455$, $\Delta df = 1$, $p < .001$). Finally, a model with a second-order factor of positive affect and subjective stress together had no significant differences in model fit ($\chi^2 = 53.56$; $df = 13$; CFI = 0.94; TLI = 0.93; RMSEA = 0.076; SRMR = 0.062) than a two-factor model of subjective stress and positive affect ($\chi^2 = 54.31$; $df = 15$; CFI = 0.94; TLI = 0.93; RMSEA = 0.077; SRMR = 0.063). Therefore, the two-factor model with positive affect and stress modeled as separate constructs provides a better fit to the data.

Controls. We control for age, sex (1 = male), location (urban or rural; urban = 1), marital status (1 = married), and poverty index of the entrepreneur's family in the 1982–84 wave and in the 1987 wave. The poverty index, an indicator of family income normalised by family size, affects the extent to which an entrepreneur can engage in risk-taking behaviors. Ethnic background was coded using four dummy variables—White, Black, Asian/Pacific Islander, and Aleut, Eskimo or American Indian—with category “other” as the baseline. Education was measured as years of schooling—12 years of high school, each year of a four-year college education, and graduate school. We also control for human capital based on prior work experiences as a composite of (a) the occupational prestige score based on Stevens and Hoisington (1987) and (b) the number of years a person has worked in the occupational class. Since the number of hours worked could affect income, we also control for the number of hours worked. Finally, drawing on the remaining sub-scales in the CES-D we control for depressed affect (seven items), somatic state (seven items), and interpersonal relations (two items). Reliabilities and indicator weights for relevant reflective and formative control variables are listed in Table A.1(a). Table 1 shows the correlations among the variables.

TABLE 1
Correlation Table

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Income (T2)	10.42	3.47	1																				
2. Personal Health (T2)	0	1	-0.17	1																			
3. Stress	0	1	0.13	-0.32	1																		
4. Positive Affect	1.87	0.81	0.11	0.19	-0.15	1																	
5. Income (T1)	10.07	3.79	0.79	-0.15	0.19	0.21	1																
6. Personal Health (T1)	0	1	-0.13	0.84	-0.37	0.16	-0.15	1															
7. Age	33.76	8.13	0.11	-0.05	-0.03	0.05	0.12	-0.05	1														
8. Sex	0.74	-	0.09	-0.04	0.19	0.04	0.08	-0.03	0.01	1													
9. Race—White	0.87	-	0.28	0.11	0.04	0.06	0.21	0.12	0.02	0.11	1												
10. Race—Black	0.09	-	0.05	0.08	0.03	0.05	0.03	0.09	0.03	0.19	0.02	1											
11. Race—Asian/Pacific Islander	0.03	-	0.10	0.09	0.02	0.04	0.08	0.09	0.01	0.13	0.02	0.01	1										
12. Race—Aleut, Eskimo or American Indian	0.00	-	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.02	1									
13. Location—Urban	0.62	-	0.19	0.04	0.02	0.02	0.01	0.02	0.03	0.04	0.02	0.01	0.01	0.04	1								
14. Poverty Index (T1)	3.71	.89	0.15	-0.09	0.07	0.15	0.17	-0.11	0.06	0.18	0.41	-0.15	0.05	0.01	-0.07	1							
15. Poverty Index (T2)	3.70	.84	0.16	-0.11	0.06	0.14	0.11	-0.13	0.07	0.17	0.40	-0.14	0.08	0.02	-0.06	0.83	1						
16. Marital Status	.63	.17	0.11	0.06	0.02	0.02	0.13	0.07	0.11	0.04	0.08	-0.06	0.06	0.01	0.05	0.11	0.10	1					
17. Education	13.94	1.04	0.18	0.05	0.09	0.04	0.19	0.05	0.07	0.06	0.50	-0.11	0.18	0.02	0.07	0.17	0.18	0.11	1				
18. Human Capital	0	1	0.22	-0.04	0.13	0.03	0.24	-0.05	0.09	0.07	0.44	-0.17	0.11	0.01	0.08	0.25	0.24	0.08	0.71	1			
19. Hours worked	34	4.77	0.26	0.08	0.13	0.16	0.16	0.07	0.03	0.02	0.01	0.01	0.01	0.00	0.03	0.02	0.04	0.03	0.16	0.12	1		
20. Depressed Affect	1.02	0.53	-0.08	-0.22	0.17	-0.27	-0.09	-0.21	0.07	0.06	0.16	0.06	0.05	0.02	0.09	0.11	0.10	-0.05	0.11	0.14	0.03	1	
21. Somatic State	1.09	0.44	-0.06	-0.20	0.19	-0.33	-0.08	-0.23	0.04	0.08	0.21	0.03	0.04	0.02	0.10	0.13	0.11	-0.07	0.18	0.17	0.06	0.73	1
22. Interpersonal relations	1.05	0.29	0.13	0.18	-0.10	0.15	0.14	0.17	0.04	0.05	0.18	-0.03	0.08	0.01	0.05	0.20	0.04	0.03	0.06	0.07	0.05	-0.15	-0.17

All correlations above |0.09| are significant at $p < .05$.

Analytical Approach

We use path analysis to analyze our data. The outcome variables—Income (T1 and T2) and Personal Health (T1 and T2)—have a non-normal distribution; therefore, we use Robust Weighted Least Squares (RWLS) estimation in Mplus 5.21. We start by testing Hypothesis 1, by comparing differences in stress levels between entrepreneurs and non-entrepreneurs.

Test of Entrepreneurial Stress Levels

Although anecdotal evidence and conceptual research show that entrepreneurs experience higher levels of stress than do non-entrepreneurs, we empirically test for such differences (H1). In order to assess the robustness and validity of our model, we use matched pair sampling to create comparable groups of entrepreneurs and non-entrepreneurs. Matching is an increasingly popular method of causal inference in many fields including statistics (Rubin, 2006), medicine (Christakis & Iwashyna, 2003), economics (Dehejia & Wahba, 1999), political science (Hansen & Bowers, 2009), and sociology (Morgan & Harding, 2006).

To match the 688 entrepreneurs with a comparable group of non-entrepreneurs, we used nine matching covariates—age, sex, race, location, poverty index (T1) and (T2), marital status, education, and human capital—without replacement. Using the SUDAAN 10.0 software package for complex survey data, we used pairwise deletion on the nine matching covariates to identify a pool of 10,342 non-entrepreneurs to match with entrepreneurs in our sample. We then used five different matching algorithms to identify a matching set of non-entrepreneurs: (a) Nearest neighbor, (b) Radius matching, (c) Kernel matching, (d) Caliper matching ($\delta = 0.1$), and (e) Genetic matching. According to Diamond and Sekhon (2013, p. 932), genetic matching is a “a method of multivariate matching, that uses an evolutionary search algorithm to determine the weight each covariate is given”. It does not use any DNA or genetic code information but rather matching covariates such as those listed above to identify employees who are most similar to the 688 self-employed people in our sample. For the first four approaches based on propensity score matching, we used the *psmatch2* package in Stata 11, and used *GenMatch* by Sekhon (2007) for genetic matching. The balance test was met; hence the covariates resulted in an acceptable level of matching and further changes in specification of the vector of covariates were not necessary.

Table 2 presents the differences in stress levels between entrepreneurs and non-entrepreneurs for a measure of biological stress, subjective stress, and a combined stress measure. Across the five matching approaches, entrepreneurs experienced higher stress levels than non-entrepreneurs.

TABLE 2
Differences in Stress Levels between Entrepreneurs and Non-entrepreneurs
using Propensity Score Matching and Genetic Matching Algorithms²

	<i>Difference in stress levels</i>		
	<i>Biological and Subjective stress levels combined</i>	<i>Biological measures of stress</i>	<i>Subjective measure of stress</i>
<i>Propensity Score Matching</i> ^{3,4}			
Nearest Neighbor Matching	0.133*	0.157*	0.103 [^]
Radius Matching	0.141*	0.152*	0.119*
Kernel Matching	0.172*	0.166*	0.104 [^]
Caliper matching ($\delta = 0.1$)	0.160*	0.174*	0.113*
<i>Genetic Matching Algorithm</i> ^{3,5}			
<i>GenMatch</i>	0.194*	0.168*	0.166*

[^] $p < .10$; * $p < .05$.

Figure 2, based on the smallest difference in stress levels under nearest neighbor matching, shows that the distribution of combined stress levels (both subjective and biological stress) is significantly further to the right for entrepreneurs than non-entrepreneurs (Kolmogorov-Smirnov test = 0.136, $p = .017$). This analysis supports Hypothesis 1 that the stress of entrepreneurs is greater than that of non-entrepreneurs.

Correcting for Endogeneity

To address the potential for endogeneity between stress and income across our sample, we used several instrumental variables, including weather, religious attendance, age, marital status, and prior health conditions. Our analysis suggests that for the key variables of stress, health, and income, the estimates are unbiased and can therefore be reported, with correction for potential reverse causality (Davidson & MacKinnon, 2006). Please refer to Appendix 2 for details of this analysis.

² Matching co-variables—Age, Sex, Race, Location, Poverty Index (T1) and (T2), Marital Status, Education, Human Capital.

³ *psmatch2* in Stata 11.

⁴ Balancing hypothesis [i.e. distribution of control (0 = non-entrepreneurs) and treatment (1 = entrepreneurs) groups is identical for the matching covariates] was supported for *psmatch2* and *Matching* algorithms.

⁵ R package *GenMatch* for genetic algorithm matching.

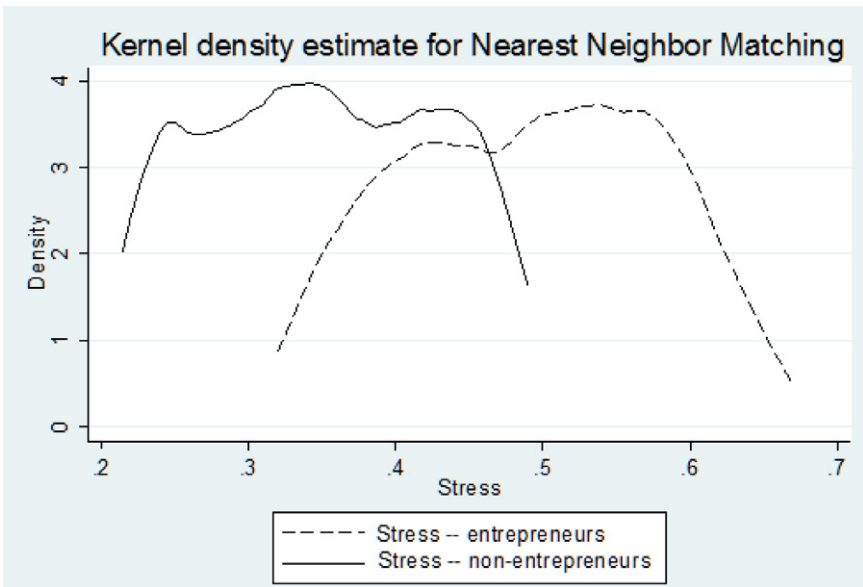


FIGURE 2. Stress distributions between entrepreneurs and non-entrepreneurs using nearest neighbor matching.

H2–H5 Results

To analyze and interpret path analysis results, we first assess the reliability and validity of the measurement model, followed by a test of the proposed cross-lagged model (Barclay, Higgins, & Thompson, 1995). Table A.1(a) shows loadings for the reflective measures, Cronbach's alpha, and Average Variance extracted (Fornell & Larcker, 1981). Effectiveness of the formative indicators is assessed using loading and variance inflation factors (VIFs). All the item loadings were significant, with the lowest t -value of 8.085. All the item loadings are strong and reliabilities and average variance extracted are within recommended limits. According to Diamantopoulos and Siguaw (2006), the VIF of formative measures should be less than 3.3. The highest VIF in our study was 3.07.

Results in Table 3 indicate that the paths are significant and the strength of relationships are higher than 0.1 for all of the hypothesised paths estimated in the model. In addition, we compared nested models and estimated changes in effect sizes by excluding the direct effect of stress, positive affect, and moderation effects. The model fit for both the sample of entrepreneurs ($\chi^2 = 488.325$; $df = 189$; CFI = 0.93; TLI = 0.92; RMSEA = 0.073; SRMR = 0.042) and the sample of non-entrepreneurs ($\chi^2 = 504.632$; $df = 189$; CFI = 0.94;

TABLE 3
Stacked Path Analysis Estimates—Nearest Neighbor Matching

	<i>Entrepreneurs—Parameter Estimates</i>	<i>Non-entrepreneurs—Parameter Estimates</i>	<i>z-value⁶</i>
<i>Hypothesized Effects</i>			
Stress → Personal Health (T2) (H2)	-0.443***	-0.351***	-2.423*
Stress → Income (T2) (H3)	0.409***	0.355***	2.496*
Positive Affect → Income (T2)	0.382***	0.369***	1.695^
Positive Affect → Personal Health (T2)	0.398***	0.370***	2.315*
Stress × Positive Affect → Personal Health (T2) (H4)	0.332***	0.260**	2.335*
Stress × Positive Affect → Income (T2) (H5)	0.211**	0.170*	2.249*
<i>Cross-lagged Effects</i>			
Income (T1) → Income (T2)	0.850***	0.730***	1.624
Income (T1) → Personal Health (T2)	0.494***	0.458***	1.594
Personal Health (T1) → Personal Health (T2)	0.692***	0.685***	1.555
Personal Health (T1) → Income (T2)	0.598***	0.580***	1.329
<i>Controls</i>			
Age → Income (T2)	0.056*	0.095*	-2.428*
Age → Personal health (T2)	-0.074	-0.113	0.427
Sex → Income (T2)	0.035	0.028	0.992
Sex → Personal health (T2)	0.046	0.052	-0.950
Race1 → Income (T2)	0.082*	0.085*	-0.891
Race1 → Personal health (T2)	0.029	0.023	0.519
Race2 → Income (T2)	0.046	0.045	0.488
Race2 → Personal health (T2)	0.030	0.026	0.557
Race3 → Income (T2)	0.003	0.011	-0.357
Race3 → Personal health (T2)	0.023	0.027	-0.628
Race4 → Income (T2)	0.008	0.001	1.142
Race4 → Personal health (T2)	0.014	0.001	1.318
Location → Income (T2)	0.008	0.020	-0.642
Location → Personal health (T2)	0.036	0.039	-0.380

Poverty Index (T1) → Income (T2)	0.402***	0.396***	0.807
Poverty Index (T1) → Personal health (T2)	0.131*	0.140*	-0.328
Poverty Index (T2) → Income (T2)	0.293**	0.299**	-0.587
Poverty Index (T2) → Personal health (T2)	0.072*	0.078	-0.457
Marital Status → Income (T2)	0.044	0.036	0.976
Marital Status → Personal health (T2)	0.006	-0.004	1.016
Education → Income (T2)	0.128*	0.109*	0.909
Education → Personal health (T2)	0.189*	0.210**	-1.234
Human Capital → Income (T2)	0.298**	0.249**	2.363*
Human Capital → Personal health (T2)	0.231**	0.248**	-0.685
Hours worked → Income (T2)	0.136	0.122	0.406
Hours worked → Personal health (T2)	0.092	0.083	0.145
Depressed Affect → Income (T2)	0.082*	0.111*	-0.548
Depressed Affect → Personal health (T2)	-0.041*	-0.056*	0.491
Somatic State → Income (T2)	-0.016	-0.078	0.271
Somatic State → Personal health (T2)	-0.245**	-0.197*	-0.505
Interpersonal relations → Income (T2)	0.090	0.093	-0.566
Interpersonal relations → Personal health (T2)	0.020	0.034	-0.773
Model fit			
R^2 —Income (T2)	$\chi^2 = 488.325; df = 189; CFI = 0.93;$	$\chi^2 = 504.632; df = 189; CFI = 0.94;$	
R^2 —Personal Health (T2)	TLI = 0.92; RMSEA = 0.073;	TLI = 0.93; RMSEA = 0.068;	
	SRMR = 0.042	SRMR = 0.039	
	0.536	0.613	
	0.625	0.728	

Notes: $\wedge p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$; 688 entrepreneur and non-entrepreneur matched pair sample.

$$z = \frac{(b_1 - b_2)}{\sqrt{SE(b_1)^2 + SE(b_2)^2}}$$

TLI = 0.93; RMSEA = 0.068; SRMR = 0.039) was within recommended limits. Nested model comparison showed a significant difference between the proposed model and (a) excluding positive affect ($\chi^2/df = 4.322$; CFI = 0.75; TLI = 0.68; RMSEA = 0.223) and (b) excluding moderating effects ($\chi^2/df = 5.764$; CFI = 0.77; TLI = 0.72; RMSEA = 0.153).

The two-group path analysis estimates based on nearest neighbor matching are presented in Table 3. Hypothesis 2 proposed a negative effect of stress on personal health ($\beta = -0.443$; $p < .001$), which was supported. In addition, its effect on the sample of entrepreneurs was stronger than for the sample of non-entrepreneurs (z -value = -2.423 , $p < .05$). Hypothesis 3 proposed a positive effect of stress on income ($\beta = 0.409$; $p < .01$), which was also supported. Its effect on the sample of entrepreneurs was stronger than for the sample of non-entrepreneurs (z -value = 2.496 , $p < .05$). In Hypothesis 4, we proposed that positive affect would mitigate the negative effect of stress on personal health. We find support for this hypothesis ($\beta = 0.332$; $p < .001$), and the difference in effects between entrepreneurs and non-entrepreneurs was significant (z -value = 2.335 , $p < .05$). Hypothesis 5 proposed a reinforcing effect of positive affect on the relationship between stress and income ($\beta = 0.211$; $p < .05$), which was supported. This moderation effect of positive affect for accentuating income was also stronger for the sample of entrepreneurs than for non-entrepreneurs (z -value = 2.249 , $p < .05$). Overall, we find support for Hypotheses 1, 2, 3, 4 and 5. Not only are the hypothesised effects significant for entrepreneurs, but the relationships are also stronger for entrepreneurs than for non-entrepreneurs. While the differences in effect sizes between entrepreneurs and non-entrepreneurs were not specifically hypothesised, these supplementary findings lend additional support to our suggestion that not only do entrepreneurs experience more stress than non-entrepreneurs (H1), but the effects of such stress are also different for entrepreneurs than for their employed counterparts and therefore require unique study. These effects were consistent across alternate matching algorithms.

To better understand the nature of the interactions for Hypotheses 4 and 5, we graphed the results (see Figure 3). As shown in Figure 3(a), although stress typically leads to a decline in personal health, individuals under high stress experience a lower decline in personal health when they have greater positive trait affect. Positive trait affect seems to mitigate the degree of deterioration of personal health due to the experience of stress. Also, as shown in Figure 3(b), when positive affect is high, the relationship between stress and income is stronger than when positive affect is low, suggesting that positive affect accentuates the relationship between stress and income for entrepreneurs.

Finally, in Table 4, we check whether the results are consistent when only the biological stress measure is used (Table 4(a)) and when only the subjective

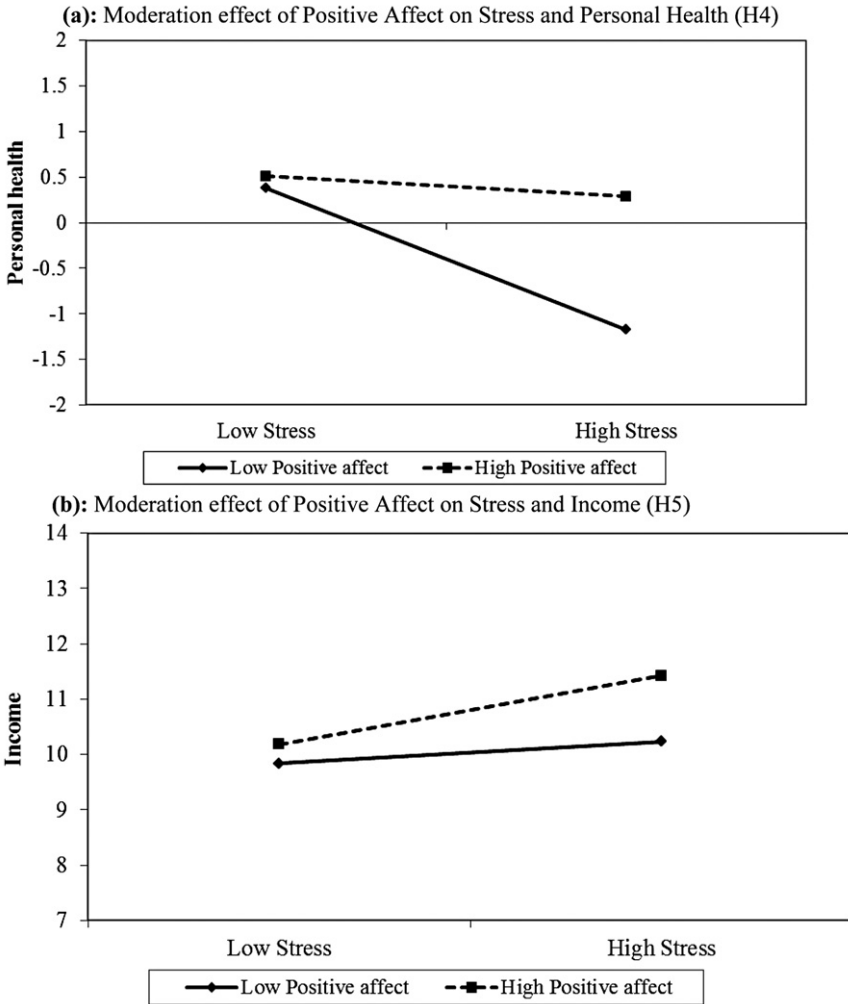


FIGURE 3. Two-way interaction effects.

stress measure is used (Table 4(b)). The hypotheses are supported in both models.

DISCUSSION

Many scholars have previously argued that stress is a fundamental, although not always welcome, aspect of entrepreneurship (Rahim, 1996), in particular

TABLE 4
Results for Biological and Subjective Stress Reports

	Entrepreneurs—Parameter Estimates	Non-entrepreneurs—Parameter Estimates	z-value ^a
<i>Hypothesised Effects</i>			
Stress → Personal Health (T2) (H2)	-0.204**	-0.145*	-2.202*
Stress → Income (T2) (H3)	0.253***	0.161**	2.386*
Positive Affect → Income (T2)	0.278**	0.259**	1.515
Positive Affect → Personal Health (T2)	0.297***	0.206**	2.126*
Stress × Positive Affect → Personal Health (T2) (H4)	0.250**	0.140*	2.228*
Stress × Positive Affect → Income (T2) (H5)	0.223**	-0.119*	2.060*
<i>Cross-lagged Effects</i>			
Income (T1) → Income (T2)	0.705***	0.646***	1.424
Income (T1) → Personal Health (T2)	0.320***	0.295***	1.402
Personal Health (T1) → Personal Health (T2)	0.508***	0.544***	-1.376
Personal Health (T1) → Income (T2)	0.467***	0.473***	-1.212
<i>Controls</i>			
Model fit	Included	Included	
	$\chi^2 = 472.929; df = 189; CFI = 0.94;$	$\chi^2 = 417.344; df = 189; CFI = 0.94;$	
	TLI = 0.93; RMSEA = 0.066;	TLI = 0.93; RMSEA = 0.063;	
	SRMR = 0.040	SRMR = 0.037	
R ² —Income (T2)	0.427	0.534	
R ² —Personal Health (T2)	0.501	0.605	

4(b): Subjective Stress Stacked Path Analysis Estimates (Nearest Neighbor Matching)

	Entrepreneurs—Parameter Estimates	Non-entrepreneurs—Parameter Estimates	z-value
<i>Hypothesised Effects</i>			
Stress → Personal Health (T2) (H2)	-0.275***	-0.172**	-2.306*
Stress → Income (T2) (H3)	0.331***	0.151*	2.307*
Positive Affect → Income (T2)	0.248**	0.196**	1.655^
Positive Affect → Personal Health (T2)	0.220**	0.140*	2.183*
Stress × Positive Affect → Personal Health (T2) (H4)	0.288***	0.101*	2.217*
Stress × Positive Affect → Income (T2) (H5)	0.211**	0.137*	2.112*
<i>Cross-lagged Effects</i>			
Income (T1) → Income (T2)	0.673***	0.584***	1.434
Income (T1) → Personal Health (T2)	0.363***	0.309**	1.447
Personal Health (T1) → Personal Health (T2)	0.552***	0.503***	1.397
Personal Health (T1) → Income (T2)	0.485***	0.443***	1.222
<i>Controls</i>			
Model fit	Included	Included	
	$\chi^2 = 523.426$; $df = 189$; CFI = 0.93; TLI = 0.92; RMSEA = 0.058; SRMR = 0.043	$\chi^2 = 539.522$; $df = 189$; CFI = 0.93; TLI = 0.92; RMSEA = 0.065; SRMR = 0.041	
R ² —Income (T2)	0.536	0.613	
R ² —Personal Health (T2)	0.625	0.728	

Notes: ^ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. 688 entrepreneur and non-entrepreneur matched pair sample.

$$z = \frac{(b_1 - b_2)}{\sqrt{SE(b_1)^2 + SE(b_2)^2}}$$

due to the large workload (Harris et al., 1999), uncertainty of success (Baron, 2008), and personal identification and responsibility felt for the success or failure of the venture (e.g. Shepherd, 2003). Prior research in entrepreneurship has demonstrated the potentially harmful effects of stress on self-employed individuals (e.g. Prottas & Thompson, 2006), and has separately argued that positive affect may be an important resource in helping entrepreneurs cope with stress (Baron, 2008).

Despite a call for such research several years ago (Rahim, 1996) as well as more recently (Heaphy & Dutton, 2008), this is one of the first studies of both physical and economic outcomes of stress in entrepreneurship and one of the first studies in entrepreneurship to measure stress using both self-reported stress and physiological stress measures. This is important because a person's subjective evaluation of his or her ability to cope with job or role demands is often quite distinct from their physiological activation that results from psychological or physical demands (Permeth-Levine, 2007; Seaward, 2002). By incorporating both into our study we provide a more complete picture of the influence of stress on physical and financial health for entrepreneurs.

Why would we anticipate that stress would be different for entrepreneurs than for non-entrepreneurs? First, the job demands and work context of entrepreneurs are typically more complex and uncertain than the demands and contexts experienced by managers in large organisations (Baron, 1998; Busenitz & Barney, 1997). Second, entrepreneurs typically have very high (significantly higher than non-entrepreneurs) achievement goals for themselves (McClelland, 1961), which can further increase job demands (Hambrick et al., 2005). Finally, entrepreneurs face extreme scarcities of job resources, including not only financial resources (e.g. Stinchcombe, 1965), but also more personal resources such as social support and feedback from supervisors (Baron, 2010). Our findings indicate that entrepreneurs do indeed experience higher levels of stress than non-entrepreneurs, and that these differences are significant.

We also find that stress has a positive financial but negative physical impact on entrepreneurs. These results may help us understand why entrepreneurs put themselves through such long and intense hours, because it yields productive outcomes, despite the personal health risks this imposes. Other scholars have proposed and found that entrepreneurial intention does not depend on the amount of work required or income anticipated by potential entrepreneurs (Douglas & Shepherd, 2002), yet this is in direct contrast to work that suggests that income is a powerful entrepreneurial motivator across the world (Benzing et al., 2009). Our study suggests that self-employed people do indeed experience greater personal income gains compared to employees, and that these income gains come alongside significant health costs. Yet we do not know the extent to which entrepreneurs realise that

becoming self-employed involves not only more and different work obligations, but also potentially detrimental physical health effects. This suggests that stress is a problematic factor for entrepreneurs, and perhaps we should be exploring ways in which we can help entrepreneurs to better manage their stress without damaging their physical health.

This is also one of the first studies of the potential moderating role of positive affect on the relationships between stress and physical and financial outcomes. While stress researchers typically focus much more on negative affect than positive affect (Hoge & Bussing, 2004), attention has been shifting to focus more on the role PA may play in helping buffer individuals from the negative impact of stress (Hochwarter & Treadway, 2003). Ganster notes that “positive affect appears to improve many aspects of the decision-making process, especially those concerned with generating innovative alternatives. This effect has been ignored in the stress and decision-making literature, yet it suggests interesting new avenues for stress researchers to explore” (Ganster, 2005, p. 497). The literature concerning the impact of positive affectivity on decision-making, creativity, and performance consistently shows its benefits, including improved cognitive flexibility, problem-solving, and acceptance of novel information (e.g. Foo et al., 2009; Fredrickson, 1998), all of which enhance individual performance (Davis, 2009). Our results suggest that positive affect is an important aspect of entrepreneurial success, as it has a significant accentuating impact on income, and also a significant role in helping alleviate the negative health risks associated with stress. This takes an important step forward in extending research in the medical and organisational fields on the potentially positive stress-buffering effects of positive affect for entrepreneurs.

Limitations and Future Research Directions

There are several limitations of our work. First, although our data come from two separate time points and waves of measures of stress, extended longitudinal data could help test the effects of other intervening factors that could further assess the relevance and role of positive affect. In addition, although our measures are based on widely used scales in medicine and sociology, alternative measures such as cortisol levels (e.g. Heaphy & Dutton, 2008) or the PANAS to measure positive affect (Watson et al., 1988) could add to the robustness of our findings. As mentioned above, we also do not have information about the drivers of different behaviors, such as whether lack of exercise leads to depression and stress, or whether a person exercises to overcome their stress. While this is a limitation of our use of behavioral measures of physical health, it is also an opportunity for future research to examine the motivations behind stress and health-related behaviors.

Our findings raise several other questions for future research, primarily concerning appropriate coping mechanisms for entrepreneurs, what other potential stress-buffering resources exist or can be developed for entrepreneurs, and the need for a more nuanced view of stress in entrepreneurship. If, as the results suggest, positive affect can help entrepreneurs accentuate the positive impact of stress on their economic performance, an obvious question is if and how entrepreneurs can increase their level of positive affect. Literature on optimism (e.g. Hmieleski & Baron, 2009), hope (Snyder et al., 1991), emotional labor (Hochschild, 1983), passion (Cardon et al., 2009), and emotional regulation (Gross, 1998) may provide useful insights. While we examined trait positive affect in our study, Baron (2008) suggests that dispositional and situational positive affect may operate similarly. Empirical research on whether situational positive affect can help entrepreneurs cope with stress would be fruitful. Also, we need a better understanding of how entrepreneurs can regulate their emotions in order to harness the productive potential of positive affect. In addition, recent conceptual work (Baron, Hmieleski, & Henry, 2012) has suggested that while positive affect can be useful, at too high a level it can be detrimental, interfering with cognitions, perceptions, motivation, and self-regulation, all of which could hurt firm performance and potentially also the health and well-being of the entrepreneur. The implications of this for stress management for entrepreneurs should be explored.

A second area for inquiry involves other potential stress-buffering resources, aside from positive affect. For example, activities such as visualisation, self-support, exercise, and even yoga can decrease or at least help individuals cope with stress. Similarly, Hahn and colleagues (2011) studied the effects of a training program where participants are taught how to recover from stressful work situations, finding that recovery processes such as unwinding from the job are important for reducing the negative effects of stress on well-being (Geurts & Sonnentag, 2006). Boyd and Gumpert (1983) argue that the first step in managing stress is to become aware of how destructive it can be to oneself, both physically and psychologically. The extent to which such activities and coping mechanisms help entrepreneurs address their stress would be an interesting phenomenon to explore. Several studies in entrepreneurship shed light on coping processes of entrepreneurs, and can be built upon towards this goal. For example, Goldsby et al. (2005) examine the relationship between exercise and firm sales and accomplishment of entrepreneurial goals, and find that running is positively related to sales volume, extrinsic rewards, and intrinsic rewards, while weightlifting is related to extrinsic and intrinsic rewards but not to sales. This study suggests that exercise may be an important source of coping to examine more closely. Uy and colleagues (2013) take a broader perspective and examine how active and avoidance coping influences psychological well-being and performance for entrepreneurs, and provide insights into how to potentially mitigate

the deleterious effects of stress on one's health. Patzelt and Shepherd (2011) examine the regulation of negative emotions associated with self-employment. Finally, Shelton (2006) discovers that female business owners handle stress and potential stress from conflict differently from men, suggesting an additional avenue for research on gender-based coping strategies and stress management techniques.

Perhaps a broader question that needs further exploration is whether sacrificing one's health is worth the apparent increase in one's personal income for entrepreneurs. We have suggested that entrepreneurial stress is indeed "worth it" due to the positive impact of stress on financial gains despite the negative impact on physical health. Yet entrepreneurs are motivated by a variety of factors, and perhaps life satisfaction or personal well-being should be incorporated as other important measures of performance for entrepreneurs (Cooper & Artz, 1995; Uy et al., 2013) in addition to personal income.

In addition, while we focus on a structural view of the role of positive affect in helping entrepreneurs realise the productive potential of stress, we do not address the processes through which such relationships occur. For example, Moltz (2003) suggests that the entrepreneurial process is like a rollercoaster that one is trying to control while on it, suggesting that there are periods of high pressure and stress, but also periods that are slower and more stable and predictable. In-depth research on the coping processes of entrepreneurs and how and why they are able to leverage positive affect and manage stress throughout the entrepreneurial life cycle, and through the ebbs and flows of periods of high and low stress, is needed. An early step in this direction is the work of Gorgievski and colleagues (2010), who found that financial problems and psychological distress for business owners act like a self-fulfilling spiral, where stress and financial problems reinforce each other in a negative way, and this spiral is worse for those who experience longer term distress. Examining the different motivations people have for starting ventures, even something as basic as whether they intend to start a growth-oriented or independence-oriented venture (Douglas, *in press*) and how this influences their anticipated income, stress, and health trade-offs as well as coping strategies they utilise as the business is launched, would make a fascinating study.

CONCLUSION

Stress is a fundamental part of being an entrepreneur. Our study suggests that stress plays a dualistic role, both motivating entrepreneurs to perform such that they increase their income, but also harming their physical health in the process. Such trade-offs appear to be less problematic for entrepreneurs who experience positive affect, which accentuates the income-producing

effects of stress while also mitigating its health debilitating effects. We find this area ripe for inquiry and we encourage further exploration and testing of such dualistic effects.

REFERENCES

- Akande, A. (1992). Coping with entrepreneurial stress: A Nigerian case study. *Leadership & Organization Development Journal*, 13(2), 27–32.
- Aldrich, H.W., & Martinez, M.A. (2001). Many are called, but few are chosen: An evolutionary perspective for the study of entrepreneurship. *Entrepreneurship Theory and Practice*, 25, 41–56.
- Alstete, J.W. (2008). Aspects of entrepreneurial success. *Journal of Small Business and Enterprise Development*, 15(3), 584–594.
- Amabile, T.M. (1997). Entrepreneurial creativity through motivational synergy. *Journal of Creative Behavior*, 31(1), 18–26.
- Anda, R.F., Williamson, D.F., Escobedo, L.G., Remington, P.L., Mast, E.E., & Madans, J.H. (1992). Self-perceived stress and the risk of peptic ulcer disease: A longitudinal study of US adults. *Archives of Internal Medicine*, 152(4), 829–833.
- Auld, M.C. (2005). Smoking, drinking, and income. *Journal of Human Resources*, 40(2), 505–518.
- Axon, R.N., Zhao, Y., & Egede, L.E. (2009). Association of depressive symptoms with all-cause and ischemic heart disease mortality in adults with self-reported hypertension. *American Journal of Hypertension*, 23(1), 30–37.
- Barclay, D., Higgins, C., & Thompson, R. (1995). The partial least squares (PLS) approach to causal modeling: Personal computer adoption and use as an illustration. *Technology Studies*, 2(2), 285–309.
- Baron, R.A. (1998). Cognitive mechanisms in entrepreneurship: Why and when entrepreneurs think differently than other people. *Journal of Business Venturing*, 13(4), 275–294.
- Baron, R.A. (2008). The role of affect in the entrepreneurial process. *Academy of Management Review*, 33(2), 328–340.
- Baron, R.A. (2010). Job design and entrepreneurship: Why closer connections = mutual gains. *Journal of Organizational Behavior*, 31(2–3), 370–378.
- Baron, R.A., Hmieleski, K.M., & Henry, R.A. (2012). Entrepreneurs' dispositional positive affect: The potential benefits—and potential costs—of being “up”. *Journal of Business Venturing*, 27(3), 310–324.
- Baron, R.A., & Tang, J. (2011). The role of entrepreneurs in firm-level innovation: Joint effects of positive affect, creativity, and environmental dynamics. *Journal of Business Venturing*, 26(1), 49–60.
- Baum, C.F., Schaffer, M.E., & Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *Stata Journal*, 3(1), 1–31.
- Baumol, W.J. (1990). Entrepreneurship: Productive, unproductive, and destructive. *Journal of Political Economy*, 98(5), 893–921.
- Bell, P.A., & Baron, R.A. (2006). Aggression and heat: The mediating role of negative affect. *Journal of Applied Social Psychology*, 6(1), 18–30.

- Benzing, C., Chu, H., & Kara, O. (2009). Entrepreneurs in Turkey: A factor analysis of motivations, success factors, and problems. *Journal of Small Business Management*, 47(1), 58–91.
- Bond, J.T., Thompson, C., Galinsky, E., & Protzas, D. (2002). *Highlights of the national study of the changing workforce*. New York: Families and Work Institute.
- Boyatzis, R.E., Smith, M.L., & Blaize, N. (2006). Developing sustainable leaders through coaching and compassion. *Academy of Management Learning and Education*, 5(1), 8–24.
- Boyd, D., & Gumpert, D. (1983). Coping with entrepreneurial stress. *Harvard Business Review*, 61(2), 44–64.
- Bradley, D.E., & Roberts, J.A. (2004). Self-employment and job satisfaction: Investigating the role of self-efficacy, depression, and seniority. *Journal of Small Business Management*, 42(1), 37–58.
- Brockhaus, R.H. (1980). Risk taking propensity of entrepreneurs. *Academy of Management Journal*, 23(3), 509–520.
- Brockhaus, R.H., & Horwitz, P.S. (1986). The psychology of the entrepreneur. In D. Sexton & R. Smilor (Eds.), *The art and science of entrepreneurship* (pp. 25–48). Cambridge, MA: Ballinger Publishing Company.
- Brody, J. (1981). *Jane Brody's Nutrition Book*. New York: Bantam Books.
- Brody, S., Preut, R., Schommer, K., & Schurmeyer, T.H. (2002). A randomized controlled trial of high dose ascorbic acid for reduction of blood pressure, cortisol, and subjective responses to psychological stress. *Psychopharmacology*, 159(3), 319–324.
- Busenitz, L.W., & Barney, J.B. (1997). Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of Business Venturing*, 12(1), 9–30.
- Buttner, E. (1992). Entrepreneurial stress: Is it hazardous to your health? *Journal of Managerial Issues*, 4(2), 223–240.
- Cardon, M.S., Wincent, J., Singh, J., & Drnovsek, M. (2009). The nature and experience of entrepreneurial passion. *Academy of Management Review*, 34(3), 511–532.
- Cardon, M.S., Zietsma, C., Saparito, P., Matherne, B., & Davis, C. (2005). A tale of passion: New insights into entrepreneurship from a parenthood metaphor. *Journal of Business Venturing*, 20(1), 23–45.
- Carisma, B., & Lowder, S. (2008). Economic cost of traffic congestion: A literature review for multiple locations. Available at: http://greenconsumerism.net/wp-content/uploads/2008/08/the-cost-of-tra_c-congestion.pdf
- Carletto, G., & Zezza, A. (2006). Being poor, feeling poorer: Combining objective and subjective measures of welfare in Albania. *Journal of Development Studies*, 42(5), 739–760.
- Carver, C.S., & Scheier, M.F. (2001). Optimism, pessimism, and self-regulation. In E.C. Chung (Ed.), *Optimism and pessimism: Implications for theory, research, and practice* (pp. 31–51). Washington, DC: American Psychological Association.
- CDC (Centers for Disease Control and Prevention) (2013). National health and nutrition examination survey. Retrieved 26 May 2013, from: <http://www.cdc.gov/nchs/nhanes/nhefs/nhefs.htm>

- Christakis, N.A., & Iwashyna, T.J. (2003). The health impact of health care on families: A matched cohort study of hospice use by decedents and mortality outcomes in surviving, widowed spouses. *Social Science & Medicine*, *57*(3), 465–475.
- Cooper, A.C., & Artz, K.W. (1995). Determinants of satisfaction for entrepreneurs. *Journal of Business Venturing*, *10*(6), 439–458.
- Covin, J.G., & Slevin, D.P. (1991). A conceptual model of entrepreneurship as firm behavior. *Entrepreneurship Theory and Practice*, *16*, 7–25.
- Cutrona, C.E. (1996). *Social support in couples: Marriage as a resource in times of stress*. Thousand Oaks, CA: Sage Publications.
- Darr, W., & Johns, G. (2008). Work strain, health, and absenteeism: A meta-analysis. *Journal of Occupational Health Psychology*, *13*(4), 293–318.
- Davidson, R., & MacKinnon, J.G. (2006). Bootstrap methods in econometrics. *Palgrave Handbook of Econometrics*, *1*, 812–838.
- Davis, M. (2009). Understanding the relationship between mood and creativity: A meta-analysis. *Organizational Behavior and Human Decision Processes*, *108*(1), 25–38.
- Dehejia, R.H., & Wahba, S. (1999). Causal effects in nonexperimental studies: Reevaluating the evaluation of training programs. *Journal of the American Statistical Association*, *94*(448), 1053–1062.
- Demerouti, E., Bakker, A.B., Nachreiner, F., & Schaufeli, W.B. (2001). The Job Demands-Resources Model of Burnout. *Journal of Applied Psychology*, *86*(3), 499–512.
- Diamantopoulos, A., & Siguaw, J.A. (2006). Formative versus reflexive indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*, *17*(4), 263–282.
- Diamond, A., & Sekhon, J. (2013). Genetic matching for estimating causal effects: A general multivariate matching method for achieving balance in observational studies. *Review of Economics and Statistics*, *95*(3), 932–945.
- Diener, E. (2000). Subjective well-being: The science of happiness, and a proposal for a national index. *American Psychologist*, *55*, 34–43.
- Dienstbier, R.A. (1989). Arousal and physiological toughness: Implications for mental and physical health. *Psychological Review*, *96*(1), 84–100.
- Dierker, L.C., Donny, E., Tiffany, S., Colby, S.M., Perrine, N., & Clayton, R.R. (2007). The association between cigarette smoking and DSM-IV nicotine dependence among first year college students. *Drug and Alcohol Dependence*, *86*(2–3), 106–114.
- Douglas, E. (in press). Reconstructing entrepreneurial intentions to identify predisposition for growth. *Journal of Business Venturing*.
- Douglas, E., & Shepherd, D.A. (2000). Entrepreneurship as a utility-maximizing response. *Journal of Business Venturing*, *15*(3), 231–252.
- Douglas, E., & Shepherd, D.A. (2002). Self-employment as a career choice: Attitudes, entrepreneurial intentions, and utility maximization. *Entrepreneurship Theory and Practice*, *26*(3), 81–90.
- Eden, D. (1975). Organizational membership vs. self-employment: Another blow to the American dream. *Organizational Behavior and Human Performance*, *13*(1), 79–94.

- Eisenhauer, J.G. (1995). The entrepreneurial decision: Economic theory and empirical evidence. *Entrepreneurship Theory and Practice*, 19(4), 67–79.
- Ellertsen, B., Johnsen, T.B., & Ursin, H. (1978). Relationship between the hormonal responses to activation and coping. In H. Ursin, E. Baade, & S. Levine (Eds.), *Psychobiology of stress: A study of coping men* (pp. 105–124). New York: Academic Press.
- Farmer, M.E., Locke, B.Z., Moscicki, E.K., Dannenberg, A.L., Larson, D.B., & Radloff, L.S. (1988). Physical activity and depressive symptoms: The NHANES I Epidemiologic Follow-up Study. *American Journal of Epidemiology*, 128(6), 1340–1351.
- Fazio, A.F. (1977). *A concurrent validation study of the NCHS General Well-Being Schedule*. Darby, PA: DIANE Publishing.
- Finucane, M.L., Alhakami, A., Slovic, P., & Johnson, S.M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, 13(1), 1–17.
- Folkman, S., & Lazarus, R. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology*, 48, 150–170.
- Folkman, S., & Moskowitz, J. (2000). Positive affect and the other side of coping. *American Psychologist*, 55(6), 647–654.
- Foo, M.D., Uy, M., & Baron, R.A. (2009). How do feelings influence effort? An empirical study of entrepreneurs' affect and venture effort. *Journal of Applied Psychology*, 94(4), 1086–1094.
- Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(3), 382–388.
- Fredrickson, B. (1998). What good are positive emotions? *Review of General Psychology*, 2(3), 300–319.
- Fredrickson, B., & Joiner, T. (2002). Positive emotions trigger upward spirals towards emotional well-being. *Psychological Science*, 13(2), 172–175.
- Ganster, D.C. (2005). Response: Executive job demands: Suggestions from a stress and decision-making perspective. *Academy of Management Review*, 30(3), 492–502.
- Geurts, S.A.E., & Sonnentag, S. (2006). Recovery as an explanatory mechanism in the relation between acute stress reactions and chronic health impairment. *Scandinavian Journal of Work, Environment & Health*, 32(6), 482–492.
- Goldsby, M.G., Kuratko, D.F., & Bishop, J.W. (2005). Entrepreneurship and fitness: An examination of rigorous exercise and goal attainment among small business owners. *Journal of Small Business Management*, 43(1), 78–93.
- Goodman, R.N. (2008). Performance under pressure: Examination of relevant neurobiological and genetic influence. Doctoral dissertation, University of Maryland, College Park.
- Gorgievski, M.J., Bakker, A.B., Schaufeli, W.B., Van der Veen, H.B., & Giesen, C.W.M. (2010). Financial problems and psychological distress: Investigating reciprocal effects among business owners. *Journal of Occupational and Organizational Psychology*, 83(2), 513–530.

- Gould, D., & Udry, E. (1994). Psychological skills for enhancing performance: Arousal regulation strategies. *Medicine & Science in Sports & Exercise*, 26(4), 478–485.
- Greenfield, T.K., & Kerr, W.C. (2008). Alcohol measurement methodology in epidemiology: Recent advances and opportunities. *Addiction*, 103(7), 1082–1099.
- Gross, J.J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, 2(3), 271–299.
- Hahn, V.C., Binnewies, C., Sonnentag, S., & Mojza, E.J. (2011). Learning how to recover from job stress: Effects of a recovery training program on recovery, recovery-related self-efficacy, and well-being. *Journal of Occupational Health Psychology*, 16(2), 202–216.
- Hambrick, D.C., Finkelstein, S., & Mooney, A.C. (2005). Executive job demands: New insights for explaining strategic decisions and leader behaviors. *Academy of Management Review*, 30(3), 472–491.
- Hansen, B.B., & Bowers, J. (2009). Attributing effects to a cluster-randomized get-out-the-vote campaign. *Journal of the American Statistical Association*, 104(487), 873–885.
- Harris, J.A., Saltstone, R., & Fraboni, M. (1999). An evaluation of the job stress questionnaire with a sample of entrepreneurs. *Journal of Business and Psychology*, 13(3), 447–455.
- Haskell, W.L., & Lee, I. (2007). Physical activity and public health. Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, 116(9), 1081–1093.
- Hausman, J., Stock, J.H., & Yogo, M. (2005). Asymptotic properties of the Hahn-Hausman test for weak-instruments. *Economics Letters*, 89(3), 333–342.
- Heaphy, E.D., & Dutton, J.E. (2008). Positive social interactions and the human body at work: Linking organizations and physiology. *Academy of Management Review*, 33(1), 137–162.
- Hennessy, D.A., Wiesenthal, D.L., & Kohn, P.M. (2000). The influence of traffic congestion, daily hassles, and trait stress susceptibility on state driver stress: An interactive perspective. *Journal of Applied Biobehavioral Research*, 5(2), 162–179.
- Hmieleski, K., & Baron, R. (2009). Entrepreneurs' optimism and new venture performance: A social cognitive perspective. *Academy of Management Journal*, 52(3), 473–488.
- Hobfoll, S.E., & Shirom, A. (2000). Conservation of resources theory: Applications to stress and management in the workplace. In R.T. Golembiewski (Ed.), *Handbook of organizational behavior* (pp. 57–81). New York: Dekker.
- Hochschild, A.R. (1983). *The managed heart: Commercialization of human feeling*. Berkeley, CA: University of California Press.
- Hochwarter, W.A., & Treadway, D.C. (2003). The interactive effects of negative and positive affect on the politics perceptions–job satisfaction relationship. *Journal of Management*, 29(4), 551–567.
- Hoge, T., & Bussing, A. (2004). The impact of sense of coherence and negative affectivity on the work stressor–strain relationship. *Journal of Occupational Health Psychology*, 9(3), 195–205.

- Hundley, G. (2001). What and when are the self-employed more satisfied with their work? *Industrial Relations*, 40(2), 293–316.
- Hunter, L.W., & Thatcher, S.M.B. (2007). Feeling the heat: Effects of stress, commitment, and job experience on job performance. *Academy of Management Journal*, 50(4), 953–968.
- Idler, E.L., & Kasl, S.V. (1997). Religion among disabled and nondisabled persons: Cross-sectional patterns in health practices, social activities, and well-being. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 52(6), S294–S305.
- Idler, E.L., Russell, L.B., & Davis, D. (2000). Survival, functional limitations, and self-rated health in the NHANES I Epidemiologic Follow-up Study, 1992. First National Health and Nutrition Examination Survey. *American Journal of Epidemiology*, 152(9), 874–883.
- Ikegaya, H., & Suganami, H. (2008). Correlation between climate and crime in Eastern Tokyo. *Canadian Journal of Criminology and Criminal Justice*, 50(2), 225–238.
- Istvan, J., Zavala, K., & Weidner, G. (1992). Body weight and psychological distress in NHANES I. *International Journal of Obesity and Related Metabolic Disorders*, 16(12), 999–1003.
- Ivancevich, J., & Matteson, M. (1980). *Stress and work: A managerial perspective*. Glenview, IL: Scott, Foresman and Company.
- Jamal, M., & Badawi, J. (1995). Job stress and quality of working life of self-employed immigrants: A study in workforce diversity. *Journal of Small Business and Entrepreneurship*, 12, 55–63.
- Jex, S. (1998). *Stress and job performance: Theory, research and implications for managerial practice*. Thousand Oaks, CA: Sage.
- Jex, S., & Beehr, T. (1991). Emerging theoretical and methodological issues in the study of work-related stress. *Research in Personnel and Human Resource Management*, 9, 311–365.
- Johnson-Sabine, E., Wood, K., Patton, G., Mann, A., & Wakeling, A. (2009). Abnormal eating attitudes in London schoolgirls—a prospective epidemiological study: Factors associated with abnormal response on screening questionnaires. *Psychological Medicine*, 18(3), 615–622.
- Kaplan, S., Bradley, J.C., Luchman, J.N., & Haynes, D. (2009). On the role of positive and negative affectivity in job performance: A meta-analytic investigation. *Journal of Applied Psychology*, 94(1), 162–176.
- Karlamangla, A.S., Sarkisian, C.A., Kado, D.M., Dedes, H., Liao, D.H., Kim, S., Reuben, D.B., Greendale, G.A., & Moore, A.A. (2008). Light to moderate alcohol consumption and disability: Variable benefits by health status. *American Journal of Epidemiology*, 169(1), 96–104.
- Kaufmann, P.J. (1999). Franchising and choice of self-employment. *Journal of Business Venturing*, 14(4), 345–361.
- Kim, J.J., & Diamond, D.M. (2002). The stressed hippocampus, synaptic plasticity and lost memories. *Nature Reviews Neuroscience*, 3(6), 453–462.
- Kivimäki, M., Head, J., Ferrie, J.E., Shipley, M.J., Brunner, E., Vahtera, J., & Marmot, M.G. (2006). Work stress, weight gain and weight loss: Evidence for

- bidirectional effects of job strain on body mass index in the Whitehall II study. *International Journal of Obesity*, 30(6), 982–987.
- Kleibergen, F., & Paap, R. (2006). Generalized reduced rank tests using the singular value decomposition. *Journal of Econometrics*, 133(1), 97–126.
- Kondo, N., Sembajwe, G., Kawachi, I., van Dam, R.M., Subramanian, S.V., & Yamagata, Z. (2009). Income inequality, mortality, and self rated health: Meta-analysis of multilevel studies. *British Medical Journal*, 339, b4471.
- Kuratko, D.F., & Hodgetts, R.M. (2004). *Entrepreneurship: Theory, process, practice* (6th edn.). Mason, OH: South-Western/Thomson Publishers.
- Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- LePine, J.A., Podsakoff, N.P., & LePine, M.A. (2005). A meta-analytic test of the challenge stressor–hindrance stress framework: An explanation for inconsistent relationships between stressors and performance. *Academy of Management Journal*, 48(5), 764–775.
- Levesque, M., Shepherd, D.A., & Douglas, E. (2002). Employment or self-employment: A dynamic utility-maximizing model. *Journal of Business Venturing*, 17(3), 189–210.
- Levin, J.S., & Chatters, L.M. (1998). Research on religion and mental health: An overview of empirical findings and theoretical issues. In H.G. Goenig (Ed.), *Handbook of religion and mental health* (Vol. xxxvii, pp. 33–50). San Diego, CA: Academic Press.
- Lewin-Epstein, N., & Yuchtman-Yar, E. (1991). Health risks of self-employment. *Work and Occupations*, 18, 291–312.
- Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin*, 131(6), 803–855.
- McClelland, D.C. (1961). *The achieving society*. Princeton, NJ: Van Nostrand.
- Mannheim, B., & Schiffrin, M. (1984). Family structure, job characteristics, rewards and strains as related to work-role centrality of employed and self-employed professional women with children. *Journal of Occupational Behaviour*, 5(2), 83–101.
- Meier, L.L., Semmer, N.K., Elfering, A., & Jacobshagen, N. (2008). The double meaning of control: Three-way interactions between internal resources, job control, and stressors at work. *Journal of Occupational Health Psychology*, 13(3), 244–258.
- Miller, N. (1980). A perspective on the effects of stress and coping on disease and health. In S. Levine & H. Ursin (Eds.), *Coping and health* (pp. 323–354). New York: Plenum.
- Min, P.G. (1990). Problems of Korean entrepreneurs. *International Migration Review*, 24(3), 436–455.
- Moltz, B. (2003). *You need to be a little crazy*. Chicago, IL: Dearborn Press.
- Morgan, S.L., & Harding, D.J. (2006). Matching estimators of causal effects: Prospects and pitfalls in theory and practice. *Sociological Methods & Research*, 35(1), 3–60.
- Moskowitz, J.T., Epel, E.S., & Acree, M. (2008). Positive affect uniquely predicts lower risk of mortality in people with diabetes. *Health Psychology*, 27(1), S73–S82.

- Mroczek, D.K., & Almeida, D.M. (2004). The effect of daily stress, personality, and age on daily negative affect. *Journal of Personality, 72*(2), 355–378.
- Murnieks, C.Y. (2007). Who am I? The quest for an entrepreneurial identity and an investigation of its relationship to entrepreneurial passion and goal-setting. Unpublished doctoral dissertation, University of Colorado-Boulder.
- Murray, M.P. (2006). Avoiding invalid instruments and coping with weak instruments. *Journal of Economic Perspectives, 20*(4), 111–132.
- Narayanan, L., Menon, S., & Spector, P.E. (1999). Stress in the workplace: A comparison of gender and occupations. *Journal of Organizational Behavior, 20*, 63–73.
- O'Hanlon, J.F., & Beatty, J. (1976). Catecholamine correlates of radar monitoring performance. *Biological Psychology, 4*(4), 293–303.
- Patzelt, H., & Shepherd, D.A. (2011). Negative emotions of an entrepreneurial career: Self-employment and regulatory coping behaviors. *Journal of Business Venturing, 26*, 226–238.
- Permuth-Levine, R. (2007). Differences in perceived stress, affect, anxiety, and coping ability among college students in physical education courses. Doctoral dissertation, University of Maryland, College Park, MD.
- Perrewé, P.L., & Spector, P.E. (2002). Personality research in the organizational sciences. *Research in Personnel and Human Resource Management, 21*, 1–63.
- Perrewé, P.L., Zellars, K.L., Ferris, G.R., Rossi, A.M., Kacmar, C.J., & Ralston, D.A. (2004). Neutralizing job stressors: Political skill as an antidote to the dysfunctional consequences of role conflict. *Academy of Management Journal, 47*(1), 141–152.
- Petrie, K.J., Fontanilla, I., Thomas, M.G., Booth, R.J., & Pennebaker, J.W. (2004). Effect of written emotional expression on immune function in patients with Human Immunodeficiency Virus infection: A randomized trial. *Psychosomatic Medicine, 66*(2), 272–275.
- Pickett, K.E., Kelly, S., Brunner, E., Lobstein, T., & Wilkinson, R.G. (2005). Wider income gaps, wider waistbands? An ecological study of obesity and income inequality. *British Medical Journal, 330*(8), 670–674.
- Prottas, D.J., & Thompson, C.A. (2006). Stress, satisfaction, and the work–family interface: A comparison of self-employed business owners, independents, and organizational employees. *Journal of Occupational Health Psychology, 11*(4), 366–378.
- Rahim, A. (1996). Stress, strain, and their moderators: An empirical comparison of entrepreneurs and managers. *Journal of Small Business Management, 34*(1), 46–58.
- Rasmussen, H.N., Scheier, M.F., & Greenhouse, J.B. (2009). Optimism and physical health: A meta-analytic review. *Annals of Behavioral Medicine, 37*(3), 239–256.
- Richardson, K.M., & Rothstein, H.R. (2008). Effects of occupational stress management intervention programs: A meta-analysis. *Journal of Occupational Health Psychology, 13*, 69–93.
- Rubin, D.B. (2006). *Matched sampling for causal effects*. New York: Cambridge University Press.

- Ruggiero, K.J., Armstadter, A.B., Acierno, R., Kilpatrick, D.G., Resnick, H.S., Tracy, M., & Galea, S. (2009). Social and psychological resources associated with health status in a representative sample of adults affected by the 2004 Florida hurricanes. *Psychiatry: Interpersonal & Biological Processes*, 72(2), 195–210.
- Schindehutte, M., Morris, M., & Allen, J. (2006). Beyond achievement: Entrepreneurship as extreme experience. *Small Business Economics*, 27(4), 349–368.
- Seaward, B. (2002). *Managing stress: Principles and strategies for health and wellbeing* (3rd edn.). Sudbury: Jones and Bartlett.
- Sekhon, J.S. (2007). Matching: Algorithms and software for multivariate and propensity score matching with balance optimization via genetic search. *Journal of Statistical Software*.
- Semmer, N.K., Grebner, S., & Elfering, A. (2004). Beyond self-report: Using observational, physiological, and situation-based measures in research on occupational stress. In P.L. Perrewe & D.C. Ganster (Eds.), *Emotional and physiological processes and positive intervention strategies (Research in occupational stress and well-being, Vol. 3)*, pp. 205–263. Bingley: Emerald Group Publishing.
- Sheehan, T.J., Fifield, J., Reisine, S., & Tennen, H. (1995). The measurement structure of the Center for Epidemiologic Studies Depression Scale. *Journal of Personality Assessment*, 64(3), 507–521.
- Shelton, L.M. (2006). Female entrepreneurs, work–family conflict, and venture performance: New insights into the work–family interface. *Journal of Small Business Management*, 44(2), 285–297.
- Shepherd, D.A. (2003). Learning from business failure: Propositions of grief recovery for the self-employed. *Academy of Management Review*, 28(2), 318–328.
- Snyder, C.R., Harris, C., Anderson, J.R., Holleran, S.A., Irving, L.M., Sigmon, S.T., Yoshinobu, L., Gibb, J., Langelle, C., & Harney, P. (1991). The will and the ways: Development and validation of an individual-differences measure of hope. *Journal of Personality and Social Psychology*, 60(4), 570–585.
- Staiger, D., & Stock, J.H. (1997). Instrumental variables regression with weak instruments. *Econometrica: Journal of the Econometric Society*, 65(3), 557–586.
- Stensland, B., Park, J.Z., Regnerus, M.D., & Robinson, L.D. (2000). The measure of American religion: Toward improving the state of the art. *Social Forces*, 79, 291–318.
- Steffy, B.D., & Jones, J.W. (1988). Workplace stress and indicators of coronary-disease risk. *Academy of Management Journal*, 31(3), 686–698.
- Steptoe, A., O'Donnell, K., Badrick, E., Kumari, M., & Marmot, M. (2008). Neuroendocrine and inflammatory factors associated with positive affect in healthy men and women: The Whitehall II study. *American Journal of Epidemiology*, 167(1), 96–102.
- Stevens, G., & Hoisington, E. (1987). Occupational prestige and the 1980 US labor force. *Social Science Research*, 16, 74–105.
- Stinchcombe, A.L. (1965). Social structure and organizations. In J.G. March (Ed.), *Handbook of organizations* (pp. 142–193). Chicago, IL: Rand McNally.
- Stoner, C.R., Hartman, R.I., & Arora, R. (1990). Work–home role conflict in female owners of small businesses: An exploratory study. *Journal of Small Business Management*, 28(1), 30–39.

- Tetrick, L., Slack, K., Da Silva, N., & Sinclair, R. (2000). A comparison of stress-strain process for business owners and nonowners: Differences in job demands, emotional exhaustion, satisfaction, and social support. *Journal of Occupational Health Psychology, 5*(4), 464–476.
- Thompson, C.A., Kopelman, R., & Schriesheim, C. (1992). Putting all one's eggs in the same basket: A comparison of commitment and satisfaction among self- and organizationally employed men. *Journal of Applied Psychology, 77*(5), 738–743.
- Thurston, R.C., Kubzansky, L.D., Kawachi, I., & Berkman, L.F. (2006). Do depression and anxiety mediate the link between educational attainment and CHD? *Psychosomatic Medicine, 68*, 25–32.
- USDHHS, CDC, and NCHS (United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics) (1992). National Health and Nutrition Examination Survey I: Epidemiologic Follow-up Study, 1992. ICPSR06861-v1. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2000. doi:10.3886/ICPSR06861.v1
- Uy, M.A., Foo, M.D., & Song, Z. (2013). Joint effects of prior start-up experience and coping strategies on entrepreneurs' psychological well-being. *Journal of Business Venturing, 28*, 583–597.
- Van Yperen, N.W., & Janssen, O. (2002). Fatigued and dissatisfied or fatigued but satisfied? Goal orientation and responses to high job demands. *Academy of Management Journal, 6*, 1161–1171.
- Vargas, C.M., Ingram, D.D., & Gillum, R.F. (2000). Incidence of hypertension and educational attainment: The NHANES I Epidemiologic Follow Up Study. *American Journal of Epidemiology, 152*(3), 272–278.
- Vogel, J.S., Hurford, D.P., Smith, J.V., & Cole, A.K. (2003). The relationship between depression and smoking in adolescents. *Adolescence, 38*(149), 57–75.
- Ward, T.B. (2004). Cognition, creativity, and entrepreneurship. *Journal of Business Venturing, 19*(2), 173–188.
- Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.
- Weiss, H.M., & Cropanzano, R. (1996). Affective events theory: A theoretical discussion of the structure, causes, and consequences of affective experiences at work. In B.M. Staw & L.L. Cummings (Eds.), *Research in organizational behavior: An annual series of analytical essays and critical reviews* (Vol. 18, pp. 1–74). New York: Elsevier Science/JAI Press.
- Zellars, K.L., Perrewé, P.L., Hochwarter, W.A., & Anderson, K.S. (2006). The interactive effects of positive affect and conscientiousness on strain. *Journal of Occupational Health Psychology, 11*(3), 281–289.

APPENDIX 1

TABLE A.1(a)
Measurement Model Fit

	<i>Weight</i>	<i>VIF</i>	<i>Loading</i>	<i>Reliability</i>	<i>AVE</i>
Positive Affect ¹				0.881	0.762
Happy			0.922		
Good			0.817		
Hopeful			0.853		
Enjoy			0.931		
<i>Biological Stress</i>				0.842	0.703
Systolic Blood Pressure (mmHg)			0.816		
Diastolic Blood Pressure (mmHg)			0.859		
Diagnosis of Hypertension by a doctor			0.834		
<i>Subjective Stress</i> (6-point scale; 1—Yes—almost more than I could bear or stand to 6—not at all)				0.758	0.650
Been under or felt you were under any strain, stress, or pressure during the past month?			0.772		
Been anxious, worried or upset			0.725		
How relaxed or tense have you been during the past month? (10-point scale, 0—relaxed to 10—tense; reverse coded)			0.757		
Personal Health (T1; T2 in parentheses)					
Alcohol Use					
Frequency	0.813** (0.784**)	1.425 (1.291)			
Quantity	0.760*** (0.741**)	1.457 (2.015)			
Smoking					
Frequency	0.711*** (0.744**)	1.091 (1.741)			
Quantity	0.797*** (0.719**)	1.369 (1.690)			
Physical Activity				0.713 (0.738)	0.677 (0.702)
In things you do for recreation, for example, sports, hiking, dancing, etc., do you get much exercise, moderate exercise, little or no exercise? (reverse coded)			0.761 (0.708)		
In your usual day, aside from recreation, are you physically very active, moderately active, or quite inactive? (reverse coded)			0.792 (0.813)		

TABLE A.1(a)
Continued

	<i>Weight</i>	<i>VIF</i>	<i>Loading</i>	<i>Reliability</i>	<i>AVE</i>
Do you follow a regular program of physical exercise? (Yes/No)			0.718 (0.743)		
Weight gain (kilograms)			0.683 (0.702)		
Subjective Health (excellent, very good, good, fair, or poor)			0.807 (0.781)		
Depressed Affect ¹				0.968	0.841
I felt depressed			0.940		
I felt, that I could not shake off the blues even with help from my family or friends			0.944		
I thought my life had been a failure			0.955		
I felt fearful			0.902		
I felt lonely			0.930		
I had crying spells			0.924		
I felt sad			0.965		
Somatic State ¹				0.791	0.683
I was bothered by things that usually don't bother me			0.711		
I did not feel like eating; my appetite was poor			0.722		
I had trouble keeping my mind on what I was doing			0.785		
I felt that everything I did was an effort			0.750		
My sleep was restless			0.797		
I talked less than usual			0.759		
I could not get "going"			0.800		
Interpersonal Relations (reverse coded) ¹				0.887	0.766
People were unfriendly			0.878		
I felt that people disliked me			0.913		

¹ four-item scale; 0 = rarely; 1 = some or a little of the time; 2 = occasionally or a moderate amount of time; 3 = most or all of the time).

TABLE A.1(b)
Second-Order Factor Analysis

TABLE A.1(b)(i): Second-Order Test for Personal Health (T1—1982–84)

<i>Model</i>	<i>Normed χ^2</i>	<i>GFI</i>	<i>IFI</i>	<i>TLI</i>	<i>CFI</i>	<i>RMSEA</i>
Model 1 (one-factor model)	2.893	0.783	0.761	0.743	0.701	0.14
Model 4 (one second order factor)	1.249	0.930	0.921	0.913	0.914	0.05
Personal Health (T2—1987)						
Model 1 (one-factor model)	2.309	0.781	0.762	0.740	0.722	0.16
Model 4 (one second order factor)	1.433	0.938	0.924	0.918	0.913	0.07

TABLE A.1(b)(ii): Second-order factor model for Stress

<i>Model</i>	<i>Normed χ^2</i>	<i>GFI</i>	<i>IFI</i>	<i>TLI</i>	<i>CFI</i>	<i>RMSEA</i>
Model 1 (one-factor model)	2.841	0.780	0.749	0.731	0.734	0.21
Model 2 (two uncorrelated factors—biological stress and subjective stress)	3.191	0.813	0.803	0.792	0.778	0.17
Model 3 (two correlated factors)	2.543	0.827	0.810	0.807	0.842	0.10
Model 4 (one second order factor)	1.831	0.948	0.907	0.938	0.917	0.07

TABLE A.1(c)
Exploratory Factor Analysis—Subjective Stress, Biological stress,
and Positive Affect

	<i>Exploratory Factor Analysis</i>		
	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>
Positive Affect ¹			
Happy	0.889	0.095	0.112
Good	0.862	0.136	0.144
Hopeful	0.775	0.099	0.194
Enjoy	0.828	0.136	0.061
Subjective Stress (6-point scale; 1—Yes—almost more than I could bear or stand to 6—not at all)			
Been under or felt you were under any strain, stress, or pressure during the past month?	0.144	0.809	0.193
Been anxious, worried or upset	0.197	0.827	0.155
How relaxed or tense have you been during the past month? (10-point scale, 0—relaxed to 10—tense; reverse coded)	0.102	0.873	0.079
Biological Stress			
Systolic Blood Pressure (mmHg)	0.131	0.053	0.866
Diastolic Blood Pressure (mmHg)	0.107	0.082	0.807
Diagnosis of Hypertension by a doctor	-0.065	0.071	0.832

¹ four-item scale; 0 = rarely; 1 = some or a little of the time; 2 = occasionally or a moderate amount of time; 3 = most or all of the time).

APPENDIX 2

Controlling for Endogeneity

Using data from the National Weather Service between 1982 and 1984, we use two weather-related instrumental variables: (a) number of sunny days in the state (Hennessy, Wiesenthal, & Kohn, 2000; Ikegaya & Suganami, 2008), and (b) average temperature (Bell & Baron, 2006). Religious involvement has also been linked to lower levels of stress. We use data from the General Social Survey 1984, and use state-level (c) averages of frequency of religious attendance (Idler & Kasl, 1997; Levin & Chatters, 1998). In addition, we use (d) the RELTRAD scheme proposed by Steensland, Park, Regnerus, and Robinson (2000) to develop a measure of religiosity at the state level. Furthermore, we use (e) age (Mroczek & Almeida, 2004), (f) if the individual is married (Cutrona, 1996), (g) smoking in teenage years (Vogel, Hurford, Smith, & Cole, 2003), (h) weight in early years (Johnson-Sabine, Wood, Patton, Mann, & Wakeling, 2009), and (i) congestion at the state level (Carisma & Lowder, 2008). The nine proposed instrumental variables have been found by previous scholars to be significantly related to stress, but seem to have limited effect on income. Therefore, these sets of instrumental variables, albeit weak, could be used to limit the endogenous effects of income on stress. Next, we test the relevance of instrumental variables.

We conduct a test of exogeneity using Wu-Hausman *F*-test and the Durbin-Wu-Hausman test. Non-significant *F*-tests and non-significant chi-square tests as part of the Durbin-Wu-Hausman test suggest that the variables in question (i.e. stress, health, and income) are exogenous, and that their estimates are unbiased and can thus be reported (Baum, Schaffer, & Stillman, 2003). Using *ivreg2* statistical package in Stata 11, our findings suggest that the variables cannot be considered exogenous and that reverse causality must be corrected. The highest Wu-Hausman *F*-test (χ^2 test = 6.187; $p < .001$) was found for age in the employee group, smoking in the self-employed group (χ^2 test = 6.552; $p < .001$), and smoking (χ^2 test = 4.847; $p < .001$) in the employee group.

A key criterion that we test before testing for exogeneity is instrumental relevance. Recent research has suggested that many applications of instrumental variables (IV) regressions suffer from “weak instruments” or “weak identification” (Murray, 2006). Recently, an earlier approach proposed by Staiger and Stock (1997) using *F*-tests has been shown to bias the instrumental variable estimator. Therefore, we use a more recently developed test, the Cragg–Donald statistic (Kleibergen & Paap, 2006). To assess the joint significance of three exogenous variables with the list of instrumental variables, we ran each test using *ivreg2* statistical package in Stata 11. Cragg–Donald test (null hypotheses: H_0 : instruments are weak) is compared to the critical

value (at 5 per cent) compiled by Hausman, Stock, and Yogo (2005) and reported by *ivreg2*. If the Cragg-Donald statistic is above this critical value then one rejects the null hypothesis that the instruments are weak. The Cragg-Donald statistics were (i) Entrepreneurs: 37.19 (Stock and Yogo critical value was 28.17); (ii) self-employed: 29.183 (critical value = 21.43); (iii) employee: 25.183 (critical value = 19.87).