Erasmus School of Economics

Self-employment and Mental Health

An investigation of the relationship between self-employment and mental health with social support and self-efficacy as moderators and stress as mediator

Erasmus University Rotterdam - Erasmus School Of Economics (ESE) - Master Thesis [Industrial Dynamics and Strategy]

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ABSTRACT

In a response to the increasing prevalence of individuals suffering from mental illness, this study investigates the relationship between self-employment and mental health using the MIDUS II study on health and well-being from the United States. In addition, the paper provides an insight in the underlying mechanisms of this relation by analyzing the moderation effects of social support and self-efficacy and the mediation effect of stress. Estimation results confirm the expectation of better self-evaluated mental health for the self-employed compared to wage workers but show no significant difference in depressive symptoms between the two occupational groups. Social support and self-efficacy do not have a significant role as moderators, nor does stress function as a mediator. Nevertheless, given the evidence for an association between self-employment and mental health, the findings suggest that stimulation of self-employment and more entrepreneurial work characteristics within corporate environments are instrumental in enhancing mental health.

KEYWORDS

Mental health; Self-employment; Social support; Self-efficacy; Stress

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1. Introduction

With information coming from a rising number of (digital) sources, busy daily routines and high pressure to perform, people place a large burden on their psychological health in today's society (Hoogendijk and Rek, 2017). Unsurprisingly, mental disorders are an increasingly relevant problem worldwide. In 2015, there were an estimated 43.4 million adults aged 18 or older with any mental illness in the United States within the past year. The group represented 17.9 per cent of all U.S. adults, whereas this was 14 per cent the year before (Center for Behavioral Health Statistics and Quality, 2015). The growing number of mental illness incidents is posing a large cost on society. Employers face costs due to absenteeism, presenteeism and loss of productivity, while national governments have to raise expenditure on health care and social welfare in the form of disability benefit payments. According to a study by the World Economic Forum and the Harvard School of Public Health (2011), the world's total price tag of mental illness is expected to more than double by 2030 compared to 2010, from 2,493 to 6,046 billion US dollars. This highlights the societal relevance of combating mental illness.

In the current study, the relation between an individual's occupational status in terms of self-employment vs. wage work and mental health is investigated. Self-employment is by many governments considered as a stimulating factor for economic growth (Gilbert, 2004; European Commission, 2015). In 2014, the self-employed Americans and the workers they hired accounted for 44 million jobs, equal to 30 per cent of the entire national workforce (Pew Research Center, 2014). A growing stream of literature has linked self-employment to differences in personal health (Buttner, 1992; Jamal, 1997; Lewin-Epstein and Yuchtman-Yaar, 1991; Parslow et al., 2004; Dahl et al., 2010, Yoon and Bernell, 2013; Shepherd and Patzelt, 2015). However, because of conflicting structural differences in autonomy and flexibility vs. responsibility and work intensity, so far research on the direction of this relationship has been scarce and inconsistent (Torres, 2012).

The present study aims to provide better insight into the dynamics underlying health differences between the self-employed and wage workers. The paper contributes to the existing literature on self-employment and health by investigating the moderating roles of social support and self-efficacy and the mediating role of stress. Social support and self-efficacy respectively account for environmental and personality factors that may influence the strength of the main relationship. By including both objective measures (cortisol and blood pressure) as well as subjective (self-reported) health indicators (perceived stress, self-evaluated mental health, depressive symptoms) and focusing on the individual's general

mental health condition plus a specific mental illness (depression), this study distinguishes itself from previous research in the field which is less comprehensive. As far as this study has sight of, there is no research yet examining both moderating and mediating pathways in the relationship between self-employment and health. Besides, a study exclusively on the association between self-employment and mental health is a valuable addition to existing literature. Although mental health and physical health are often interrelated, mental disorders are not directly visible and therefore often neglected or underreported by employers, employees and national governments.

This research builds on the idea that mental illness is not an individual problem but has a collective and societal nature. It assigns a determinant and harmful role to current work environmental characteristics that are believed to facilitate the emergence of mental disorders (Steenhuis, 2017). By investigating the relationship between self-employment and mental health, the goal of this study is to create better recognition of factors in the work place that can trigger or exacerbate mental health and provide employer incentive for modification of tasks, schedules and management strategies (Cooper & Cartwright, 1997).

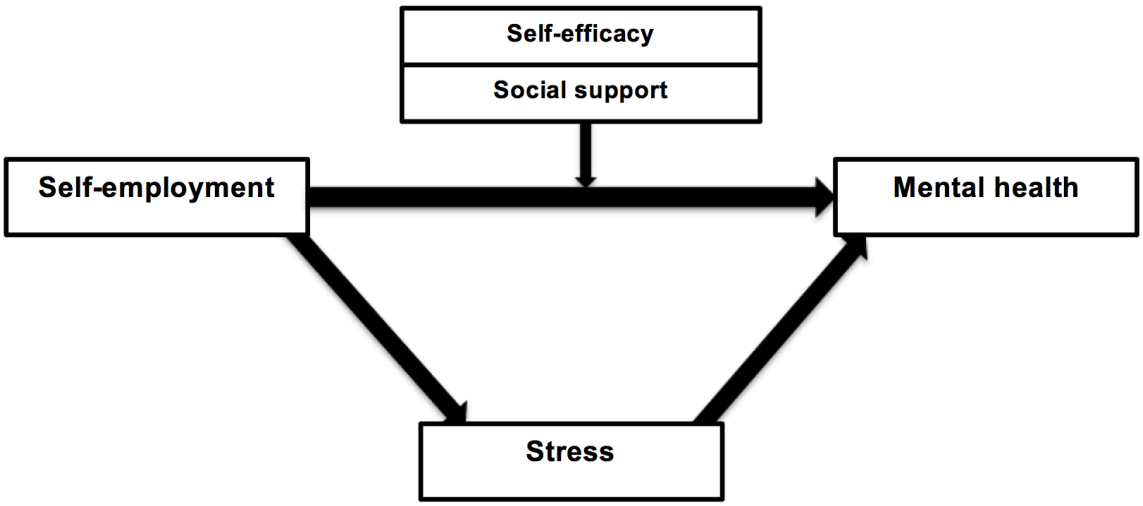
This empirical study of an American sample from the Midlife in the United States (MIDUS 2) of 2009 reveals that the self-employed report significantly higher evaluations of their mental health compared to wage workers, while they do not differ in the probability of reporting depressive symptoms. In addition, social support and self-efficacy are found to be rather confounders than moderators in the proposed relationship. Despite the fact that the self-employed score significantly different on objective stress measures and self-reported stress is directly associated with mental illness, this study does not find significant evidence for a mediation effect of stress in the relationship between self-employment and mental health. Still, the current results emphasize the need for promotion of self-employment and more entrepreneurial work characteristics within corporate environments in order to enhance the health of the employees and avoid high costs.

The remainder of this paper is organized as follows. First, in section 2, the conceptual model is developed, grounded by existing work stress and health literature, and hypotheses are formulated. In section 3, an analysis of the data is presented and the research methodology is described. Next, the descriptive statistics and results are discussed in section 4, followed by an assessment of the limitations. At last, the paper ends with conclusive remarks including suggestions for future research and practical implications for policy makers and businesses.

2. Theoretical framework

Work status can affect an individual's mental health condition (Kasl et al., 1962; Banks et al., 1980). The mental health may vary for the self-employed and wage workers who are confronted with dissimilar work environments, work conditions, experiences and possess distinctive capabilities, resources and personality traits. To examine the differential effect on mental health for the self-employed versus wage workers, this study considers the role of stress as mediator and two moderators. Since stress levels differ for self-employed individuals and wage workers (Hessels et al., 2017) and prolonged and intense levels of stress are unambiguously negatively related to mental health (Cardon and Patel, 2013), work stress may function as a mediator in the relationship between self-employment and mental health (see figure 1). Besides, social support and self-efficacy are added as moderators in the conceptual model represented in figure 1, as they respectively account for environmental and personality factors that may influence the strength of the relationship. After defining the main concepts of the current study, this section explicates the proposed relationships of figure 1 advanced by previous theoretical and empirical literature.

Figure 1 - Conceptual model: self-employment - stress - mental health with social support and self-efficacy as moderators.



2.1. Main concepts

The definition of mental health depends on how one interprets the concept. Early research in the occupational literature at the empirical level (Argyris, 1951; Allport, 1958; Jahoda, 1958) often used the notion of '*positive mental health*'. This term refers to behavior, attitude and feelings associated with an individual's level of satisfaction, success and personal effectiveness (Banks et al, 1980). However, because of the vagueness and general nature of this term, the notion of mental health defined in terms of '*absence of mental illness*' is deemed more accurate and used in recent studies (Lewin-Epstein and Yuchtman-Yaar, 1991; Parslow et al. 2004; Yoon and Bernell, 2013; Rietveld et al, 2016). Furthermore, the term self-employment signifies *'individuals who earn no wage or salary but derive their income by exercising their profession of business on their own account and at own risk'* (Parker, 2009). Self-employment is not just a job but also means ownership over own property and assets (Lewin-Epstein and Yuchtman-Yaar, 1991).

2.2. Self-employment and mental health

A long tradition of research on health illness has investigated its relationship with social classes. Central in this research history is the observation of class differences in health as a result of structural determined influences on members of the classes (Lewin-Epstein and Yuchtman-Yaar, 1991). There exists a wide belief that life-style, occupation and job characteristics are central to social class differences in health (Fox and Adelstein, 1978; Fox et al., 1985; Marmot et al. 1987; Ravesteijn et al., 2013). In particular, the diverse set of structural features between the self-employed and wage workers is likely to play a role in the mental health condition of these two groups. Whereas the self-employed are free from constraints related to employment in formal organizations and possess greater work autonomy, they face higher levels of uncertainty, adopt more risk-taking behavior and hold full responsibility over survival of the own business (Lewin-Epstein and Yuchtman-Yaar, 1991; Bjuggren et al., 2012). The former and latter are believed to have contrasting effects on the health of the self-employed. Unsurprisingly, results comparing mental health for the self-employed and employed have so far not been conclusive or consistent. Eden (1975) has been one of the first showing that despite more enriching job requirements, opportunities for self-fulfillment and skill-utilization and other advantageous job settings, the self-employed do not outperform the employed in their mental health condition. Similar results are found by Jamal (1997). Additionally, Parslow et al. (2004) distinguish between males and females in the relationship between self-employment and mental health. Neither for men nor for women significant positive or negative associations are found. In a more recent study, Rietveld et al. (2016) conclude that the self-employed are generally in better health than wage workers,

although the difference in mental health is not statistically significant when controlling for demographics and employment characteristics. Similarly, Yoon and Bernell (2013) show that self-employed individuals are physically healthier than wage workers but find no significant relationship between self-employment and mental health. The authors suggest the absence of significance to be explained by the stigma, which prevents the self-employed from admitting mental health problems, but do not elaborate on the reason behind increased stigma for certain groups of individuals.

In contrast, Ettner and Grzywacz (2001) conclude more positive views on the work-health effects for the self-employed. Though, they do not include any measures of observed health conditions to their analysis. In line with Ettner and Grywacz (2001), Patzelt and Shepherd (2011) investigate the relative importance of positive and negative emotional outcomes experienced by the self-employed. The authors disintegrate the suggestion that the self-employed are more susceptible to negative emotions like mental strain than employees and prove this difference to be enlarged when problem-focused and/or emotion-focused coping tools are used.[1] Hence, since more recent research tends to conclude better mental health for the self-employed, the following is proposed:

H1: *The self-employed report better mental health than wage workers.*

2.3. Moderation of the relationship between self-employment and mental health

The strength of the relationship between self-employment and mental health is likely to depend on the work environment an individual operates in and its personality characteristics (Rahim, 1996). As suggested by Stephan and Roesler (2010), studies on health should take into account the moderating effects of specific personality and environmental orientations as they can increase the ability to reap health benefits of work. Accordingly, the following paragraph describes the role of one's social network and self-efficacy as moderators.

2.3.1. Social Support

Social support – *'the availability of help in times of need from supervisors, coworkers, family members and friends'* (Rahim, 1996) - is often considered as an important moderator in the relationship between self-employment and health (Rahim 1996; Chay 1993; Tetrick et al., 2000; Viswesvaran et al. 1999). According to Cohen and Wills (1985), social network support

[1] Problem-focused coping refers to dealing with sources of negative emotions and includes, for example, making a plan of action or focusing on the next steps. Emotion-focused coping refers to regulating the experience of negative emotions by, for example, engaging in distractive activities, seeking emotional support, or consuming drugs and alcohol (Folkman and Moskowitz, 2004).

[2] Rauch and Frese (2007) differentiate generalized self-efficacy (a personality concept) from specific

is related to overall well-being because it provides positive affect, a sense of predictability, stability of one's life situation and recognition of self-worth. A broad social network can also avoid negative experiences that would otherwise have increased the probability of psychological or physical disorder. More specific, Chay (1993) states that supportive relationships with coworkers and supervisors enhance psychological and physical well-being.

The level of social support is assumed to differ for the self-employed and wage workers. Self-employed individuals do often not have supervisors and coworkers and therefore they receive little work-related support compared to others (Rahim, 1996). The highly supportive relationships that wage workers have with their supervisors and/or coworkers may weaken the negative effects of stressors created by job demands (Fisher, 1985; Geller and Hobfoll, 1994; House, 1981; Terry et al., 1993). Moreover, it is plausible to argue that the self-employed receive less support from family, spouse and friends because they have longer working hours (Hyytinen and Ruuskanen, 2007) and can therefore spend less time with their private support network.

The Job-Demand-Control-Support (JDCS) model (Johnson and Hall, 1988) integrates the social support dimension into the relationship between work and health. According to the JDCS model, social integration is, besides job demands and job controls, a crucial aspect in the development of health problems. The buffer hypothesis of this model assumes that social support moderates the negative impact of high work demands on psychological well-being (Van Der Doef and Maes, 1999).

Empirical results on the buffer hypothesis of the JDCS model have so far been inconsistent. Research by Karasek et al. (1982) and Landsbergis et al. (1992) show support for moderating effects of support depending on the support measure and type of analyses used. Besides, findings by Viswesvaran (1999) indicate a threefold effect of social support on the work stressor-health relationship with one of them being moderation of the stressor-strain relationship. Nevertheless, studies by Lerner et al. (1994), Bourbonnais et al. (1996) and Rahim (1996) do not find significant evidence for moderation effects.

Assuming different levels of social support for the self-employed and wage workers, a positive link between social support and mental health and following the buffer hypothesis of the JDCS model, this study expects a stronger relation between self-employment and mental health when the support from the social network is higher. Therefore, the following is predicted:

H2 (a): *The positive association between self-employment and mental health is moderated by social support, such that this relationship is stronger when social support is high compared to low.*

2.3.3. Self-efficacy

Another factor that can act as a moderator in the relationship between self-employment and mental health is an individual's belief about him-/herself. Self-efficacy – *'the belief in one's own capacity to perform a given task'* (Bandura, 1977) – is one type of belief. The level of self-efficacy affects the way of thinking, feeling and acting (Schwarzer, 1997). According to Grau et al. (2001), individuals with a low sense of self-efficacy experience more mental health disorders like depression, anxiety and helplessness.

Bradley and Roberts (2004) propose higher self-efficacy levels for self-employed individuals compared to others. Since self-efficacy is related to perceptions of competence and control, and is associated with risk taking and opportunity recognition (capabilities and characteristics that are more prevalent for the self-employed) the authors see this personality trait as particular common for self-employed individuals. Moreover, by matching personality traits to tasks of entrepreneurs, Rauch and Frese (2007) find a significant correlation between generalized self-efficacy[2] and entrepreneurial behavior in the form of business creation and business success. They argue that people with high self-efficacy are looking for more challenging opportunities, show higher degree of personal initiative, have higher hopes for success and actively search for new information compared to individuals with low self-efficacy which makes them more likely to start new, successful businesses (Rauch and Frese, 2007).

The belief to carry out own job responsibilities is often shown to play a moderating role in the relationship between stress and strain or health (O'Leary, 1992; Roddenberry and Renk, 2010; Jex and Bliese, 1999; Jex et al., 2001; Grau et al., 2001). In general, when people lack the feeling of being capable of performing own job tasks, they experience certain situations as more stressful and threatening and consequently face more mental health problems (Jex et al., 2001). Jex and Bliese (1999) demonstrate moderating effects of self-efficacy in the stressor-strain relationship depending on the type of self-efficacy, stressors and outcomes. Their findings reveal that individuals with strong self-efficacy react less negatively in terms of psychological and physical strain to long work hours and work overload than those with low levels of efficacy. Similarly, Grau et al. (2001) find support for the moderating role of self-efficacy in relationships between aspects of work that can be perceived as stressors and their consequences. More specific, they prove that self-efficacy is a significant moderator in the relation between job autonomy and emotional exhaustion, which is considered to be 'the core of a burnout' (Grau et al., 2007).

Assuming different levels of self-efficacy for self-employed individuals and wage workers, a positive link between self-efficacy and mental health and following previous

[2] Rauch and Frese (2007) differentiate generalized self-efficacy (a personality concept) from specific self-efficacy because they consider the latter as not being a personality trait.

studies on self-efficacy as moderator, the relation between self-employment and mental health is expected to be stronger when individual levels of self-efficacy are high. Consequently, the following is hypothesized:

H2 (b): *The positive association of self-employment on mental health is moderated by self-efficacy, such that this relationship is stronger when self-efficacy is high compared to low.*

2.3. Role of stress in the relationship between self-employment and mental health

Since clear and consistent evidence for a direct relationship between self-employment and mental health lacks, some studies advocate for advanced research on this relationship (Yoon and Bernell, 2013; Shepherd and Patzelt, 2015). Shepherd and Patzelt (2015) call for further investigation on the role of stress in the link between self-employment and the health condition of this group. Similarly, Hessels et al. (2017) suggest a study on the consequences of stress in terms of physical and mental health outcomes with, in particular, examination of intermediary pathways including stress hormones. Stress is generally defined as *'the process by which psychological experiences and demands (stressors) produce both short-term (strains) and long-term changes in mental and physical health'* (Ganster and Rosen, 2013). In stress situations, requirements exceed an individual's resources and are consequently appraised as harmful, threatening or challenging (Lazarus, 1990). This paragraph first discusses the direct relationships between self-employment and stress and between stress and mental health. Subsequently, it explains the mediation effect of stress in the link between self-employment and mental health.

2.3.1. Self-employment and stress

In the last decades, researchers have increasingly examined stress levels of the self-employed compared to those of wage workers justified by different underlying mechanisms. Depending on the stress measure used and the emphasis given to specific job characteristics or stress perception, contradictory results are found. Harris et al (1999) motivate their finding of more on-the-job stress for self-employed individuals by the higher workload of this type of workers. In addition, Blanchflower (2004) states that self-employed individuals work longer hours which results in them being more exhausted, having limited family time, sleeping less, feeling more work pressure, and as a consequence experiencing more stress. According to Jamal's study on workers in Canada and Pakistan (2009), the life domination of work and its demands and the uncertainty and responsibility requiring high

investment in emotional and physical resources create greater levels of job stress for the self-employed. On the other hand, some studies find no significant differences in stress levels for the self-employed and wage workers at all (Parslow et al., 2004; Andersson, 2008) or conclude a negative relationship between self-employment and stress. In Rahim's study (1996), the fact that entrepreneurs are in general more internally focused – belief that events are result of own behavior and actions – results in lower stress levels for this particular group compared to managers. Baron et al. (2013) argue for lower levels of stress for founding entrepreneurs partly derived from high psychological capital – a combination of self-efficacy, optimism, hope and resilience. Recently, Hessels et al. (2017) performed a study using a large, longitudinal sample from Australia with improved stress measures and focusing solely on self-employment and stress related to work. The authors take the Job Demand-Control (JDC) model[3] (Karasek, 1979) to weigh the stress-enhancing and stress-diminishing sources in an environment of self-employment. They show that self-employed individuals experience less work-related stress than wage workers which is fully explained by job control. Hessels et al. (2017) argue that the higher control and autonomy of the self-employed balances out the job demands resulting in lower perceived stress levels. Drawing upon their findings, self-employment is expected to be negatively associated with the level of stress. Thus, the following is proposed:

H3 (a): *The self-employed report lower stress than wage workers.*

2.3.2. Stress and mental health

Prolonged and intense levels of stress are unambiguously negatively related to mental health (Cardon and Patel, 2013). It is widely believed that long-term activation of the body's stress-response system prevents the return to baseline levels. Mental and physical resources are slowly exhausted by the constant effort that is needed to tackle stressful situations. Consequently, the risk of health disorders is increased (Hessels et al., 2017). Extreme levels of stress appear to have a harmful effect both on physical and, although studied less often, also on mental health (Karasek, 1979; Bromet et al., 1988; Karasek and Theorell, 1990; Stansfeld et al., 1997; Cropley et al., 1999; Stansfeld et al., 1999; Van der Doef and Maes, 1999; Mausner-Dorsch and Eaton, 2000; Paterniti et al., 2002; Stansfeld, 2002; De Lange et al., 2003; Theorell, 2003; Wang, 2005). According to findings from occupational stress research and, more general, life event stress literature, stressful experiences contribute to 'depression' (Tennant, 2001). Virtanen et al. (2007) confirm that work stress is associated

[3] The Job Demand-Control (JDC) model suggests a buffering function of control in the impact of job demands on strain (Karasek, 1979).

with lifetime and 12-month depressive and anxiety disorders for men and women. Furthermore, objective measures of stress show similar results (McEwen, 2000). Increases in cortisol levels (stress-hormone) are found to accompany an intensified neural response leading to structural changes in the central nervous system. This, in turn, facilitates the development of mental disorders. Based on the above-mentioned knowledge, the following is expected:

H3 (b): *Stress is negatively associated with mental health.*

2.3.3. Stress as mediator

As aforementioned, this study assumes that self-employment is negatively related to stress and that stress, in turn, is negatively related to the absence of mental health illness. Consequently, it is likely that stress, at least partly, mediates the relationship between self-employment and mental health. Mediation of the relation between self-employment and mental health by stress suggests that all or some effects of self-employment on mental health evaluation and mental disorders as depression would be through the effects of self-employment on stress. This idea matches the definition of stress by Ganster and Rosen (2013) where self-employment and wage-employment create different stressors that lead, through the process of stress generation, to changes in mental and/or physical. Hence, the current study argues:

H3 (c): *The relationship between self-employment and mental health is mediated by stress.*

3. Data and methodology

3.1. Sample

The current study makes use of the Midlife in the United States (MIDUS) cross-sectional dataset, a national longitudinal study of health & well-being funded by the National Institute on Aging. The National Institute on Aging has carried out three MIDUS surveys. MIDUS II, completed in 2009, repeats the comprehensive assessments obtained in the original research and launches new areas of biological and neurological assessment. In total, the follow-up research consists of five separate projects. For this study, project 1 on psychological, socio-demographic and health variables as in MIDUS 1 and project 4 on biomarkers are selected. Project 4 provides additional information on cortisol levels, blood pressure and various measures for stress and depression. A total of 1,255 respondents completed both projects. Deletion of missing values, outliers (defined below) and all observations on individuals other than currently self-employed or wage worker results in a reduction to 679 observations. A total of 548 (80.71%) individuals in the sample are currently working for a wage compared to a group of 131 (19.29%) self-employed individuals. The sample consists of slightly more females compared to males, respectively 50.66% and 49.34%. All respondents are aged between 34 and 81.

3.2. Measures[4]

3.2.1. Mental health

The mental health of the individuals in the sample is measured using two variables. The first variable, *self-evaluated mental/emotional health* is a subjective measure of an individual's mental health perception. Individuals were asked to generally rate their mental or emotional health on a 4-point scale ranging from poor/fair (0) to excellent (3).

The second variable, *The Center for Epidemiologic Studies Depression Scale* (CES-D) (Radloff, 1977), is a self-report scale specifically on depressive symptoms. The *CES-D Depressive scale* is a widely used measure (Center for Innovative Public Health Research, 2017), which has demonstrated internal and external validity among various heterogeneous research groups (Cheng and Chan, 2005; Irwin, et al., 1999). It has proven good sensitivity and specificity in detecting depression diagnosis (Björgvinsson et al., 2013; Zhang et al., 2012). The scale is composed of 20 statements related to feelings and attitudes and individuals have to declare on how often certain statements applied to them in the past week.

[4] A detailed description of the variables is given in table A1 of Appendix 1. Appendix 2 contains the scale items.

The final scale score is computed by summing across all items, meaning that lower values are associated with more depressive symptoms. In cases with one missing value, mean substitution is used. Since the existence of depressive symptoms on itself does not directly indicate depression and a significant number of observations has a value of 0, the *CES-D Depression Scale* is transformed to a binary variable that takes value 1 if criteria for depressive episode are met and 0 if no clinical significance is present. The threshold is set at 16 as suggested by The Center of Epidemiologic Studies Depression (CESD).

3.2.2. Self-employment

The main independent variable in this study is self-employment. Self-employment is measured using a binary variable that takes value 1 if the current work status of an individual is self-employed and 0 if the individual is currently working for a wage.

3.2.4. Moderators

Social support as environmental and self-efficacy as personality factor are included to account for differences in characteristics of the work environment and personality traits of the individual that effect the strength of the main relationship under study.

3.2.4.1. Social support

Social support is a self-computed summation of means of five support sources; supervisor-, coworker-, family-, spouse/partner- and friends support (Cronbach's alpha = 0.61). Due to a large number of missing values in the current dataset, a measure only on work-related support is less accurate.[5] Previous research frequently uses similar indicators of social support but seldom examines more than three sources together (Walen and Lachman, 2000; Schuster et al., 1990; Grzywacz and Marks, 1999;2000;2001). The support received from family, spouse/partner and friends are measured through four parallel items and answered on a 4-point scale. The items for coworker and supervisor support slightly differ with a total of, respectively, two and three items. Since the questions for family, spouse/partner and family were answered on a 4-point scale and those for coworker and supervisor on a 5-point scale, the latter items are transformed to identical scale. Higher values of the scale scores indicate higher levels of support from the total social network. The social support variable ranges from a minimum of 0 to a maximum of 20.

[5] See the section 5 on robustness for results with only work-related support.

3.2.4.2. Self-efficacy

Self-efficacy is measured using the personal mastery scale of the MIDUS II dataset, which consists of two items from Pearlin and Schooler's (1978) Mastery Scale and two items created by Lachman and Weaver (1998). Other studies by Skinner (1996), Soederberg Miller and Lachman (2000), Prenda and Lachman (2001) suggest and/or make use of the personal mastery measure. The scale refers to an individual's sense of efficacy or effectiveness in carrying out goals (MIDUS II). *Self-efficacy* is defined in general terms (not domain specific, e.g. entrepreneurial self-efficacy) because of data restrictions.[6] Respondents are asked to describe their level of agreement with four statements related to task control on a 7-point scale. The scale scores are constructed by calculating the mean across the set of items, with higher scores indicating higher levels of self-efficacy. In cases with more than half of the items missing, scale scores are not computed. The self-efficacy variable ranges from a minimum of 0 to a maximum of 7.

3.2.4. Stress

The mediator is measured using three variables: (i) *Perceived Stress Scale (PPS)*; (ii) *Systolic blood pressure*; (iii) *Saliva cortisol level*. The current study measures stress at the general level as it is often hard to assign stress to a source and stress spillovers cannot be ruled out. Moreover, since it is unlikely that mental illness is affected by the response to one particular stressor/event, the general stress level is an adequate measure (Cohen and Williamson, 1988). This study takes one subjective and two objective measures to account for a potential reporting bias in stress perception among the individuals in the sample. The subjective *Perceived Stress Scale* assesses the degree to what situations in life are appraised as stressful (Cohen et al., 1983). The *PPS* is a popular tool worldwide with strong psychometric properties (Roberti et al., 2006; Lee, 2012) and has proven to be associated with greater vulnerability to stressful life-event-elicited depressive symptoms (Kuiper and Olinger, 1986). In the current study, respondents are asked to rate the frequency of feelings of unpredictability, uncontrollability and overloading in the past month for ten items on a 5-point scale ranging from 1 = never to 5 = very often. The final scale scores are computed by summing across all items, meaning that higher scores are associated with higher levels of perceived stress. Again, in cases with one missing value mean substitution is applied. The PPS variable ranges from a minimum scale score of 10 to a maximum score of 50.

Systolic blood pressure and *saliva cortisol levels* are taken as objective measures. Both are more often used in the work stress literature (Sonnentag and Fritz, 2006) as they

[6] Because of multiple domains in the MIDUS study (health and psychological well-being), the use of a generalized measure was deemed more appropriate.

independently predict mental health outcomes and are relatively easy to sample (Ganster and Rosen, 2013). Regarding the *systolic blood pressure*, various studies show evidence for increased blood pressure levels in individuals experiencing high stress (Light et al., 1992; Schnall et al., 1992; Schnall et al., 1998). In particular, Vrijkotte et al. (2000) find that chronic work stress is associated with higher systolic blood pressure during work and leisure time, but not with higher diastolic pressure. In line with Vrijkotte et al. (2000), the current study uses a continuous variable (range 83-191) measuring the average *systolic blood pressure* in mmHg of the respondents during sitting activity over three measurements. Cortisol is a stress hormone, which is released in response to fearful or stressful events and helps to restore homeostasis. Chronic levels of stress damage the functioning of the feedback inhibition mechanism and result in continued production of cortisol (McEwen, 1998). Consequently, psychological stress is found to be associated with higher cortisol levels (Pruessner et al., 1999; Ruiz et al., 2001; Van Eck and Nicolson, 1994). This study includes a continuous variable measuring the baseline *saliva cortisol level* obtained from an experimental protocol in nmol/L. After dropping an outlier of 1889.31 nmol/L, the variable ranges from 1.29 to 73.44 nmol/L.

3.2.5. Control variables

The current study controls for demographic and work-related variables that may be correlated with the independent and dependent variables. The relevant controls are selected based upon earlier studies on self-employment, stress and health.

3.2.5.1. Demographic controls

First, the *age* in years of the respondent is added as a continuous variable because it is shown that the first onset of mental disorders usually occurs in childhood or adolescence (Kessler et al., 2008). Additionally, as demonstrated by a study on the OECD, the probability of being self-employed rises with age (Blanchflower, 2000). As another reason, *age* is included to account for individual differences in blood pressure independent from changes caused by stress. Pinto (2007) states that elderly face structural changes in the arteries resulting in decreased diastolic and increased systolic blood pressure. Secondly, the current study takes into account *gender* (1 = male; 0 = female) because mental disorders like depression and anxiety appear to predominate for women (World Health Organization, 2017) and the probability of self-employment is found to be higher among men than women (Blanchflower, 2000). Thirdly, distinction is made between the *marital statuses* of an individual. Results obtained by Simon (2002) provide support for the claim that marriage is associated with better mental health. The variable is defined as a categorical that takes value 0 if respondent is married, 1 if respondent is separated or never married and 2 if respondent

is divorced or widowed. Treating *marital status* as categorical instead of binary, may partly measure the negative effect of life events on one's mental health condition (Vinokur and Selzer, 1975; Van den Berg et al., 2010). In the same research, Simon (2002) demonstrates an increase in emotional distress due to marital loss. Besides, the stability associated with marriage, gives an appropriate motivation for entering into risky self-employment (Faridi et al., 2011). Robinson and Sexton (1994) show that being single, widowed or divorced compared to being married have a negative impact on the probability of being self-employed. Finally, this study controls for *number of children* including adopted, step and foster children as continuous variable. Since the rate of demands increases with the number of children, higher levels of stress and lower mental health conditions are expected for individuals with more children (Gove and Geerken, 1977). On the other hand, Robinson and Sexton (1994) find the presence of children to have a positive impact on the decision for self-employment because it allows for large flexibility in scheduling work. The current sample contains a single observation of in total 17 children, which is considered an outlier and therefore deleted.

3.2.5.2. Work-related controls

This study considers work-related variables to control for heterogeneity within the self-employment category. Due to large numbers of missing values for other employment indicators, like *number of work hours* and *income*, only *profession* is added to the main regression. Self-employment tends to move to specific occupations (Rietveld et al., 2016) and various occupations have a differential impact on mental health (Wolford, 1964). *Profession* is measured as a categorical variable which distinguishes between six major professions: 0 = Executive, Administrative and Managerial; 1 = Professional specialty; 2 = Technician, Production & Repair, Operator, Laborer, Military; 3 = Sales; 4 = Administrative support; 5 = Service; 6 = Farming, Forestry, Fishing and Others.

3.3. Estimation methods

3.3.1. Analysis of direct effect

The present study estimates the following empirical model for testing the direct relationship between self-employment and mental health:

$$Y_i = f(SE_i, X_i, \varepsilon_i) \qquad (1)$$

where i indexes an individual and ε refers to the error term. Y indicates the self-evaluated mental/emotional health and CES-D Depression Scale measures. SE is the main binary

variable of interest for self-employment and X is a vector of the covariates discussed in section 3.2.5.

Since the dependent variables contain ordinal and binary measures, different functional forms of the response variable are considered when estimating Equation (1). Although the self-evaluated mental/emotional health measure is an ordinal variable, this study treats the dependent variable as a continuous to maximize consistency across the estimation methods used. For the self-evaluated mental/emotional health variable, ordinary least squares (OLS) estimates are obtained, while for the binary CES-D Depressive Scale a probit regression model is estimated. All regressions are performed with robust standard errors. For the non-linear models, the marginal effect of self-employment is calculated as a mean difference in predicted probabilities of the outcome between the self-employed and wage workers.

3.3.2. Moderation analysis

To test for the moderator effect of social support and self-efficacy, the single moderator variables plus their interactions with the main independent variable self-employment are added to the baseline estimation model. Subsequently, the following regression function is estimated, using ordinary least squares and non-linear probit estimation:

$$Y_i = \alpha_{0i} + \beta_1 SE_i + \beta_2 SS_i + \beta_3 SEF_i + \beta_4 SE_i SS_i + \beta_5 SE_i SEF_i + \beta_{6,j} X_i + \varepsilon_i \quad (2)$$

where i indexes an individual and ε refers to the error term. Y indicates the self-evaluated health and CES-D Depression Scale measures. SE is the main binary variable of interest for self-employment, SS denotes the social support moderator and SEF represents the self-efficacy moderator. X is a vector of j covariates discussed in section 3.2.5.

For measuring the hypothesized moderation, this study is particularly interested in the sign and significance of β_4 and β_5. The assumptions underlying the moderation model contain the standard OLS assumptions (Cohen et al., 2003) and homogeneity of error variance (Fairchild and MacKinnon, 2009).[7]

3.3.1. Mediation analysis

The mediation analysis is conducted to investigate the proportion of the relationship between self-employment and mental health that is mediated by stress. Besides the direct relation

[7] Homogeneity of error variance requires the residual variance of Y after predicting Y from X to be equivalent across values of the moderator.

between self-employment and mental health (c), the mediation model considers two additional ordinary least squares regression functions for estimating the indirect effect:

$$STRESS_i = \alpha_0 + a\, SE_i + \beta_{2,j} X_i + \varepsilon_i \quad (3)$$

$$Y_i = \alpha_0 + c'\, SE_i + b\, STRESS_i + \beta_{2,j} X_i + \varepsilon_i \quad (4)$$

where i indexes an individual and ε refers to the error term. Y indicates the self-evaluated health and CES-D Depression Scale measures. SE is the main binary variable of interest for self-employment and $STRESS$ denotes the mediator. X is a vector of j covariates discussed in section 3.2.5. Whereas c' represents the total effect of self-employment on mental health adjusted for the level of stress, a is the effect of self-employment on stress and b denotes the effect of stress on mental health corrected for employment status. The mediated effect or indirect effect is equal to the product ab.

Four conditions for mediation proposed by Baron and Kenny (1986) must hold in the current study: (i) self-employment is significantly related to mental health; (ii) self-employment is significantly related to stress; (iii) stress is significantly related to mental health; (iv) the coefficient of self-employment is reduced after adding stress to the model with mental health as the dependent variable. For full mediation to take place, the addition of the stress mediator must render the coefficient of self-employment insignificant. Partial mediation is present when the beta of self-employment is reduced but remains significantly different from zero. In addition, the mediation model takes account of the usual OLS assumptions (Cohen et al., 2003) and correct causal ordering of the variables, no reverse causality and no interaction between self-employment and stress are assumed (Fairchild and MacKinnon, 2009).

The current study makes use of the distribution of the product strategy to calculate the indirect effect. Preacher et al. (2007) claim this strategy to be the most accurate analytic method available for determining the significance of, and intervals for, a and b in the simple mediation model. Consequently, the often-used Sobel method (1982) to test the significance indirect effect of ab is applied.

4. Results

4.1. Descriptive statistics

4.1.1. Summary statistics

The mean values and standard deviations of all dependent, independent and control variables for the self-employed and wage workers are displayed in table 1. Additionally, column 5 presents the p-values for the mean differences. Table 1 shows that self-employed individuals (2.221) have on average a more positive perception of their mental and emotional health condition compared to wage workers (1.929). The difference in mental health perception between the self-employed and wage workers is significantly different from zero ($p < 0.01$). Moreover, the self-employed in the sample are slightly less likely to report depressive symptoms (0.107 vs. 0.120). Though, this mean difference is insignificant at the ten per cent significance level. As expected, wage workers receive on average more support from their total social network and have a somewhat lower sense of efficacy in carrying out goals than wage workers. Nevertheless, none of these mean differences in social support and self-efficacy for individuals in self-employment and wage work are significantly different from zero. Regarding the three measures for the mediator, table 1 reveals that, although the self-employed score marginally lower on the subjective stress scale, they have on average a higher systolic blood pressure and higher level of cortisol production compared to wage workers.[8] Only the t-test for saliva cortisol renders a p-value smaller than 0.01. Observing the control variables, the self-employed in the current sample are, in line with a study by Simoes et al. (2015), more often older ($p < 0.01$), male ($p < 0.10$), married ($p < 0.10$) and have more children than wage workers ($p < 0.01$). Furthermore, while individuals in wage work more regularly hold positions in administrative support ($p < 0.01$) and professional specialty ($p < 0.01$) like doctors, teachers and engineers, the self-employed are in particular more likely to work as an executive, administrative, manager ($p < 0.01$) or sales person ($p < 0.01$).

[8] It is important to note that the standard deviations are relatively high for the Perceived Stress Scale, systolic blood pressure and saliva cortisol.

Table 1 - Summary statistics for the self-employed and wage workers (mean values, standard deviations, p-values). The p-values for mean differences between the self-employed and wage workers are calculated using chi2 tests for ordinal and binary data and t-tests for continuous data.

	The Self-Employed (N=131)		Wage Workers (N=548)		
Variable	**Mean**	**S.D.**	**Mean**	**S.D.**	**P-value for mean difference**
Self-evaluated mental/emotional health (0-3)	2.221	0.825	1.929	0.840	0.002
CES-D Depression Scale (0 = No depress. sympt.; 1= Depress. sympt.)	0.107	0.310	0.120	0.326	0.665
Moderators					
Social Support (0-20)	12.059	3.313	14.357	2.790	0.270
Self-efficacy (0-7)	5.935	0.927	5.809	0.992	0.190
Mediators					
Perceived Stress Scale (0-50)	21.527	6.032	21.728	6.013	0.734
Systolic blood pressure (mmHg)	130.115	16.972	129.318	16.398	0.620
Saliva cortisol (nmol/L)	12.351	9.183	10.373	6.653	0.005
Controls					
Age (years)	56.031	10.131	50.555	9.211	<0.001
Gender (0 = Female; 1= Male)	0.565	0.498	0.476	0.500	0.068
Marital status:					
Married	0.794	0.406	0.712	0.453	0.058
Separated/Never married	0.038	0.192	0.131	0.338	0.003
Divorced/Widowed	0.168	0.375	0.157	0.364	0.757
Number of children	2.733	1.543	2.248	1.654	0.002
Profession:					
Executive, administrative and managerial	0.374	0.486	0.224	0.418	<0.001
Professional specialty	0.145	0.353	0.276	0.447	0.002
Technician, production & repair, operator, laborer, military	0.137	0.346	0.186	0.390	0.189
Sales	0.198	0.400	0.069	0.254	<0.001
Administrative support	0.031	0.173	0.141	0.348	0.001
Service	0.092	0.290	0.077	0.266	0.570
Farming, forestry, fishing and others	0.023	0.150	0.027	0.163	0.775

4.1.2. Correlation matrix

The correlation matrix is exhibited in table 2. At first, self-employment is significantly positive correlated with mental health, cortisol, age, being male, being married, and the number of children, and significantly negative with social support and the profession dummy at different significance levels. Moreover, there is a negative correlation ($p < 0.01$) between having

depressive symptoms and the self-evaluated mental/emotional health of an individual. The moderators show significant positive relations with self-evaluated mental health and significant negative relations with the probability of having depressive symptoms. They also have a marginal but significant ($p < 0.05$) positive relationship together. In line with the expectations, the Perceived Stress Scale is significant negatively correlated with the perceived mental/emotional health of an individual and positively related to the CES-D Depressive Scale at the one per cent significance level. Additionally, the matrix reveals a significant negative correlation between PSS and the moderators. Nevertheless, contrary to the expected, the PSS has an insignificant correlation with self-employment and also the objective mediators (cortisol and blood pressure) show no (or weak) significant correlation with the health measures. Regarding the control variables, all controls are significantly correlated with self-employment. Though, only age, marital status and profession have any correlation with the health outcome variables. Unsurprisingly, the systolic blood pressure and the number of children are positively associated with the age of an individual. Furthermore, being married and the number of children, age and the number of children, and being married and the level of social support have highly significant, positive correlations ($p < 0.01$). Overall, the strength of the inter-variable correlations does not seem of serious concern related to multicollinearity.

4.2. Multivariate analysis

In this section, the results of the multivariate analysis on the association between either working for a wage or in self-employment and mental health, and the roles of stress, personality characteristics and work environment in this relationship are discussed.

4.2.1. Simple regression

The simple regression investigates the direct relation between self-employment and mental health for two health measures, self-evaluated mental/emotional health and CES-D Depressive Scale. The regression output including the demographic and work-related controls is presented in table 3. The analysis using different dependent variables generates interesting findings. Whereas self-employment is significantly related at the one per cent level to self-evaluated mental/emotional health, self-employment becomes insignificant in the non-linear regression with CES-D Depressive Scale as outcome variable. In other words, the self-employed report a 0.293 ($p < 0.01$) points higher evaluation of their mental/emotional health compared to wage workers on a 4-point scale. Though, there exists no significant difference in the probability of reporting clinical depressive symptoms between individuals in

wage work and self-employment. The discrepancy in findings for the two outcome variables may be caused by some cognitive biases related to questionnaires. Whereas the condition of self-evaluated mental/emotional health is questioned in general, respondents are asked to answer questions regarding depressive symptoms based only on the past week. This is known as the 'starting time' bias (Choi and Pak, 2004). The probability of depressive symptoms in one particular week may be similar for the self-employed and wage workers, while the self-employed generally rate their mental/emotional health better. Therefore, it is relevant to know for what time period above average depressive symptoms are present. To check whether the contradictory findings are the result of a starting time bias, this study examines an alternative measure of depression, which asks respondents whether there was a time during the past 12 months that he/she felt sad, blue or depressed for two weeks or more in a row.[9] Still, using this alternative time frame, the self-employed and wage workers do not report significantly different depressive feelings. Hence, the findings of the current study partly confirm hypothesis 1. Although the self-employed and wage workers do not differ in their evaluation of depressive symptoms, in general individuals in self-employment report better mental health.

Regarding the direction and significance of the control variables in the simple regression, age is as expected significant positively related to self-evaluated mental health ($p < 0.1$) and significant negatively to the CES-D Depression Scale ($p < 0.05$). Additionally, table 3 shows that divorced and widowed individuals rate their mental health significantly lower ($p < 0.1$) and experience more depressive symptoms compared to married individuals ($p < 0.01$). It is likely that these negative effects on mental health are partially explained by the theory of life events with divorcement and loss of partner as the detrimental incidents. Furthermore, in the linear regression, compared to the Executive, Administrative and Managerial profession, individuals occupied in Professional specialty ($p < 0.1$), Technician, Production & Repair ($p < 0.01$), Operator, Laborer, Military and Service ($p < 0.01$) report significantly lower mental health ratings. Noteworthy, these professions correspond with those that are dominated by wage work as demonstrated in table 1 on summary statistics. Gender and number of children appear to have no significant relation with mental health.

[9] Regression results are presented in table A2 of Appendix 3.

Table 2 - Correlation matrix with Pearson and Spearman correlations and 0.01*, 0.05** and 0.10* significance levels.[10][11][12]**

Variable	SE	MH	CESD	SS	SE	PSS	BP	CR	Age	GD	MS	Child	Prof
Mental health	0.137***	1.000											
	(0.000)												
CESD	-0.017	-0.264***	1.000										
	(0.666)	(0.000)											
Social support	-0.299***	0.071*	-0.163***	1.000									
	(0.000)	(0.063)	(0.000)										
Self-efficacy	0.051	0.243***	-0.140***	0.088**	1.000								
	(0.187)	(0.000)	(0.000)	(0.023)									
PSS	-0.013	-0.386***	0.529***	-0.180***	-0.340***	1.000							
	(0.731)	(0.000)	(0.000)	(0.000)	(0.000)								
Blood pressure	0.019	0.060	-0.066*	-0.037	0.029	-0.051	1.000						
	(0.620)	(0.120)	(0.086)	(0.334)	(0.446)	(0.188)							
Cortisol	0.108***	0.008	0.008	0.031	0.045	-0.069*	0.098**	1.000					
	(0.005)	(0.839)	(0.833)	(0.424)	(0.243)	(0.072)	(0.010)						
Age	0.225***	0.092**	-0.076**	-0.088**	0.029	-0.178***	0.298***	0.165***	1.000				
	(0.000)	(0.017)	(0.047)	(0.023)	(0.458)	(0.000)	(0.000)	(0.000)					
Gender	0.070*	0.035	0.023	0.006	0.000	-0.056	0.139***	0.123***	0.017	1.000			
	(0.069)	(0.367)	(0.548)	(0.876)	(0.999)	(0.146)	(0.000)	(0.001)	(0.666)				
Marital status	0.073**	0.099**	-0.094**	0.405***	-0.069*	-0.015	0.039	-0.046	-0.004	0.121***	1.000		
	(0.058)	(0.010)	(0.014)	(0.000)	(0.071)	(0.694)	(0.311)	(0.231)	(0.908)	(0.001)			
#Children	0.117***	0.040	0.007	0.066*	-0.019	-0.022	0.097**	0.004	0.254***	-0.048	0.232***	1.000	
	(0.002)	(0.299)	(0.847)	(0.087)	(0.631)	(0.571)	(0.011)	(0.912)	(0.000)	(0.217)	(0.000)		
Profession	-0.074*	0.112***	-0.017	0.069*	0.044	-0.089**	-0.064*	0.026	0.044	-0.181***	0.056	-0.021	1.000
	(0.054)	(0.003)	(0.652)	(0.074)	(0.253)	(0.021)	(0.096)	(0.499)	(0.252)	(0.000)	(0.143)	(0.579)	

[10] SE = self-employment, MH = self-evaluated mental/emotional health, CESD = CES-D Depressive Scale, SS = social support, SE = self-efficacy, PSS = Perceived Stress Scale, BP = blood pressure, CR = cortisol, GD = gender, MS = marital status, Child = number of children, Prof = profession.

[11] Pearson and Spearman correlations are used interchangeably.

[12] In order to calculate the Pearson and Spearman correlations for the categorical variables, Marital status and Profession are listed as binary variables in the correlation matrix. For Marital status, the dummy takes a value of 1 if the respondent is married and 0 otherwise. For Profession, the dummy takes a value of 1 if respondent has a position in Executive, Administrative and Managerial, Professional specialty or Administrative support and 0 otherwise.

Table 3 – Linear and probit regression results with self-evaluated health (Y1) and CES-D Depression Scale (Y2) as dependent variables.

Variables	(1) Y1	(2) Y1	(3) Y2	(4) Y2
Self-employment (0 = Wage worker; 1 = Self-employed)	0.293***	0.231***	-0.071	0.031
	(0.080)	(0.086)	(0.162)	(0.179)
Controls				
Age (years)		0.006*		-0.019**
		(0.004)		(0.008)
Gender (0 = Female; 1 = Male)		0.030		0.165
		(0.070)		(0.135)
Marital status (base: Married)				
Separated/Never married		-0.083		0.178
		(0.112)		(0.212)
Divorced/Widowed		-0.187*		0.567***
		(0.101)		(0.169)
Number of children		0.001		0.045
		(0.020)		(0.040)
Profession (base: Executive, administrative and managerial)				
Professional specialty		-0.148*		-0.107
		(0.090)		(0.189)
Technician, production & repair, operator, laborer, military		-0.289***		0.045
		(0.097)		(0.192)
Sales		-0.192		-0.201
		(0.119)		(0.249)
Administrative support		-0.127		0.130
		(0.113)		(0.224)
Service		-0.398***		-0.168
		(0.139)		(0.277)
Farming, forestry, fishing and others		-0.272		0.187
		(0.248)		(0.384)
Constant	1.929***	1.795***	-1.173***	-0.509
	(0.036)	(0.191)	(0.069)	(0.398)
Observations	679	679	679	679
R-squared	0.019	0.053		

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 - Linear and probit moderation results with self-evaluated mental/emotional health (Y1) and CES-D Depression Scale (Y2) as dependent variables.

Variables	(1) Y1	(2) Y1	(3) Y1	(4) Y2	(5) Y2	(6) Y2
Self-employment (0 = Wage worker; 1 = Self-employed)	0.786**	0.738	1.137**	0.390	-0.392	-0.372
	(0.337)	(0.527)	(0.568)	(0.650)	(1.013)	(1.178)
Moderators						
Social support (0-20)	0.042***		0.030**	-0.089***		-0.078***
	(0.014)		(0.014)	(0.026)		(0.026)
Self-efficacy (0-7)		0.210***	0.199***		-0.245***	-0.219***
		(0.038)	(0.038)		(0.069)	(0.070)
Social support x Self-employment	-0.037		-0.032	-0.057		-0.058
	(0.025)		(0.025)	(0.055)		(0.054)
Self-efficacy x Self-employment		-0.088	-0.078		0.079	0.144
		(0.087)	(0.089)		(0.173)	(0.177)
Controls						
Age (years)	0.007*	0.006*	0.007*	-0.022***	-0.020**	-0.022***
	(0.004)	(0.004)	(0.004)	(0.008)	(0.008)	(0.008)
Gender (0 = Female; 1 = Male)	0.029	0.021	0.021	0.150	0.192	0.178
	(0.070)	(0.069)	(0.068)	(0.138)	(0.138)	(0.140)
Marital status (base: Married)						
Separated/Never married	0.032	-0.102	-0.022	-0.134	0.241	-0.044
	(0.117)	(0.114)	(0.119)	(0.224)	(0.217)	(0.228)
Divorced/Widowed	-0.088	-0.224**	-0.155	0.293	0.628***	0.377**
	(0.108)	(0.100)	(0.108)	(0.181)	(0.170)	(0.184)
Number of children	-0.001	0.002	0.000	0.046	0.045	0.047
	(0.020)	(0.019)	(0.019)	(0.041)	(0.041)	(0.042)
Profession (base: Executive, administrative and managerial)						
Professional specialty	-0.169*	-0.109	-0.126	-0.077	-0.143	-0.103
	(0.090)	(0.088)	(0.089)	(0.195)	(0.191)	(0.196)
Technician, production & repair, operator, laborer, military	-0.289***	-0.245**	-0.247**	0.034	-0.014	-0.012
	(0.098)	(0.096)	(0.096)	(0.197)	(0.197)	(0.200)
Sales	-0.187	-0.165	-0.163	-0.222	-0.231	-0.246
	(0.119)	(0.116)	(0.116)	(0.263)	(0.255)	(0.268)
Administrative support	-0.118	-0.081	-0.077	0.078	0.075	0.042
	(0.112)	(0.109)	(0.109)	(0.224)	(0.224)	(0.225)
Service	-0.409***	-0.364**	-0.373***	-0.130	-0.209	-0.168
	(0.138)	(0.142)	(0.141)	(0.279)	(0.282)	(0.283)
Farming, forestry, fishing and others	-0.264	-0.095	-0.100	0.105	-0.114	-0.148
	(0.249)	(0.194)	(0.199)	(0.379)	(0.378)	(0.375)
Constant	1.135***	0.556*	0.158	0.960*	0.915	2.053***
	(0.291)	(0.295)	(0.334)	(0.528)	(0.568)	(0.639)
Observations	679	679	679	679	679	679
R-squared	0.066	0.104	0.110			

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2.2. Moderation

Table 4 shows the results from the moderation model including demographic and work-related control variables. Output is presented for regression models including the moderators individually and together for the two dependent variables. At first, noteworthy, when including the moderators to the regressions in table 4, the coefficient of self-employment increases considerably (in some cases by three times its value from the simple regression in table 3) and standard errors become extremely large, while the independent remains insignificant in (2), (4), (5) and (6). This suggests collinearity between the moderators and self-employment. The Variance Inflation Factor (VIF) detection tool presented in table 5 affirms the concern about multicollinearity. The variable for self-employment and the two interactions of self-employment with the moderators have high VIF values that exceed the rule of thumb value of 10. Only two, six and two per cent respectively of their effect on the dependent is independent of other predictors in the regression. Since the interaction terms and self-employment are related, the high VIF values are not completely unexpected. Still, the multicollinearity should be kept in mind when interpreting the results from table 4.

Table 5 - VIF of model (3) from table 4 with self-evaluated mental/emotional health as dependent variable.

Variable	VIF	1/VIF
Self-employment	52.18	0.02
Moderators		
Social support	1.89	0.53
Self-efficacy	1.27	0.79
Social support x Self-employment	16.35	0.06
Self-efficacy x Self-employment	42.64	0.02
Controls		
Age	1.16	0.86
Gender	1.18	0.85
Marital status:		
Separated/Never married	1.37	0.73
Divorced/Widowed	1.29	0.77
Number of children	1.23	0.82
Profession:		
Professional specialty	1.59	0.63
Technician, production & repair, operator, laborer, military	1.45	0.69
Sales	1.25	0.80
Administrative support	1.40	0.71
Service	1.26	0.79
Farming, forestry, fishing and others	1.11	0.90
Mean VIF	8.04	

The results from table 4 show that while the moderators separately are significant and have the proposed sign[13] for both outcome variables in all six regressions, the interactions with self-employment are in none of the regression models significant. Hence, it seems that social support and self-efficacy do not function as moderators in the relationship between self-employment and mental health, but are rather confounders. A confounder is a variable related to the independent and dependent variables that falsely obscures or accentuates the relationship between them (Meinert, 1986) but does not lie on the causative pathway. Social support and self-efficacy plausibly confound the positive relationship between self-employment and mental health from the simple regression. As explained in the Theoretical Framework and indicated by the correlation matrix (table 2), the self-employed are likely to receive lower social support and to have higher levels of self-efficacy. Plus, individuals with lower levels of social support and self-efficacy likely feel mentally unhealthier.

Thus, the findings of the present study do not support hypotheses 2 (a) and 2 (b). Social support and self-efficacy do not significantly moderate the strength of the association between self-employment and mental health in the models. Instead of moderators, social support and self-efficacy act as confounders in the main relationship under study.

4.2.3. Mediation

Table 8 shows the results regarding the mediation effect of stress in the relationship between self-employment and mental health (H3 (c)). The direct relations between self-employment and stress (H3 (a), table 6) and stress and mental health (H3 (b), table 7) for multiple measurement variables are discussed before the current study turns to the mediation model.

4.2.3.1. Self-employment and stress

The examination of the link between self-employment and stress measured by the Perceived Stress Scale, the systolic blood pressure level and the saliva cortisol level discloses remarkable results. Table 6 shows that the self-employed do not report significantly different levels of stress. In contrast, regression results using objective measures of body processes and mechanisms that are associated with stress produce significant relations with the self-employment measure. As expected, the systolic blood pressure of the self-employed is 3.010 units ($p < 0.1$) lower than the blood pressure of wage workers. However, at the same time, the saliva cortisol level is 1.719 nmol/L ($p < 0.1$) higher for self-employed individuals compared to individuals in wage work. In other words, although the self-employed report

[13] Since the outcome variables self-evaluated mental/emotional health and the CES-D Depression Scale are reversed coded (e.g. mentally ill-healthy, mentally healthy-ill), the coefficients have the expected, but opposite signs.

levels of stress similar to wage workers, their blood pressure is lower but they produce more stress hormone. Thus, hypothesis 3 (a) is only partly confirmed.[14]

Table 6 - Linear regression results for the direct effect of self-employment on the Perceived Stress Scale (PSS) / the systolic blood pressure (BP) / the saliva cortisol (CR).

	(1)	(2)	(3)
Variables	**PSS**	**BP**	**CR**
Self-employment (0 = Wage worker; 1 = Self-employed)	0.489	-3.010*	1.719*
	(0.624)	(1.623)	(0.934)
Controls			
Age (years)	-0.120***	0.534***	0.113***
	(0.025)	(0.063)	(0.044)
Gender (0 = Female; 1 = Male)	-0.784	4.041***	2.047***
	(0.485)	(1.229)	(0.607)
Marital status (base: Married)			
Separated/Never married	-0.169	1.669	-0.100
	(0.753)	(2.114)	(0.847)
Divorced/Widowed	0.478	-2.868*	1.591
	(0.706)	(1.691)	(1.018)
Number of children	0.071	0.504	-0.319*
	(0.146)	(0.453)	(0.180)
Profession (base: Executive, administrative and managerial)			
Professional specialty	0.610	-3.783**	1.587*
	(0.666)	(1.719)	(0.835)
Technician, production & repair, operator, laborer, military	1.660**	0.778	0.469
	(0.661)	(1.903)	(0.817)
Sales	1.691*	-0.005	-0.433
	(0.874)	(2.125)	(0.972)
Administrative support	0.734	0.370	1.157
	(0.868)	(2.406)	(0.960)
Service	0.716	2.492	-0.178
	(0.933)	(2.478)	(0.817)
Farming, forestry, fishing and others	1.888	-3.782	-0.088
	(1.556)	(2.551)	(1.152)
Constant	27.135***	100.260***	3.503
	(1.341)	(3.417)	(2.205)
Observations	679	679	679
R-squared	0.048	0.129	0.067

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

[14] Mind that the p-values in the regressions with saliva cortisol and systolic blood pressure are relatively high. The coefficient for self-employment is in both regressions only significant at a 10 per cent significance level.

The Allostatic Load Model (ALM) of stress response (McEwen, 1998a) may explain the contrary findings for the three outcome variables. The ALM model assumes that various stress adaptation systems interact in complex and nonlinear ways and that there is a temporal sequence to the systematic activities. In the process, cortisol production is part of the primary phase that under chronic activation leads to changes in blood pressure in the secondary phase (Ganster and Rosen, 2013). In the current study, determination of the minimum dysregulation of cortisol production and blood pressure required to conclude stress lacks. The relevant question is at what level should cortisol and blood pressure be and for what period of time to argue that an individual feels stressed. Right now, the values are only measured at a different moment in time with no correction for time fluctuations and individual differences. Hence, the betas of the stress-mediators may have opposing signs.

4.2.3.2. Stress and mental health

Table 7 presents the results regarding hypothesis 3 (b). As can be seen from the table, the Perceived Stress Scale is significantly associated with self-evaluated health and the CES-D Depression Scale. When the Perceived Stress Scale score increases by one unit, individuals decrease their evaluation of mental health by 0.055 units ($p < 0.01$). Besides, holding all other variables constant, a one-unit increase in the Perceived Stress Scale score increases the probability of clinical significant depression symptoms on average by 0.022 percentage points ($p < 0.01$). In contrast, the regressions with blood pressure and cortisol as predictors do not generate significant results in any of the cases. In other words, the objective indicators of stress (e.g. higher cortisol and high blood pressure) are in the current sample not related to lower mental health evaluation and higher probability of clinical depressive symptoms. Accordingly, this study only finds partial support for hypothesis 3 (b). A similar explanation for the opposing findings as in section 4.2.3.1 applies here. Since it is unclear what levels of cortisol and blood pressure match stressed individuals, it might be hard for people to relate the body tensions to perceived beliefs about mental health and depressive feelings.

4.2.3.3. Mediation model

The mediation regression model investigates the role of stress as mediator in the relationship between self-employment and mental health. The regression output is displayed in table 8. The outcome variable CES-D Depression Scale is here treated as a continuous. Whereas in section 4.2.3.1 and 4.2.3.2 the coefficients of the mediator and the dependents are tested separately in regression analyses, the indirect effect of self-employment via stress on mental health is examined here. The Sobel tests (Aroian version) for all estimated regression models generate the same conclusion: contrary to hypothesis 3 (c), there exist no significant

mediation of stress in the relationship between self-employment and mental health. In line with the results of section 4.2.1 (table 3), there is only a significant direct effect of self-employment on the self-evaluated mental/emotional health.

Table 7 - Linear and probit regression results for the direct effect of stress on self-evaluated mental/emotional health (Y1) / CES-D Depression Scale (Y2).

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**Y1**	**Y1**	**Y1**	**Y2**	**Y2**	**Y2**
Perceived Stress Scale (0-50)	-0.055***			0.196***		
	(0.005)			(0.018)		
Systolic blood pressure (mmHg)		0.002			-0.006	
		(0.002)			(0.004)	
Saliva cortisol (nmol/L)			0.002			0.003
			(0.004)			(0.009)
Controls						
Age (years)	0.002	0.007*	0.008**	0.002	-0.017**	-0.019***
	(0.003)	(0.004)	(0.004)	(0.009)	(0.008)	(0.007)
Gender (0 = Female; 1 = Male)	-0.007	0.026	0.031	0.401**	0.186	0.158
	(0.065)	(0.071)	(0.071)	(0.202)	(0.137)	(0.135)
Marital status (base: Married)						
Separated/Never married	-0.115	-0.108	-0.103	0.277	0.190	0.178
	(0.104)	(0.113)	(0.112)	(0.274)	(0.212)	(0.211)
Divorced/Widowed	-0.171*	-0.189*	-0.199*	0.618***	0.552***	0.562***
	(0.096)	(0.101)	(0.102)	(0.218)	(0.169)	(0.170)
Number of children	0.007	0.001	0.003	0.010	0.048	0.046
	(0.018)	(0.020)	(0.020)	(0.050)	(0.040)	(0.040)
Profession (base: Executive, administrative and managerial)						
Professional specialty	-0.155*	-0.176**	-0.188**	-0.362	-0.133	-0.115
	(0.080)	(0.088)	(0.088)	(0.247)	(0.188)	(0.187)
Technician, production & repair, operator, laborer, military	-0.230**	-0.320***	-0.318***	-0.089	0.043	0.041
	(0.093)	(0.097)	(0.096)	(0.257)	(0.192)	(0.191)
Sales	-0.069	-0.165	-0.165	-0.675**	-0.205	-0.194
	(0.117)	(0.121)	(0.121)	(0.319)	(0.247)	(0.247)
Administrative support	-0.146	-0.182	-0.182	0.029	0.124	0.121
	(0.100)	(0.112)	(0.112)	(0.295)	(0.220)	(0.221)
Service	-0.364***	-0.410***	-0.403***	-0.348	-0.162	-0.166
	(0.131)	(0.141)	(0.142)	(0.319)	(0.278)	(0.277)
Farming, forestry, fishing and others	-0.197	-0.289	-0.297	-0.158	0.172	0.188
	(0.223)	(0.247)	(0.247)	(0.615)	(0.387)	(0.383)
Constant	3.244***	1.510***	1.749***	-6.410***	0.073	-0.528
	(0.218)	(0.282)	(0.192)	(0.726)	(0.561)	(0.395)
Observations	679	679	679	679	679	679
R-squared	0.189	0.045	0.043			

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 - Linear mediation results with self-evaluated mental/emotional health (Y1) and CES-D Depressive Scale (Y2) as dependent variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	**Y1**	**Y1**	**Y1**	**Y2**	**Y2**	**Y2**
Self-employment (0 = Wage worker; 1 = Self-employed)	0.258***	0.240***	0.229***	-0.008	0.003	0.005
	(0.079)	(0.086)	(0.087)	(0.028)	(0.033)	(0.034)
Perceived Stress Scale (0-50)	-0.055***			0.029***		
	(0.005)			(0.002)		
Systolic blood pressure (mmHg)		0.003			-0.001	
		(0.002)			(0.001)	
Saliva cortisol (nmol/L)			0.001			0.001
			(0.005)			(0.002)
Controls						
Age (years)	-0.000	0.005	0.006*	-0.000	-0.003**	-0.004**
	(0.003)	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)
Gender (0 = Female; 1 = Male)	-0.013	0.019	0.028	0.050**	0.032	0.026
	(0.063)	(0.069)	(0.070)	(0.023)	(0.027)	(0.027)
Marital status (base: Married)						
Separated/Never married	-0.092	-0.088	-0.083	0.040	0.037	0.035
	(0.101)	(0.110)	(0.110)	(0.036)	(0.043)	(0.043)
Divorced/Widowed	-0.160*	-0.178*	-0.188**	0.105***	0.116***	0.118***
	(0.084)	(0.092)	(0.092)	(0.030)	(0.036)	(0.036)
Number of children	0.005	-0.000	0.001	0.006	0.009	0.009
	(0.020)	(0.021)	(0.021)	(0.007)	(0.008)	(0.008)
Profession (base: Executive, administrative and managerial)						
Professional specialty	-0.115	-0.137	-0.150	-0.039	-0.025	-0.022
	(0.084)	(0.092)	(0.092)	(0.030)	(0.036)	(0.036)
Technician, production & repair, operator, laborer, military	-0.197**	-0.291***	-0.290***	-0.035	0.014	0.013
	(0.093)	(0.100)	(0.100)	(0.033)	(0.039)	(0.039)
Sales	-0.098	-0.192	-0.192	-0.078*	-0.029	-0.029
	(0.112)	(0.122)	(0.122)	(0.040)	(0.047)	(0.047)
Administrative support	-0.086	-0.128	-0.128	0.005	0.026	0.025
	(0.107)	(0.116)	(0.116)	(0.038)	(0.045)	(0.045)
Service	-0.358***	-0.405***	-0.398***	-0.055	-0.032	-0.034
	(0.121)	(0.132)	(0.132)	(0.043)	(0.051)	(0.051)
Farming, forestry, fishing and others	-0.167	-0.261	-0.272	-0.010	0.040	0.044
	(0.190)	(0.207)	(0.207)	(0.068)	(0.080)	(0.080)
Constant	3.301***	1.508***	1.791***	-0.537***	0.345***	0.244***
	(0.223)	(0.283)	(0.194)	(0.080)	(0.110)	(0.075)
Observations	679	679	679	679	679	679
R-squared	0.202	0.056	0.053	0.302	0.029	0.027

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Robustness

This section assesses the sensitivity and reliability of the estimation results from section 4 by analyzing dichotomous versions of the dependent, moderation and mediation variables, including additional controls and restricting the analysis sample. Furthermore, alternative samples are examined to check for generalizability of the findings.[15][16]

5.1. Dichotomization of variables

5.1.1. Dependent variable

For consistency across the estimation methods, the current study dichotomizes the self-evaluated mental/emotional health outcome variable to a binary measure with a median split at the original 4-point scale. The dummy takes a value of 0 if individuals rate their mental health generally low (0 = poor/fair and 1 = good) and 1 if individuals report high ratings (2 = very good and 3 = excellent). The original findings concluding higher mental health ratings for the self-employed are confirmed using this measurement form ($p < 0.01$). Whereas social support and self-efficacy still do not function as moderators, social support also looses significance as confounder ($p > 0.1$). Nothing changes regarding the conclusions about the absence of a mediation effect.

5.1.2. Moderators

This study also checks whether the conclusion about the moderation effect of social support changes when only work-related support sources are investigated. Such an investigation is relevant because these are the support sources that employers and employees can influence to achieve a healthier workforce. Again in line with the expectations, mean values of work-related support for the self-employed are lower than for wage workers (5.35 vs. 7.07; $p < 0.01$). However, the estimation results differ substantially.[17] With self-evaluated mental health as dependent, the work-related support variable (Cronbach's alpha = 0.62) still has a significant effect on the mental health rating that is similar in sign and magnitude ($p < 0.1$)

[15] It is important to keep in mind that the robustness checks are only a test for the sensitivity of the original results. No reliable, independent conclusions can be drawn with regard to these results since the number of observations for the self-employed is very limited in most cases.
[16] Regression results for section 5.1 and 5.2 are not displayed in the current paper in order to preserve space.
[17] The interaction term of self-employment and work-related support has a larger effect on mental health that is independent from other predictors (11 per cent for work-related support vs. 6 per cent for total social support (see table 5)). Still, the VIF statistics for self-employment and the interactions show concerns of multicollinearity.

and the work support interaction remains insignificant ($p > 0.5$). Nevertheless, the direct relationship between self-employment and mental health is no longer significant ($p > 0.5$). In contrast, with depressive symptoms as outcome variable, the coefficient of self-employment is for the first time positively significant ($p < 0.05$) and there is a significant negative moderation effect of work-related social support ($p < 0.05$). In other words, the probability of reporting depressive symptoms is 0.231 percentage points higher for the self-employed compared to wage workers. Though, for a self-employed individual receiving an extra unit of work-related support, the probability of depressive symptoms decreases. The difference in sign, magnitude and significance for work-related support effects are not peculiar. As Frone et al. (1992) already stated, social support from work and non-work sources potentially has asymmetric effects and should ideally be analyzed separately. Moreover, since the number of observations is relatively low (especially for the group of self-employed) due to many missing values, the results should be interpreted with caution.

Furthermore, in order to make a clearer distinction between groups of individuals with low and high levels of self-efficacy, the self-efficacy measure is transformed to a binary variable with a median split at the original 7-point scale that takes value 0 if an individual has a low level of self-efficacy (< 4) and 1 if this level is high (>= 4). For both outcome variables, the binary measure of self-efficacy does not alter the conclusions regarding the absence of moderation effect but again shows significance as confounder ($p < 0.1$). Overall, results for self-efficacy are robust to the baseline findings.

5.1.3. Mediators

For sensitivity of the findings regarding the Perceived Stress Scale, the current study uses the 4-item version of the PSS, which is a combination of questions B, D, E and J of the 10-item version used in the main analysis of section 4. The 10-item and 4-item versions are shortened forms of the original 14-item Perceived Stress Scale by Cohen (1983). Just like the 10-item version, PSS-4 has validated internal reliability (Cohen and Williamson, 1988). Consequently, the alternative perceived stress measure is a reliable variable to check the consistency of the findings. Estimation results with PSS-4 are qualitatively similar to the original estimates; PSS has a significant, negative effect on mental health evaluation ($p < 0.01$), a significant, positive effect on depression ($p < 0.01$) and is still not a significant mediator in the relationship between self-employment and mental health.

In addition, this study looks at the diastolic blood pressure instead of the systolic blood pressure as these are alternately or jointly used in previous research. Whereas the systolic pressure is the maximum pressure your heart exerts while beating, the diastolic pressure is the lowest pressure when the heart relaxes between beats. The conclusion

concerning no evidence for blood pressure as mediator stays. Besides, the effect of self-employment on the diastolic blood pressure remains negative (β = -0.469) but the magnitude of the coefficient is smaller and insignificant at the 10 per cent significance level. The insignificance does not come as a surprise. In their research, Vrijkotte et al. (2000) also find no difference in the diastolic blood pressure for high-work stressed individuals. Additionally, they mention that the diastolic pressure effects of job strain have always been less pronounced than the systolic pressure in previous studies.

For saliva cortisol, it is hard to determine the correct threshold for a binary measurement form since individual levels of cortisol vary greatly during the day; usually highest right after waking up, decreasing gradually throughout the day and reaching a low point in the late evening. The present data provides the time of the sample collection but does not say anything about the exact time after awakening. Accordingly, this study varies the thresholds of saliva cortisol for dichotomization. With a threshold of 20 nmol/L, self-employment has no significant effect on the level of cortisol anymore ($p > 0.2$). Nevertheless, when the threshold is 15 nmol/L, there is a significant positive effect found ($\beta = 0.094$; $p < 0.05$). Most importantly, in all cases, cortisol is still no significant mediator in the relationship between self-employment and mental health.

5.2. Alternative controls and restriction of the sample

5.2.1. Hours worked and full-time work

Whereas the number of hours worked is not taken into account in the main analysis due to lots of missing values, the control is included for the robustness checks. The current study examines hours worked in general and additionally restricts the sample to full time workers (> 35 hours of work a week). Qualitative analyses of many studies provide support for a positive link between hours worked and ill health (Sparks et al., 1997) as well as a stimulating effect on the probability of experiencing depression (Shields, 1999). Therefore, controlling for weekly working hours likely results in more reliable estimation results.

Contrary to other studies (Hyytinen and Ruuskanen, 2007), the current sample shows a higher average of hours worked for wage workers compared to self-employed individuals (39.88 vs. 36.15; $p < 0.01$). However, the dispersion of the estimates is greater for the self-employed (standard deviation of respectively 18.68 and 12.17). Besides, the sample restricted to full-time workers generates higher mean values for individuals in self-employment (49.39 vs. 44.53; $p < 0.01$). Although insignificant on itself in the full sample, the variable hours worked does not distort the significant relationship between self-employment and self-evaluated mental/emotional health nor the findings regarding the moderation and mediation effects. Only in the restricted sample of full-timers, the effect of hours worked on

mental health evaluation is significantly positive ($p < 0.1$). Hence, the number of hours worked only affects perception of mental health for full-time workers, but does not change the sensitivity of the estimates for self-employment.

5.2.2. Age range

In the original sample all working individuals, independent of the age, are considered. For robustness, this study limits the sample to those that are obliged by law to work (in this sample 34-67). Results remain similar in sign, magnitude and significance.

5.3. Generalizability

To check whether the relationship between self-employment and mental health holds for other countries besides the United States, the current study makes use of cross-sectional country data from the European Quality of Life Survey (EQLS) of 2011-2012. The survey is conducted by the European Foundation for the Improvement of Living and Working Conditions (Eurofound) and includes information on employment, income, education, housing, family, health, work-life balance, life satisfaction and perceived quality of society. The role of the Eurofound is to provide research-based findings and knowledge in order to assist in the development of better social, employment and work-related policies (Eurofound, 2017). For this generalizability analysis, the full sample[18] of 18,798 individuals aged 18-65+ from 34 countries and a restricted sample[19] of 4,276 respondents from 11 high-income countries with similar GDP per capita levels in 2009 are examined. Since the dataset does not provide information on stress, biomarkers, support from the social network and self-efficacy, only the sensitivity of the main relationship between self-employment and mental health is tested (H1). The regression results of this robustness check are provided in table A3 of Appendix 4. The self-evaluated mental health is in the EQLS survey measured by the continuous WHO-5 Mental Well-being Index. For the depressive severity, respondents were asked how often they felt downhearted and depressed on a 6-point scale with higher scores indicating lower depression symptoms.

The full sample consists of 13,391 wage workers and 5,407 self-employed individuals. The self-employed score on average somewhat higher for the mental well-being

[18] The following 34 European countries are included in the full sample: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Germany, Denmark, Estonia, Greece, Spain, Finland, France, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, Malta, the Netherlands, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia, United Kingdom, Turkey, Croatia, Macedonia, Kosovo, Serbia, Montenegro, Iceland.

[19] According to the World Bank and the OECD, the GDP per capita of the United States was 47,001.6 current US dollars in 2009. The seven countries with a similar (+/- 5,000) income level per capita in current US dollars are: Austria, Belgium, Germany, Finland, Ireland, the Netherlands and Sweden.

and the depressive symptoms variables, respectively 64.80 vs. 63.84 ($p < 0.01$) and 5.19 vs. 5.18 ($p > 0.10$). Estimation results from the full sample are robust to the original findings of this study. The self-employed rate their mental well-being generally 0.668 points higher than wage workers ($p < 0.05$). In line, wage workers do not experience significantly more or less depressive feelings.

The restricted sample consists of 3,060 individuals in wage work and 1,216 individuals in self-employment. The mean values for the two outcome variables are slightly higher for the self-employed; 67.82 vs. 65.59 ($p < 0.01$) for mental well-being and 5.49 vs. 5.38 ($p < 0.05$) for depression. Like the full sample, the self-employed report significantly higher mental well-being ($\beta = 1.716$, $p < 0.005$). Surprisingly, the relationship between self-employment and depression is also significant in the restricted sample ($\beta = 0.065$, $p < 0.05$), meaning the self-employed feel less often downhearted or depressed. Though, the magnitude of the self-employment coefficient is only marginal. Thus, the above supports the generalizability of the findings regarding hypothesis 1 from the MIDUS II data to European countries.

6. Limitations

The current study including moderation and mediation analyses provides deeper insight in the mechanisms underlying divergent mental health conditions for individuals in self-employment and wage work and is a valuable contribution to existing literature on self-employment, stress and health. However, there are some limitations related to the study design and data availability.

6.1. Reverse causality

The present study does not account for reverse causality problems that may be apparent in the relationship between self-employment and mental health. First of all, as mentioned in the paper of Shepherd and Patzelt (2015), there is evidence of an increased probability to choose for self-employment when people face certain health related restrictions or strive to enhance their health.[20] Individuals search for more flexibility (Wasserman, 2008) and autonomy (Heynie and Shepherd, 2011) to reduce health problems and find these needs more often in self-employment. On the other hand, the cost of poor health due to limited social security makes self-employment less feasible (Shepherd and Patzelt, 2015). Second, there is some concern of reverse causality related to the interdependency of mental and physical health, which may result in underreporting of depressive symptoms. Whereas the current study focuses on self-evaluation of mental and physical health separately, one's physiological- and psychical condition are often intertwined, forming a sort of vicious circle. Chronic psychical health problems can have detrimental effects on one's mental health, which can in turn reinforce the seriousness of the psychical health problems through a feedback loop. A paper by Goldberg (2010) finds support for a reciprocal relationship between depression and chronic physical illness. Not only do chronic physical illnesses cause higher depression rates, but depression also predates chronic physical problems. According to Goldberg, the depression associated with physical illness is less detected than depression on its own. Consequently, respondents in the current sample might not consider the former for their mental health evaluation, leading to distorted views on the prevalence of depression for the self-employed and wage workers.

[20] In their paper, Rietveld et al. (2016) control for health history to resolve the reverse causality from health to self-employment. An identical control in the present study did not qualitatively change the magnitude and significance of the self-employment coefficient in the relationship with self-evaluated mental/emotional health, so reverse causality does probably not entirely explain the main correlation.

6.2. Self-selection

Another potential issue that the current study does not control for is the endogenous selection into self-employment. It is possible that unobserved individual profiles are associated with both the self-employment and mental health measures (Yoon and Bernell, 2013). For example, healthier individuals might self-select into self-employment. If this is the case, the self-employment variable is correlated with the error term, leading to biased and inconsistent estimates. Instrumental variable or longitudinal data analyses could be used to address the potential sources of bias. Unfortunately, the data at hand does not allow for such investigations because valid and reliable instruments are not available.

6.3. Measures

It is important to mention that most measures in this study are based on self-reported data. Although self-reported data gives great insight in individuals' feelings and beliefs, one should be aware of the backsides of self-reports. In particular, for rating scales, interpretation and use of scales differ per person. Two individuals with the same opinion can still rate their mental health differently. In the worst case, this applies to entire groups of self-employed and wage workers. Moreover, response bias – the tendency to respond a certain way, regardless of actual evidence – may be a problem because admitting mental illness is still seen as a taboo by many (Corrigan and Watson, 2002). These biases might influence the results of the current study.

Beside the potential self-report biases, some of the variables also have their drawbacks. First, as mentioned in section 4, while blood pressure and cortisol are in this study only measured at one point in time, they are known to vary in a diurnal/hebdomadal rhythm (Linkowski et al., 1987) and per individual (Hinton and Burton, 1992). Only at prolonged high levels, the two variables measure chronic stress. A more effective approach would be to quantify change from a baseline condition at a prefixed point in time obtained for each respondent. However, due to the absence of the right variables and many missing values, this is not possible. Secondly, the self-computed social support variable is not optimal. A better social network measure would investigate work and non-work support sources independently and/or would apply weights to the separate support sources based on their relative importance. Though, again, the data at hand makes this impossible.

6.4. Sample

There are two main restrictions regarding the sample. The first issue concerns the rather limited size of the analysis sample (n = 679) and the group of self-employed (n = 131).

Hence, power considerations indicate that only strong effects are possible to reveal. Furthermore, the sample does not include observations on working individuals younger than 35. This might distort the results as three quarters of the mental disorders start by the mid-20s (Kessler et al., 2007).

7. Conclusion and future research

The current study examines the effect of work status on mental health for a sample of 679 American adults aged 34 to 81 of whom all are either self-employed or work for a wage. In line with expectations, the results provide evidence that the self-employed in the US generally rate their mental health better compared to wage workers, after controlling for age, gender, number of children, marital status and profession. Nevertheless, individuals in self-employment and wage work do not significantly differ in the probability of reporting depressive symptoms. Since environmental and personality characteristics play a role in the ability to take advantage of structural work features, respectively social support and self-efficacy are expected to moderate the relationship of self-employment and mental health. On the contrary, the current study does not find support for the predicted moderation effect, but instead suggests a confounding effect of social support and self-efficacy. Similarly, the hypothesized mediating role for stress using three measurements is not statistically demonstrated. Still, the significant association between self-employment and cortisol/blood pressure plus the link between perceived stress and mental health evaluation, indicate that stress should not be disregarded in the self-employment – mental health literature.

This study is a major contribution to the existing literature on self-employment and mental health because it gives insight in the underlying mechanisms using mediation and moderation analyses. Additionally, this paper is one of the first that investigates multiple measures of mental health and stress, both subjective and more objective. Despite several insignificant results, examination of the fundamental pathways of self-employment and mental health creates a fruitful base for future studies.

Future research could benefit from an increased sample size in order to avoid multicollinearity, identify significance for smaller effect sizes and ameliorate the reliability of the findings. The quality of such a sample can be even more improved when all working individuals including those below 35 that are either self-employed or working for a wage are included. Besides, a similar study design using longitudinal data is recommendable. In this way, over time changes in mental health, perceived stress, cortisol levels and blood pressure can be taken into account, correction for potential reverse causality and/or self-selection problems is possible and self-report biases can be alleviated by controlling for individual fixed effects (Hessels et al., 2017). Whereas the current study does not find a significant association between self-employment and the probability of reporting depressive symptoms, examining a set of multiple mental disorders is valuable for future research to test for potential heterogeneous outcomes. Such a set may contain more broadly defined categories like anxiety and mood disorders and the separate illnesses within these categories. As a final

suggestion, the use of domain-specific measures for social support and self-efficacy and a work-related measure for stress is recommended to maximize the likelihood of finding moderating and mediating relationships in a given domain (e.g., Bandura, 1997; Lachman, 1986).

In short, the current findings lend support to the view that self-employment may have some mental health benefits. Consequently, this study is relevant for policy makers and business managers/employers who face increasing costs related to mental illness. Both parties should realize that mental illness is a collective problem that cannot be solved by the ill individual alone. Encouraging self-employment and bringing structural, entrepreneurial changes to the corporate environment are crucial to enhance mental health. The Entrepreneurial Action Plan for 2020 by DG Enterprise and Industry of the European Commission (2015), that acknowledges the need to promote entrepreneurship, is a first step in the right direction. In other words, more entrepreneurship in- and outside corporations could be instrumental for a healthier future society.

8. Reference list

Allport, G.W. (1958). Personality: Normal and abnormal. *Sociological Review,* V. 6, pp. 167-180.

Andersson, P. (2008). Happiness and health: Well-being among the self-employed. *Journal of Socio-Economics*, V. 37, pp. 213–236.

Argyris, C. (1951). *Personality Fundamentals for Administrators.* New Haven, Connecticut: Yale Labor Management Center.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, New Jersey: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The Exercise of Control.* New York: Freeman.

Banks, M.H., Clegg, C.W., Jackson, P.R., Kemp, N.J., Stafford, E.M., and Wall, T.D. (1980). The use of the General Health Questionnaire as an indicator of mental health in occupational studies. *Journal of Occupational Psychology*, V. 53, pp. 187-194.

Baron, R.A., Franklin, R.J.m and Hmieleski, K.M. (2013). Why Entrepreneurs Often Experience Low, Not High, Levels of Stress: The Joint Effects of Selection and Psychological Capital. *Journal of Management*, V. 42, pp. 742-768.

Baron, R.M., and Kenny, D.A. (1986). The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, V. 51, pp. 1173–1182.

Blanchflower, D.G. (2004). Self-employment: More may be better. *Swedish Economic Policy Review,* V. 11, pp. 15-74.

Bourbonnais, R., Brisson, C., Moisan, J., and Vézina, M. (1996). Job strain and psychological distress in white-collar workers. *Scandinavian Journal of Work, Environment and Health*, V. 22, pp. 139-145.

Bradley, D.E., and Roberts, J.A. (2004). Self-Employment and Job Satisfaction: Investigating the Role of Self-Efficacy, Depression, and Seniority. *Journal of Small Business Management,* V. 42, pp. 37-58.

Bromet, E.J., Dew, M.A., Parkinson, D.K., and Schulberg, H.C. (1988). Predictive effects of occupational and marital stress on the mental health of a male workforce. *Journal of Organizational Behavior*, V. 9, pp. 1–13.

Björgvinsson, T., Kertz, S.J., Bigda-Peyton, J.S., McCoy, K.L., and Aderka, I.M. (2013). Psychometric Properties of the CES-D-10 in a Psychiatric Sample. *American Psychological Association, Society for Clinical Psychology,* V. 20, pp. 429-436.

Bjuggren, C.M., Johansson, D., and Stenkula, M. (2012). Using self-employment as proxy for entrepreneurship: some empirical caveats. *International Journal of Entrepreneurship and Small Business*, V. 17, pp. 290–303.

Bloom, D.E., Ca ero, E.T., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L.R., Fathima, S., Feigl, A.B., Gaziano, T., Mowa , M., Pandya, A., Prettner, K., Rosenberg, L., Seligman, B., Stein, A., and Weinstein, C. (2011). The Global Economic Burden of Non-communicable Diseases. *World Economic Forum*, pp. 1-46.

Buttner E.H. (1992). Entrepreneurial stress: is it hazardous to your health?. *Journal of Managerial Issues*, V. 4, pp. 223–240.

Cardon, M.S., and Patel, P.C. (2015). Is stress worth it? Stress-related health and wealth trade-offs for entrepreneurs. *Applied Psychology*, V. 64, pp. 379–420.

Center for Behavioral Health Statistics and Quality. (2015). Behavioral health trends in the United States: Results from the 2014 National Survey on Drug Use and Health. *U.S. Department of Health and Human Services Publication,* pp. 1-37.

Center for Behavioral Health Statistics and Quality. (2016). Key substance use and mental health indicators in the United States: Results from the 2015 National Survey on Drug Use and Health. *U.S. Department of Health and Human Services Publication,* pp. 1-37.

Chay, Y.W. (1993). Social support, individual differences, and w ell-being: A study of small business entrepreneurs and employees. *Journal of Occupational and Organizational Psychology*, V. 66, pp. 285-302.

Cheng, S., and Chan, A.C.M. (2005). The Center for Epidemiologic Studies Depression Scale in older Chinese: thresholds for long and short forms. *International Journal of Geriatric Psychiatry,* V. 20, No, 5, pp. 465-470.
Choi, B.C.K., and Pak, A.W.P. (2005). A Catalog of Biases in Questionnaires. *Preventing Chronic Disease*, V. 2, pp. 1-13.
Cohen, J., Cohen, P., West, S.G., and Aiken, L.A. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.
Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, V. 24, pp. 385-396.
Cohen, S., and Wills, T.A. (1985). Stress, Social Support, and the Buffering Hypothesis. *Psychological Bulletin,* V. 98, pp. 310-357.
Cohen, S., and Williamson, G. (1988). *Perceived stress in a probability sample of the United States*. Newbury Park, California: Sage.
Cooper, C.L., and Cartwright, S. (1997). An intervention strategy for workplace stress. *Journal of Psychosomatic Research*, V. 43, pp. 7-16.
Corrigan, P.W., and Watson, A.C. (2002). Understanding the impact of stigma on people with mental illness. *World Psychiatry*, V. 1, pp. 16–20.
Cropley, M., Steptoe, A., and Joekes, K. (1999). Job strain and psychiatric morbidity. *Psychological Medicine*, V. 29, pp. 1411–1416.
Dahl, M.S., Nielsen, J., and Mojtabai, R. (2010). The effects of becoming an entrepreneur on the use of psychotropics among entrepreneurs and their spouses. *Scandinavian Journal of Public Health*, V. 38, pp. 857–863.
De Lange, A., Taris, T.W., Kompier, M.A.J., Houtman, I.L.D., and Bongers, P.M. (2003). "The very best of the millennium": longitudinal research and the Demand–Control–(Support) Model. *Journal of Occupational Health Psychology*, V. 4, pp. 282–305.
Ettner, S.L., and Grzywacz, J.G. (2001). Worker's Perceptions of How Jobs Affect Health: A Social Ecological Perspective. *Journal of Occupational Health Psychology*, V. 6, pp. 101-113.
European Commission. (2015). The entrepreneurship 2020 Action Plan. *DG Enterprise and Industry,* V. 1, pp. 1-28.
Fairchild, A.J., and MacKinnon, D.P. (2009). A General Model for Testing Mediation and Moderation Effects. *Prevention Science,* V. 10, pp. 87-99.
Faridi, M.Z., Chaudhry, I.S., and Malik, M.S. (2011). Why Women are Self-Employed? Empirical Evidence from Pakistan. *International Journal of Economics and Finance,* V. 3, pp. 198-207.
Fisher, C. D. (1985). Social support and adjustment to work: A longitudinal study. *Journal of Management*, V. 11, pp. 39- 53.
Folkman, S., and Moskowitz, J.T. (2004). Coping: Pitfalls and Promise. *Annual Review of Psychology*, V. 55, pp. 745-774
Fox, A. J., and Adelstein, A. M. (1978). Occupational mortality: Work or way of life?. *Journal of Epidemiology and Community Health*, V. 32, 73-78.
Fox, A. J., Goldblatt, P. O., and Jones, D. R. (1985). Social class mortality differentials: Artefact, selection, or life circumstances?. *Journal of Epidemiology and Community Health*, V. 39, pp. 1-8.
Frone, M.R., Russell, M., and Cooper, M.L. (1992). Antecedents and Outcomes of Work-Family Conflict: Testing a Model of the Work-Family Interface. *Journal of Applied Psychology,* V. 77, pp. 65-78.
Ganster, D.C., and Rosen, C.C. (2013). Work Stress and Employee Health A Multidisciplinary Review. *Journal of Management*, V. 39, pp. 1085-1122.
Geller, P.A., and Hobfoll, S.E. (1994). Gender differences in job stress, tedium and social support in the workplace. *Journal of Social and Personal Relationships*, V. 11, pp. 555-572.
Gilbert, B.A., Audretsch, D.B., and McDougall, P.P. (2004). The emergence of entrepreneurship policy. *Small Business Economics*, V. 22, pp. 313–323.

Goldberg, D. (2010). The detection and treatment of depression in the physically ill. *World Psychiatry*, V. 9, pp. 16–20.
Gove, W.R., and Geerken, M.R. (1977). The Effect of Children and Employment on the Mental Health of Married Men and Women. *Social Forces,* V. 56, pp. 66-76.
Grau R., Salanova, M., and Peiró, J.M. (2001). Moderator effects of self-efficacy on occupational stress. *Psychology in Spain*, V. 5, pp. 63-74.
Grzywazc, J.G., and Marks, N.F. (1999). Family Solidarity and Health Behaviors: Evidence From the National Survey of Midlife Development in the United States. *Journal of Family Issues,* V. 20, pp. 243-268.
Grzywazc, J.G., and Marks, N.F. (2000). Reconceptualizing the Work-Family Interface: An Ecological Perspective on the Correlates of Positive and Negative Spillover between Work and Family. *Journal of Occupational Health Psychology,* V. 5, pp. 111-126.
Grzywazc, J.G., and Marks, N.F. (2001). Social Inequalities and Exercise during Adulthood: Toward an Ecological Perspective. *Journal of Health and Social Behavior,* V. 42, pp. 202-220.
Harris, J.A., Saltstone, R., and Fraboni, M. (1999). An evaluation of the job stress questionnaire with a sample of entrepreneurs. *Journal of Business Psychology*, V. 13, pp. 447–455.
Haynie, J.M., Shepherd, D., 2011. Toward a theory of discontinuous career transition: investigating career transitions necessitated by traumatic life events. Journal of Applied Psychology, V. 96, pp. 501-524.
Hessels, J., Rietveld, C.A., and Van Der Zwan, P. (2016). Self-employment and work-related stress: The mediating role of job control and job demand. *Journal of Business Venturing,* V. 32, pp. 178-196.
Hinton, J.W., and Burton, R.F. (1992). Clarification of the concept of psychological stress ("psystress"). *International Journal of Psychosomatics,* V. 39, pp. 42-43.
Hoogendijk, W., and Rek, de W. (2017). Van Big Bang tot Burn Out: Het Grote Verhaal over Stress. *Balans,* pp. 1-256.
House, J. S. (1981). *Work stress and social support*. Reading, MA: Addison-Wesley.
Hyytinen, A., and Ruuskanen, O.P. (2007). Time use of the self-employed. *Kyklos*, V. 60, pp. 105–122.
Inter-University Consortium for Political and Social Research. (2010). National Survey of Midlife Development in the United States (MIDUS II) 2004-2006: Documentation of Psychosocial Constructs and Composite Variables in MIDUS II Project 1. *University of Wisconsin Institute on Aging,* pp.1-111.
Inter-University Consortium for Political and Social Research. (2012). National Survey of Midlife Development in the United States (MIDUS II): Biomarker Project, 2004-2009: Scales and Composite Variables in MIDUS II Project 4. *University of Wisconsin Institute on Aging,* pp.1-73.
Irwin, M., Artin, K.H., and Oxman, M.N. (1999). Screening for Depression in the Older Adult Criterion Validity of the 10-Item Center for Epidemiological Studies Depression Scale (CES-D). *American Medical Association*, V. 159, pp. 1-4.
Jahoda, M. (1958). *Current Concepts of Mental Health.* New York: Basic Books.
Jamal, M. (1997). Job stress, satisfaction, and mental health: An empirical examination of self-employed and non-self-employed Canadians. *Journal of Small Business Management*, V. 35, pp. 48–57.
Jamal, M. (2009). Self-Employment and Quality of Work and Non-work Life: A Study in Cross-Cultural Management. *Journal of Small Business and Entrepreneurship*, V. 22, pp. 455–466.
Jex, S.M., and Bliese, P.D. (1999). Efficacy Beliefs as a Moderator of the Impact of Work-Related Stressors: A Multilevel Study. *Journal of Applied Psychology,* Vol. 84, pp. 349-361.
Jex, S.M., Bliese, P.D., Buzzell, S., and Primeau, J. (2001). The Impact of Self-Efficacy on Stressor-Strain Relations: Coping Style as an Explanatory Mechanism. *Journal of Applied Psychology,* V. 86, pp. 401-409.

Johnson, J.V., and Hall, E.M. (1988). Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, V. 78, pp. 1336-1342.
Karasek, R.A. (1979). Job demands, job decision latitude, and mental strain: implications for job redesign. *Administrative Science Quarterly*, V. 24, pp. 285–308.
Karasek, R.A., and Theorell, T. (1990). *Healthy Work Stress, Productivity, and the Reconstruction of Working Life.* New York: Basic Books.
Karasek, R.A., Triantis, K.P., and Chaudhry, S.S. (1982). Coworker and supervisor support as moderators of associations between task characteristics and mental strain. *Journal of Occupational Behavior*, V. 3, pp. 181-200.
Kasl, S.V., and French, J.R.P. (1962). The Effects of Occupational Status on Physical and Mental Health. *Journal of Social Issues*, V. 18, pp. 67-89.
Kessler, R.C., Amminger, G.P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., and Ustun, T.B. (2007). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry*, V. 20, pp. 359–364.
Kuiper, N.A., and Oiinger, L.J. (1986). Dysfunctional attitudes and a self-worth contingency model of depression. *Advances in Cognitive-Behavioral Research and Therapy*, V. 5, pp. 115-142.
Lachman, E.M. (1986). Locus of Control in Aging Research: A Case for Multidimensional and Domain-Specific Assessment. *Psychology and Aging*, V. 1, pp. 34-40.
Lachman, M.E., and Weaver, S.L. (1998). The sense of control as a moderato of social class differences in health and well-being. *Journal of Personality and Social Psychology*, V. 74, pp. 763-773.
Landsbergis, P.A., Schnall, P.L., Deitz, D., Friedman, R., and Pickering, T. (1992). The patterning of psychological attributes and distress by 'job strain' and social support in a sample of working men. *Journal of Behavioral Medicine*, V. 15, pp. 379-405.
Lazarus, R.S. (1990). Theory-Based Stress Measurement. *Psychological Inquiry,* V. 1, pp. 3-13.
Lee, R.N.E. (2013). Review of the Psychometric Evidence of the Perceived Stress Scale. *Asian Nursing Research,* V. 7, pp. 1-160.
Lerner, D.J., Levine, S., Malspeis, S., and D'Agostino, R.B. (1994).Job strain and health-related quality of life in a national sample. *American Journal of Public Health*, V. 84, pp. 1580-1585.
Lewin-Epstein, N., and Yuchtman-Yaar, E. (1991). Health risks of self-employment. *Work and Occupations*, V. 18, pp. 291–312.
Light, K.C., Dolan, C.A., Davis, M.R., and Sherwood, A. (1992). Cardiovascular Responses to an Active Coping Challenge as Predictors of Blood Pressure Patterns 10 to 15 Years Later. *Psychosomatic Medicine,* V. 54, pp. 217-230.
Linkowski, P., Mendlewicz, J., Kerkhofs, M., Leclercq, R., Golstein, J., Brasseur, M., Copinschi, G., and Van Cauter, E. (1987). 24-Hour Profiles of Adrenocorticotropin, Cortisol, and Growth Hormone in Major Depressive Illness: Effect of Antidepressant Treatment. *Journal of Clinical Endocrinology and Metabolism*, V. 65, pp. 141-152.
Marmot, M.G., Adelstein, A.M., Robinson, N., and Rose, G.A. (1987). Changing social class distribution of heart disease. *British Medical Journal*, V. 2, pp. 1109-1112.
Mausner-Dorsch, H., and Eaton, W.W. (2000). Psychosocial work environment and depression: epidemiologic assessment of the Demand–Control Model. *American Journal of Public Health*, V. 90, pp. 1765–1770.
McEwen, B.S. (1998a). Protective and Damaging Effects of Stress Mediators. *The New England Journal of Medicine*, V. 338, pp. 171-179.
McEwen, B.S. (2000). The neurobiology of stress: from serendipity to clinical relevance. *Brain Research Interactive,* pp. 172-189.
Meinert, C.L. (1986). *Clinical trials: Design, conduct, and analysis*. New York: Oxford University Press.
Parker, S.C. (2009). *The Economics of Entrepreneurship,* New York: Cambridge University Press.

Parslow, R.A., Jorm, A.F., Christensen, H., Rogers, B., Strazdins, L., and D'Souza, R.M. (2004). The association between work stress and mental health: A comparison of organizationally employed and self-employed individuals. *Work and Stress*, V. 18, pp. 231–244.

Paterniti, S., Niedhammer, I., Lang, T., and Consoli, S.M. (2002). Psychosocial factors at work, personality traits and depressive symptoms: Longitudinal results from the GAZEL Study. *British Journal of Psychiatry*, V. 181, pp. 111–117.

Patzelt, H., and Shepherd, D.A., (2011). Negative emotions of an entrepreneurial career: self-employment and regulatory coping behaviors. *Journal of Business Venturing*, V. 26, pp. 226–238.

Pearlin, L.I., and Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior*, V. 19, pp. 2-21.

Preacher, K.J., Rucker, D.D., and Hayes, A.F. (2007). Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions. *Multivariate Behavioral Research*, V. 42, pp. 185-227.

Prenda, K.M., and Lachman, M.E. (2001). Planning for the future: A life management strategy for increasing control and life satisfaction in adulthood. *Psychology and Aging*, V. 16, pp. 206-216.

Pruessner, J.C., Hellhammer, D.H., and Kirschbaum, C. (1999). Burnout, Perceived Stress, and Cortisol Responses to Awakening. *Psychosomatic Medicine,* V. 61, pp. 197-204.

O'Leary, A. (1992). Self-Efficacy and Health: Behavioral and Stress-Physiological Mediation. *Cognitive Therapy and Research*, V. 16, pp. 229-245.

Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied psychological measurement,* V. 1, pp. 385-401.

Rahim, A. (1996). Stress, strain and their moderators: an empirical comparison of entrepreneurs and managers. *Journal of Small Business Management*, V. 34, pp. 46–58.

Ravesteijn, B., Van Kippersluis, H., and Van Doorslaer, E. (2013) The Contribution of Occupation to Health Inequality. *Research on Economic Inequality*, V. 21, pp. 311-332.

Rauch, A., and Frese, M. (2007). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology,* V. 16, pp. 353-385.

Roberti, J.W., Harrington, L.N., and Storch, E.A. (2006). Further Psychometric Support for the 10-Item Version of the Perceived Stress Scale. *Journal of College Counseling,* V. 9, pp. 135-147.

Robinson, P.B., and Sexton, E.A. (1994). The effect of education and experience on self-employment success. *Journal of Business Venturing*, V. 9, pp. 141-156.

Roddenberry, A. and Renk, K. (2010). Locus Of Control And Self-efficacy: Potential Mediators Of Stress, Illness, And Utilization Of Health Services In College Students. *Child Psychiatry and Human Development,* V. 41, pp. 353-370.

Rietveld, C.A., Van Kippersluis, H., and Thurik, A.R. (2016). Self-employment and Health: Barriers or Benefits?. *Health Economics*, V. 24, pp. 1302-1313.

Ruiz, J.R., Fullerton, J., Brown, C.E.L., and Schoolfield, J. (2001). Relationships of Cortisol, Perceived Stress, Genitourinary Infections, and Fetal Fibronectin to Gestational Age at Birth. *Biological Research For Nursing,* V. 3, pp. 39-48.

Schnall, P.L., Schwartz, J.E., Landsbergis, P.A., Warren, K., and Pickering, T.G. (1992). Relation Between Job Strain, Alcohol, and Ambulatory Blood Pressure. *Hypertension,* V. 19, pp. 488-494.

Schnall, P.L., Schwartz, J.E., Landsbergis, P.A., Warren, K., and Pickering, T.G. (1998). A Longitudinal Study of Job Strain and Ambulatory Blood Pressure: Results From a Three-Year Follow-up. *American Psychosomatic Society,* V. 60, pp. 697-706.

Schuster, T.L., and Kessler, R.C., and Aseltine, R.H. (1990). Supportive Interactions, Negative Interactions, and Depressed Mood. *American Journal of Community Psychology,* V. 18, pp. 423-438.

Schwarzer, R. (1997). General perceived self-efficacy in 14 Cultures. Retrieved from: http://userpage.fu-berlin.de/~health/selfscal.htm.
Shepherd, D.A., and Patzelt, H. (2015). The “heart” of entrepreneurship: The impact of entrepreneurial action on health and health on entrepreneurial action. *Journal of Business Venturing Insights*, V. 4, pp. 22-29.
Shields, M. (1999). Long working hours and health. *Health reports*, V. 11, pp. 33-48.
Simoes, N., Crespo, N., and Moreira, S.B. (2015). Individual determinants of self-employment entry: what do we really know? *Journal of Economic Surveys*, pp. 1-43.
Simon, R.W. (2002). Revisiting the Relationships among Gender, Marital Status, and Mental Health. *American Journal of Sociology*, V. 107, pp. 1065-1096.
Sobel, M.E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology*, V. 13, pp. 290–312.
Soederberg Miller, L.M. and Lachman, M.E. (2000). Cognitive performance and the role of control beliefs in midlife. *Aging, Neuropsychology, and Cognition*, V. 7, pp. 69-85.
Sonnentag, S., and Fritz, C. (2006). Endocrinological Processes Associated With Job Stress: Catecholamine and Cortisol Responses to Acute and Chronic Stressors. *Emerald Group Publishing Limited*, pp. 1–59.
Sparks, K., Cooper, C., Fried, Y., and Shirom, A. (1997), The effects of hours of work on health: A meta-analytic review. *Journal of Occupational and Organizational Psychology*, V. 70, pp. 391–408.
Stansfeld, S.A. (2002). Work, personality and mental health. *British Journal of Psychiatry*, V. 181, pp. 96–98.
Stansfeld, S.A., Fuhrer, R., Head, J., Ferrie, J., and Shipley, M. (1997). Work and psychiatric disorder in the Whitehall II Study. *Journal of Psychosomatic Research*, V. 43, pp. 73–81.
Stansfeld, S.A., Fuhrer, R., Shipley, M., and Marmot, M.G. (1999). Work characteristics predict psychiatric disorder: prospective results from the Whitehall II Study. *Occupational and Environmental Medicine*, V. 56, pp. 302–307.
Steenhuis, H. (2017, May 24). De schuld van een burn-out wordt nog steeds bij de zieke gelegd. *De Verdieping Trouw,* p. 1.
Stephan, U., and Roesler, U. (2010). Comparison of entrepreneurs’ and employee’s health in a national representative sample. *Journal of Occupational and Organizational Psychology*, V. 83, pp. 717–738.
Tennant, C. (2001). Work-related stress and depressive disorders. *Journal of Psychosomatic Research*, V. 51, pp. 697–704.
Terry, D.J., Nielsen, M., and Perchard, L. (1993). Effects of work stress on psychological well-being and job satisfaction: The stress-buffering role of social support. *Australian Journal of Psychology*, V. 45, pp. 168-175.
Tetrick, L.E., Slack, K.J., Da Silva, N., and Sinclair, R.R. (2000). A Comparison of the Stress-Strain Process for Business Owners and Non-owners: Differences in Job Demands, Emotional Exhaustion, Satisfaction, and Social Support. *Journal of Occupational Health Psychology*, V. 5, pp. 464-476.
Theorell, T. (2003). To be able to exert control over one's own situation: a necessary condition for coping with stressors. *American Psychological Association*, pp. 201–219.
Torres, O. (2012) *La Santé du Dirigeant: de la Souffrance Patronage à l’Entrepreneuriat Salutaire.* Brussels: De Boeck.
Yoon, J., and Bernell, S.L. (2013). The effect of self-employment on health access to care, and health behavior. *Health*, V. 5, pp. 2116–2127.
Van den Berg, A.E., Maas, J., Verheij, R.A., and Groenewegen, P.P. (2010). Green space as a buffer between stressful life events and health. *Social Science Medicine*, V. 70, pp. 1203–1210.
Van der Doef, M., and Maes, S., (1999). The Job Demand–Control(–Support) Model and psychological well-being: a review of 20 years of empirical research. *Work Stress,* V. 13, pp. 87–144.
Van Eck, M.M., and Nicolson, N.A. (1994). Perceived stress and salivary cortisol in daily life. *Annals of Behavioral Medicine*, V. 16, pp. 221-227.

Vinokur, A., and Selzer, M.L. (1975). Desirable versus undesirable life events: their relationship to stress and mental distress. *Journal of Personality and Social Psychology*, V. 32, pp. 329–337.
Virtanen, M., Honkonen, T., Kivimäki, M., Ahola, K., Vahtera, J., Aromaa, A., and Lönnqvist, J. (2007). Work stress, mental health and antidepressant medication findings from the Health 2000 Study. *Journal of Affective Disorder,* V. 98, pp. 189-197.
Viswesvaran, C., Sanchez, J.I., and Fisher, J. (1999). The Role of Social Support in the Process of Work Stress: A Meta-Analysis. *Journal of Vocational Behavior,* V. 54, pp. 314-334.
Vrijkotte, T.G.M., Van Doornen, L.J.P., and De Geus, E.J.C. (2000). Effects of Work Stress on Ambulatory Blood Pressure, Heart Rate, and Heart Rate Variability. *Hypertension,* V. 35, pp. 880-886.
Walen, H.R., and Lachman, M.E. (2000). Social support and strain from partner, family and friends: Costs and benefits for men and women in adulthood. *Journal of Social and Personal Relationships,* V. 17, pp. 5-30.
Wang, J. (2005). Work stress as a risk factor for major depressive episode(s). *Psychological Medicine*, V. 35, pp. 865–871.
Wasserman, N. (2008). The founder's dilemma. *Harvard Business Review*, V. 86, pp. 102–109.
Wolford, J.A. (1964). Mental Health and Occupation. *Public Health Reports,* V. 79, pp. 979-984.
World Health Organization. (2017). Gender Disparities in Mental Health. *Department of Mental Health and Substance Dependence*, pp. 1-25.
Zhang, W., O'Brien, N., Forrest, J.I., Salters, K.A., Patterson, T.L., Montaner, J.S.G., Hogg, R.S., and Lima, V.D. (2012). Validating a Shortened Depression Scale (10 Item CES-D) among HIV-Positive People in British Columbia, Canada. *PLoS ONE,* V. 7, pp. 1-5.

Appendix 1 – Detailed variable description

Table A1 - Detailed variable list.

Name	Description
Self-evaluated mental/emotional health	Perceived mental/emotional health, 4-point scale ordinal variable, 0 = poor/fair; 1 = good; 2 = very good; 3 = excellent
CES-D Depression Scale	Depressive symptoms measure, binary variable, 0 = no depressive symptoms; 1 = clinical depressive symptoms, based on measure of the Center for Epidemiologic Studies
Self-employment	Work status, binary variable, 0 = wage worker; 1 = self-employed
Social Support	Total support from social network, summation of means of 5 support sources: 4-point family/spouse/friends scales and 5-point supervisor/coworkers scales, scores recoded
Self-efficacy	7-point Personal Mastery scale, ordinal variable, scores calculated based on mean across 4 items, 1 = strongly agree; 2 = somewhat agree; 3 = a little agree; 4 = neither agree nor disagree; 5 = a little disagree; 6 = somewhat disagree; 7 = strongly disagree, scores recoded
Perceived Stress Scale	5-point Perceived Stress Scale 10-item version (PSS), ordinal variable, scores calculated based on summing across 10 items, 1 = never; 2 = almost never; 3 = sometimes; 4 = fairly often; 5 = very often
Systolic Blood Pressure	Average systolic blood pressure during sitting activity in mmHg, continuous variable
Saliva Cortisol	Saliva cortisol baseline level in nmol/L, continuous variable
Age	Age of respondent at start of survey, continuous variable
Gender	Gender of respondent, binary variable, 0 = female; 1 = male
Marital Status	Current marital status, 3-point scale categorical variable, 0 = married; 1 = separated/married; 2 = divorced/widowed
Number of Children	Number of children including biological, adopted, step and foster children, continuous variable
Profession	Current profession major groups, 7-point scale categorical variable, 0 = executive, administrative and managerial; 1 = professional specialty; 2 = technician, production & repair, operator, laborer, military; 3 = sales; 4 = administrative support; 5 = service; 6 = farming, forestry, fishing and others

Appendix 2 – Scale items

1. CES-D Depression Scale [B4QCESD]: 20 items – Question 3 (a - t) "During the past week?" Coding: 1 Rarely or none of the time; 2 Some or a little of the time; 3 Occasionally or moderate amount of the time; 4 Most or all of the time.

a. I was bothered by things that usually don't bother me; b. I did not feel like eating, my appetite was poor; c. I felt that I could not shake off the blues even with the help of my family and friends; d. I felt that I was just as good as other people (R); e. I had trouble keeping my mind on what I was doing; f. I felt depressed; g. I felt that everything I did was an effort; h. I felt hopeful about the future (R); i. I thought my life had been a failure; j. I felt fearful; k. My sleep was restless; l. I was happy (R); m. I talked less than usual; n. I felt lonely; o. People were unfriendly; p. I enjoyed life (R); q. I had crying spells; r. I felt sad; s. I felt that people dislike me; t. I could not get going.

2.1. Friend Support [B1SFDSPO]: 4 items - Questions 4 (a – d). Coding: 1 A lot; 2 Some; 3 A little; 4 Not at all.

a. How much do your friends really care about you?; b. How much do they understand the way you feel about things?; c. How much can you rely on them for help if you have a serious problem?; d. How much can you open up to them if you need to talk about your worries?.

2.2. Spouse/ Partner Support [B1SSPEMP]: 6 items - Questions 11 (a – f). Coding: 1 A lot; 2 Some; 3 A little; 4; not at all.

a. How much does your spouse or partner really care about you?; b. How much does he or she understand the way you feel about things?; c. How much does he or she appreciate you?; d. How much do you rely on him or her for help if you have a serious problem?; e. How much can you open up to him or her if you need to talk about your worries?; f. How much can you relax and be yourself around him or her?.

2.3. Family Support [B1SKINPO]: 4 items - Questions 2 (a – d). Coding: 1 A lot; 2 Some; 3 A little; 4 Not at all.

a. "Not including your spouse or partner, how much do members of your family really care about you?; b. How much do they understand the way you feel about things?; c. How much can you rely on them for help if you have a serious problem?; d. How much can you open up to them if you need to talk about your worries?.

2.4. Coworker Support [B1SJCCS]: Items: 2 items - Question 30 (a, b). Coding: 1 All of the time; 2 Most of the time; 3 Sometimes; 4 Rarely; 5 Never.
a. How often do you get help and support from your coworkers?; b. How often are your coworkers willing to listen to your work-related problems?.

2.5. Supervisor Support [B1SJCSS]: 3 items - Question 30 (c, d, e). Coding: 1 All of the time; 2 Most of the time; 3 Sometimes; 4 Rarely; 5 Never.
c. How often do you get the information you need from your supervisor or superiors?; d. How often do you get help and support from your immediate supervisor?; e. How often is your immediate supervisor willing to listen to your work-related problems?.

2.6. Personal Mastery [B1SMASTE]: 4 items - Question 4 (c, f, h, l). Coding: 1 Strongly agree; 2 Somewhat agree; 3 A little agree; 4 Neither agree or disagree; 5 A little disagree; 6 Somewhat disagree; 7 Strongly disagree.
c. I can do just about anything I really set my mind to; f. When I really want to do something, I usually find a way to succeed at it; h. Whether or not I am able to get what I want is in my own hands; l. What happens to me in the future mostly depends on me.

2.7. Perceived Stress [B4QPS_PS]: 10 items – Question 4 (a – j) ”In the last month, how often have you…”. Coding: 1 Never; 2 Almost never; 3 Sometimes; 4 Fairly often; 5 Very often.
a. been upset because of something that happened unexpectedly; b. felt that you were unable to control the important things in your life; c. felt nervous and “stressed”; d. felt confident about your ability to handle your personal problems (R); e. felt that things were going your way (R); f. found that you could not cope with all the things that you had to do; g. been able to control irritations in your life (R); h. felt that you were on top of things (R); i. “been angered because of things that were outside of your control; j. felt difficulties were piling up so high that you couldn’t overcome them.

Appendix 3 – Feelings of sadness and depression for 2+ weeks

Table A2 - Regression results with feelings of sadness and depression for 2+ weeks as dependent variable.

Variables	Felt depressed
Self-employment (0 = Wage worker; 1 = Self-employed)	-0.166
	(0.162)
Controls	
Age (years)	-0.014**
	(0.006)
Gender (0 = Female; 1 = Male)	-0.258**
	(0.120)
Marital status (base: Married)	
Separated/Never married	0.309
	(0.190)
Divorced/Widowed	0.330**
	(0.153)
Number of children	-0.005
	(0.040)
Profession (base: Executive, administrative and managerial)	
Professional specialty	-0.093
	(0.165)
Technician, production & repair, operator, laborer, military	-0.105
	(0.184)
Sales	0.040
	(0.215)
Administrative support	0.070
	(0.198)
Service	0.003
	(0.218)
Farming, forestry, fishing and others	0.192
	(0.353)
Constant	-0.097
	(0.326)
Observations	678

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix 4 – Generalizability

Table A3 - Generalizability full sample (1 and 2) and restricted sample (3 and 4).

Variables	(1) Mental well-being	(2) Felt depressed	(3) Mental well-being	(4) Felt depressed
Self-employment (0 = Wage worker; 1 = Self-employed)	0.668**	-0.017	1.716***	0.065**
	(0.311)	(0.018)	(0.588)	(0.032)
Controls				
Age (years)	-1.040***	-0.032***	0.045	0.014
	(0.170)	(0.010)	(0.312)	(0.017)
Gender (0 = Male; 1= Female)	-3.173***	-0.145***	-2.235***	-0.105***
	(0.297)	(0.017)	(0.567)	(0.031)
Marital status (base: Married)				
Separated/Divorced	-3.041***	-0.324***	-4.210***	-0.304***
	(0.459)	(0.026)	(0.823)	(0.045)
Widowed/Never married	-1.015***	-0.169***	-2.598***	-0.069*
	(0.392)	(0.022)	(0.733)	(0.040)
Number of children	-0.543***	0.010	-0.748***	0.048***
	(0.156)	(0.009)	(0.285)	(0.016)
Profession (base: Manager)				
Professional	-0.403	-0.067*	-1.181	-0.020
	(0.612)	(0.035)	(1.103)	(0.060)
Technician, junior professional	-0.630	-0.135***	-0.315	-0.114*
	(0.662)	(0.038)	(1.121)	(0.061)
Clerical support	-2.087***	-0.234***	-1.229	-0.121*
	(0.649)	(0.037)	(1.151)	(0.063)
Service	-1.562**	-0.246***	-2.170*	-0.144**
	(0.632)	(0.036)	(1.116)	(0.061)
Sales	-2.508***	-0.300***	-1.445	-0.278***
	(0.697)	(0.040)	(1.320)	(0.072)
Craft and related trades	-2.955***	-0.308***	-0.309	-0.184***
	(0.657)	(0.038)	(1.263)	(0.069)
Others	-3.758***	-0.344***	-1.847	-0.124*
	(0.628)	(0.036)	(1.191)	(0.065)
Constant	71.248***	5.624***	69.383***	5.542***
	(0.800)	(0.046)	(1.430)	(0.078)
Observations	18,798	18,798	4,276	4,276
R-squared	0.016	0.026	0.020	0.029

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1