Running head: *Entrepreneurs' health*

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Health of Entrepreneurs vs. Employees in a National Representative Sample

Abstract

Prior research has found entrepreneurs to experience significantly higher job control and job demands compared with employees. This suggests that entrepreneurs have so-called active jobs and thus may benefit from positive health consequences. The present research compared entrepreneurs' health with employees' health in a national representative sample with regard to the *International Statistical Classification of Diseases and Related Health Problems*, 10th revision (ICD-10) diagnoses of somatic diseases, the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV) diagnoses of mental disorders, blood pressure, well-being (life-satisfaction) as well as behavioural health indicators (sick days, physician visits). Entrepreneurs showed significantly lower overall somatic and mental morbidity, lower blood pressure, lower prevalence rates of hypertension, and somatoform disorders, as well as higher well-being and more favourable behavioural health indicators. The results are discussed with regard to the active job hypothesis and recommendations for future research are provided.

Keywords: Entrepreneurs; Self-employed; Employees; Health; Diseases, Blood pressure; Well-being

Health of Entrepreneurs vs. Employees in a National Representative Sample

Introduction

Entrepreneurs are important for national labour markets and economies in that they contribute significantly to economic growth as well as provide the majority of jobs and create new ones (e.g., Observatory of European SMEs, 2004; OECD, 2000; van Praag & Versloot, 2007 for a review). Consequently, many current political initiatives present becoming an entrepreneur as a desirable career choice (e.g., European Commission, 2004a). They advertise the various benefits of entrepreneurship, many referring to the characteristics of the entrepreneur's job, e.g., being one's own boss means almost unlimited decision autonomy, freedom of choice in the tasks to do, time schedule flexibility, utilization and development of skills (European Commission, 2004a, 2004b). Indeed, entrepreneurs themselves mention the same aspects of their jobs when asked why they choose an entrepreneurial career (Birley & Westhead, 1994). Also, research finds entrepreneurs to have largely favourable job characteristics compared to employees (e.g. Chay, 1993; Eden, 1975; Prottas & Thompson, 2006), which should lead to positive health outcomes for entrepreneurs.

Entrepreneurs are infrequently studied in occupational health psychology compared with the large number of studies on employees. The few studies on entrepreneurs' health have yielded rather contradictory findings probably due to the variation in choice of comparison groups and the primary reliance on self-reported health. The present research aims to provide insight into entrepreneurs' health by comparing health outcomes from a nationally representative sample of entrepreneurs and employees whilst holding occupational class, age, and gender constant. Moreover, the health outcomes used included objective measures (i.e., clinically-examined blood pressure, physician-diagnosed somatic diseases, diagnosis of mental disorders based on a standardized clinical interview) as well as self-reported well-being and behavioural health indicators. In the remainder of this introduction, we will give

this study's definition of entrepreneurship, then provide an overview of research on job characteristics and health in general before combining this with research on entrepreneurs' job characteristics to develop expectations on entrepreneurs' health.

Definition of Entrepreneurship in the Present Study

A wide range of definitions of entrepreneurship exists (Davidsson, 2005; Verheul, Wennekers, Audretsch & Thurik, 2002). For instance, Hébert and Link (1989, p. 47) describe an entrepreneur as 'someone who specializes in taking responsibility for and making judgemental decisions that affect the location, form, and the use of goods, resources, or institutions'. In a broader sense and as it was used in prior studies, self-employment and business ownership are understood to be equivalent to entrepreneurship (e.g. Chay, 1993; Verheul et al., 2002). This occupational definition of entrepreneurship (i.e. entrepreneurs are people working for their own account and risk) is adopted in the present research.

Job Characteristics and Their Health Implications

Job characteristics describe external aspects of the work environment, and one of the leading models describing psychosocial job characteristics and their relation to health is the *Job-Demand-Control Model (JDCM,* Karasek, 1979; Karasek & Theorell, 1990; Theorell & Karasek, 1996). The two main dimensions of the JDCM are job control and job demands. The first dimension refers to the decision making authority that job incumbents have in their job over when and how to do their tasks as well as being able to use and develop their skills. The second dimension, psychological job demands, refers to experienced work intensity such as time pressure and conflicting demands. Job control seems to be positively and job demands negatively associated with employee health (de Lange, Taris, Kampier, Houtman & Bongers, 2003; Schnall, Landsbergis & Baker, 1994; Spector, 1986; Stansfeld, Fuhrer, Shipley & Marmot, 1999; van der Doef & Maes, 1999).

The central tenet of the JDCM, however, is that the combination of job control and demands carries important health consequences (e.g., Karasek, 1979). Firstly, the *high-strain hypothesis* states that high job demands combined with a low level of job control lead to psychological strain and ill health (Karasek, 1979; Karasek & Theorell, 1990; Theorell & Karasek, 1996). Reviews of the extensive research exploring the high-strain hypothesis in relation to various somatic health and well-being indicators typically find that roughly half the reviewed studies support the high-strain hypothesis. The other half of the studies largely yields non-significant results (de Lange et al., 2003; Belkic, Landsbergis, Schnall & Baker, 2004; Van der Doef & Maes, 1999). Based on these reviews some authors conclude that the high-strain hypothesis cannot be supported in the form of an interaction effect (high demand x low control), but acknowledge that the underlying main effects receive consistent support (Taris, 2006). Others, however, demonstrate that the varying operationalizations of the high-strain interaction lead to different results and might help to explain the partially non-significant findings (van Vegchel, de Jonge & Landsbergis, 2005, also de Lange et al., 2003).[1]

Secondly, the JDCM *active-job hypothesis* refers to a job situation characterized by both high control and high demands (as is typical for entrepreneurs, see below). The active job situation would positively challenge the job incumbent and lead to learning, the development of active coping patterns, and increased feelings of mastery, all of which inhibit future perceptions of strain as the job incumbent feels able to effectively cope with them (Karasek & Theorell, 1990; Theorell & Karasek, 1996, also Holman & Wall, 2002). The active job hypothesis remains largely under-researched with regard to learning and the development of feelings of mastery (exceptions are Holman & Wall, 2002; Taris & Kompier, 2004). Similarly, health outcomes of the active job situation have not been the focus of research. There is, however, evidence that employees in an active job situation experience better health, e.g., lower mortality rates, less atherosclerosis (a risk factor for high blood pressure and ischemia) and higher well-being (Amick, McDonough, Chang, Rogers, Pieper &

Duncan, 2002; Rosvall, Östergren, Hedblad, Isacsson, Janzon & Berglund, 2002; Tsutsumi, Kayaba, Hirokawa & Ishikawa, 2006; Wall, Jackson, Mullarkey & Parker, 1996) as well as showing more active political and leisure time engagement (Karasek & Theorell, 1990).

The JDCM postulates two more job types. Although these are not the focus of the present study and have not been the focus of research, they are mentioned for sake of completeness. The *low strain job* (high control/low demand) bears low health risks (Karasek & Theorell, 1990; Theorell & Karasek, 1996, also Amick et al., 2002). The *passive job* (low control/low demand) can be characterized as a routine or monotonous and entails health risks. Job incumbents gradually lose and unlearn skills in this job situation and experience stress reactions to monotony and meaningless work (Richter & Hacker, 1998; Karasek & Theorell, 1990). Recent research, for instance, finds exposure to passive jobs related to increased mortality rates (Amick et al., 2002).

As people spend a large amount of their waking hours at work, work-related stress resulting from unfavourable job characteristics is potentially a major source of chronic stress. The *Allostatic Load Model* (McEwen, 1998; McEwen & Stellar, 1993) provides a framework that describes how chronic stress influences health and specifies which diseases might be stress-related. The model assumes that subjective perceptions of stress caused by appraising situations as threatening lead to behavioural (e.g., fight-flight, dieting, smoking) and physiological (e.g., increased blood pressure and heart rate, increased epinephrine and cortisol levels) responses. Without sufficient time for recovery such as when exposed to chronically unfavourable job characteristics, a state of allostatic load can occur. Allostatic load describes "… the cost of chronic exposure to fluctuating or heightened neural or neuroendocrine responses" (McEwen & Stellar, 1993, p. 2093). That is, over time the behavioural and physiological responses to stress lead to wear and tear on organ systems and tissues, thereby predisposing the body to somatic disease as well as mental disorders (McEwen, 2000, 2005; McEwen & Stellar, 1993).

Typical stress-related *somatic diseases* are cardiovascular diseases (hypertension, coronary heart disease, myocardial infarction etc.), diabetes, ulceration of the gastrointestinal tract as well as diseases related to stress-related changes in the immune system, e.g. rheumatoid arthritis (McEwen, 2005; McEwen & Stellar, 1993; O'Leary, 1990). The Allostatic Load Model has also been applied to musculoskeletal disorders (Lundberg, Forsman, Zachau, Eklof, Palmerud, Melin & Kadefors, 2002). Namely, mental stress leads to increased muscle tension, which - without enough time for recovery - can cause metabolic disturbances and degenerative processes as well as muscle pain (Lundberg, et al., 2002). Furthermore, McEwen (2000) showed that the neuroendocrine changes (e.g. increases in cortisol levels) accompanying a state of allostatic load lead to structural changes in the central nervous system, which in turn seem to facilitate the development of *mental disorders*.

Applying the allostatic load model to stress at work gives an explanation as to why high-strain jobs are associated with various diseases and low well-being, because job incumbents perceive the high-strain job situation (low control/high demands) as *threatening* as they have no control over the situation. In contrast, 'activating stress' is assumed to take place in the active job situation: the high demands *challenge* the individual to engage in active problem solving, but do not lead to an appraisal of threat as the individual has high control over his/her job situation (Karasek & Theorell, 1990; Theorell & Karasek, 1996).

In line with these arguments, experimental evidence (Lundberg & Frankenhaeuser, 1980; Tomaka, Blascovich, Kelsey & Leitten, 1993) shows that subjective and physiological responses to active coping stressor situations (equivalent to an active job situation) differ from responses to passive coping stressor situations (equivalent to a high-strain job situation, i.e. low control/high demands). Subjects report enjoyment and low levels of stress in active coping situations. They also exhibit physiological reactions indicative of short-term energy mobilization (elevated epinephrine and heightened cardiac reactivity), which are found to predict fewer cases of atherosclerosis (Heponiemi, Elovainio, Raitakari, Pulkki, Puttonen &

Keltikangas-Järvinen, 2007). Subjects exposed to passive coping situations, on the other hand, report feeling threatened and distressed and exhibit physiological responses (heightened epinephrine and cortisol levels, heightened vascular reactivity) that are predictive of cardiovascular risk factors (e.g., hypertension, atherosclerosis; Treiber, Kamarck, Schneidermann, Sheffield, Kapuku & Taylor, 2003). To sum up, this evidence is consistent with the expectation of fewer health problems in active jobs, because the short-term physiological activation in the active job situation is a sign of short-term energy mobilization that discharges through action. This leads over time to a state of allostatis, i.e. a healthy dynamic balance of bodily responses, rather than chronic stress responses and allostatic load (McEwen & Stellar, 1993; also Dienstbier, 1989).

Entrepreneurs' Job Characteristics and Expected Health Consequences

Based on the JDCM, we review in this section research on entrepreneurs' job characteristics and from that derive hypotheses concerning entrepreneurs' somatic and mental health - drawing on the associations of job characteristics with health via allostatic load as discussed above.

Objectively, entrepreneurs have very high *decision authority* as they own their enterprise and control how work is organized and how resources (e.g., time, money, assets) are distributed at their workplace (e.g., Hébert & Link, 1989; Rau, Hoffmann, Metz, Richter, Roesler & Stephan, 2008). Correspondingly, research has found entrepreneurs to have high job control (high job autonomy, high job discretion, and opportunities for skill-utilization) and more so than employees (e.g., Chay, 1993; Eden, 1975; Lewin-Epstein & Yuchtman-Yaar, 1991; Parslow, Jorm, Christensen, Rodgers, Strazdins & D'Souza, 2004; Prottas & Thompson, 2006; Rau et al., 2008; Stephan, Lukes, Dej & Richter, 2005). Based on the finding that high job control is beneficial for employees' health and well-being (de Lange et al., 2003; Schnall et al., 1994; Spector, 1986; van der Doef & Maes, 1999), we would expect

that entrepreneurs experience better health compared with employees as they typically report higher job control than employees.

Moreover, most research on entrepreneurs' job characteristics finds them to report higher *job demands* and workload than employees (Chay, 1993; Eden, 1975; Rau et al., 2008; Stephan et al., 2005). Also, the number of weekly working hours is higher for entrepreneurs compared with employees (Paoli & Merllie, 2001). Hence with high job control and high job demands one could argue that entrepreneurs' jobs are the *prototypes of 'active jobs'*. Based on the active job hypothesis and the findings that entrepreneurs typically have active jobs, we expect entrepreneurs to experience better health compared with employees.

Only one empirical study (Lewin-Epstein & Yuchtman-Yaar, 1991) has explored entrepreneurs' *somatic health*. This study found higher levels of triglycerides and lower levels of high-density lipoprotein (HDL) in entrepreneurs compared with salaried employees, suggesting greater cardiovascular risk for entrepreneurs. As no national representative sample was used, it is unclear whether the results apply to the difference between entrepreneurs and employees in general.

Overall, due to the high experienced job control and the active job situation, which should keep the body in a state of allostatis (rather than allostatic load), we expect entrepreneurs to have lower prevalence rates of stress-related diseases and lower blood pressure (as a primary risk factor for cardiovascular diseases). Thus, we expect, that in a national representative sample,

Hypothesis 1a: Entrepreneurs have lower blood pressure than employees.

Hypothesis 1b: Entrepreneurs have lower prevalence rates of stress-related somatic diseases (i.e., hypertension, diabetes, gastrointestinal ulcers, rheumatoid arthritis and musculoskeletal illnesses) than employees.

Because of their high job control and the active nature of their jobs, entrepreneurs should experience less allostatic load which in turn seems to be associated with fewer *mental*

disorders and higher *well-being.* Empirical findings concerning mental health of entrepreneurs have concentrated on self-reported health and well-being, and are contradictory. Some studies report better *well-being* (Bradley & Roberts, 2004; Korunka, Frank & Becker, 1993; Subramanian, Venkatapathy & Vasudevan, 1987; Tetrick, Slack, DaSilva & Sinclair, 2000) including fewer diagnosed mental and anxiety disorders (Kawakami, Iwata, Tanigawa, Oga, Araki, Fujihara, & Kitamura, 1996) and others more health problems and health complaints in entrepreneurs compared with employees (Buttner, 1992; Jamal, 1997; Parslow et al., 2004 for women; Rau et al., 2008). Still other studies found no such differences (Chay, 1993; Eden, 1975; Lewin-Epstein & Yuchtman-Yaar, 1991; Parslow et al., 2004 for men; Prottas & Thompson, 2006; Rahim, 1996). The varying definitions of the employee comparison group, the non-representativeness of almost all samples, and the use of varying measures of health self-reports across studies make it difficult to draw conclusions. Based on the positive effect of job control on mental health and well-being as well as the propositions from the active job hypothesis we expect entrepreneurs to exhibit fewer mental disorders. Thus, we expect that in a national representative sample,

Hypothesis 2a: Entrepreneurs have lower prevalence rates of stress-related mental disorders (i.e. somatoform disorders, affective disorders, anxiety disorders and substance abuse/dependence) than employees.

Hypothesis 2b: Entrepreneurs report higher well-being (life satisfaction) than employees.

Moreover, we hypothesized that the better health of entrepreneurs (Hypotheses 1 and 2) should also be visible in behavioural indicators, thus

Hypothesis 3: Entrepreneurs report fewer sick days and physician visits than employees.

Method

Sample and Procedure

The present data derive from the *German National Health Survey 1998* (GHS, Public Use File BGS98, Stolzenberg, 2000). The GHS constitutes the first representative cross-sectional health study in unified Germany. It was conducted by the German Ministry of Health and the Robert Koch Institute. 7124 randomly chosen respondents (age: 18-79 years) took part in the core survey (this corresponds to response rate of 61.4% of the 11.601 population random sample). They completed a self-report questionnaire on health-related issues, were interviewed by physicians and went through a medical check-up (see below). The survey was conducted on 120 different sites across Germany by a trained team of investigators consisting of one physician (main task: medical interview, recording of medicine taken, blood pressure measurement, anthropometric measurement, collection of blood samples), one medical-technical assistant, one expert for nutrition, one environmental expert, and two persons mainly serving organizational functions. Further information about the sample and procedure are provided by Bellach, Knopf and Thefeld (1998), Jacobi et al. (2002, 2004), Potthoff, Schroeder, Reis and Klamert (1999) and Stolzenberg (2000).

The core survey was accompanied by several additional surveys. One of them was the Mental Health Supplement (GHS-MHS), which focused on mental disorders (see below). The GHS-MHS employed a stratified sampling design resulting in a representative sample of *N*=4181 respondents aged 18-65 years. Jacobi et al. (2002, p.8-9) describe the procedure in detail. In short, the GHS general survey included a screening questionnaire for mental disorders (see Jacobi et al., 2002). All those who registered positive for the existence of any mental disorder plus a random sample of 50% of those registering negative on this screening questionnaire were included in the GHS-MHS. The conditional response rate for this stratified sample was 87.6% resulting in *N*=4181 participants[2]. Of these 4181 participants the following were excluded for the present analyses: a) those not belonging to the workforce (e.g., being

retired, students); b) shift-workers[3]; c) participants who could not be classified because of missing data for their employment status; d) assisting family members who help an entrepreneur run the business, but do not receive an official salary for doing so; e) participants working less than five years in their current job[4]. So that only 'occupationally stable' participants remained in the sample. Criterion e) was used as a proxy for exposure to similar job characteristics over time (see Belkic et al., 2004; Landsbergis, Schnall, Pickering, Warren, & Schwartz, 2003; the same number of years/exposure time was used by Hammar, Alfredsson & Theorell, 1994). This resulted in a preliminary sample of N=1264 (30.2%) of the original 4181 participants.

Of these 1264 participants 12.8% (n=149) were entrepreneurs and 88.2% (n=1115) were employees. As is common practice in representative surveys (e.g., Eden, 1975; Prottas & Thompson, 2006) entrepreneurial status was captured through one question in the GHS self-report questionnaire (Stolzenberg, 2000). Participants reporting to be self-employed (with or without employees) formed the 'entrepreneur' group. The remaining participants formed the 'employee' group. See Appendix for details.

In order to ensure comparability of entrepreneurs and employees with regard to job content, we employed a case-control design in that we matched each entrepreneur ('case') with an employee ('control') per occupational class. Occupational classes are standardized categories of the German National Occupational Classification System (the Stabu 1975, see Statistisches Bundesamt, 1975) and encompass occupations which closely resemble each other with respect to the nature of the task and activity (Statistisches Bundesamt, 1975). More specific information on job characteristics is not available within the GHS. Table 1 provides an overview of the occupational classes occurring in the present sample. Each participant reported his or her occupation in response to an open-ended question ('Which occupational activity do you currently practice?') The answers were independently classified by at least two opinion poll specialists and the maximally allowed error rate was 1% misclassifications

(H. Stolzenberg, personal communication, May 20, 2008). Moreover, as the probability of health problems increases with age and is higher for women, we matched entrepreneurs with employees of about the same age and gender within each occupational class. Controls were randomly chosen from among the gender- and age-matched employees within each occupational class. The final sample consisted of n=149 entrepreneurs and n=149 matched employees (N=298 in total), which were comparable with regard to occupational class (i.e., the nature of the occupational task and activity), age and gender (Table 1).

Please insert Table 1 about here

We compared the final sample of N=298 participants with the preliminary sample after application of the exclusion criteria (i.e. with the remaining N=966 participants). Our final sample contained significantly fewer women (Chi^2= 36.98, df=1, p<.001) and participants were on average 3 years older (t=9.91, df=1262, p<.001). There was no difference between our final sample and the remaining participants with regard to any of the health outcomes analyzed in the present research, with the exception of life satisfaction (t=2.55, df=1256, p<.05, the selected sample being slightly less satisfied with their life M=5.40 (SE=.07) vs. M=5.59 (SE=.04)). That is, we neither selected a particularly healthy nor ill sample through our matching procedure.

Measures

Blood pressure was measured three times (with intervals of at least 3 minutes) during the clinical examination. A standard clinical device (mercury column, maximum measuring tolerance $\pm$1,8mm Hg) and stethoscope was used and the measurement was carried out by intensively trained medical examiners (see above, for details Thamm, 1999). The present analyses used the average score of the three measurements.

Somatic diseases: Hypertension, gastrointestinal ulcers, diabetes, rheumatoid arthritis, lower back pain and shoulder/neck pain were first self-reported by participants. Subsequently,

trained physicians validated this information in a standardized medical interview supported by laboratory tests (see above) resulting in ICD-10 diagnoses of somatic diseases. The present analyses included major diseases that have been shown to be associated with stress (see introduction) and that had sufficiently high prevalence rates to warrant analysis. We also included a summary measure, somatic morbidity, which captures whether the participant had been diagnosed with any somatic disease. It thus conveys information about a participant's overall somatic health.

Mental disorders were assessed by trained interviewers (psychologists and physicians) with the DIA-X-Munich Composite International Diagnostic Interview - a standardized clinical interview with established psychometric properties (DIA-X-M-CIDI; Wittchen, 1994; Wittchen & Pfister, 1997, Wittchen, Lachner, Wunderlich, & Pfister, 1998). This procedure resulted in standard diagnoses of major mental disorders according to DSM-VI criteria: 12-month diagnoses for somatoform disorders (pain disorder, somatisation disorder, hypochondrias, and undifferentiated somatoform disorder), affective disorder (major depression and dysthymia), anxiety disorders (panic disorder, phobias, generalized anxiety disorder, obsessive-compulsive disorder) and alcohol abuse or dependence. Moreover, we report the lifetime diagnosis of any mental disorder ('mental morbidity').

Well-being (life-satisfaction). Participants reported their life satisfaction in the GHS self-report questionnaire on health related issues in response to a single item, i.e. the 7-point Kunin-faces scale. Albeit not ideal, single items have been shown to capture satisfaction adequately (Wanous, Reichers & Hudy, 1997).

Behavioural health indicators. The number of physician visits and sick days were self-reported by the participants and confirmed in the interview with the physician. The participant reported whether or not he or she had been seeing any kind of physician (excluding dentists) within the past 12 months. Sick days were assessed by asking the respondent how many days

within the past 12 months he or she had not been able to undertake occupational tasks due to being ill.

Statistical Analyses

Data were weighted before statistical analyses to ensure representativeness – as is typically done in epidemiological research (e.g., Munce, Weller, Robertson, Blackmore, Heinmaa, Katz & Stewart, 2006; Jacobi et al., 2002). Due to the weighting procedure the sample size reported for statistical analyses differs from the sample size reported when describing the sample in the methods section above (see Munce et al., 2006 for the same procedure).

Body mass index (BMI) was included as a covariate when analyzing blood pressure and hypertension as it is a risk factor for high blood pressure (Pickering, 1991) and a prior study found entrepreneurs and employees to differ with regard to BMI (Lewin-Epstein & Yuchtman-Yaar, 1991). The effects remained the same when repeating the analysis of blood pressure and hypertension without controlling for BMI.

Results

To test Hypothesis 1a (*blood pressure*), we conducted multivariate analysis of covariance (MANCOVA) as systolic and diastolic blood pressure are highly interrelated. Body mass index was included as the covariate. Partial eta-square (η_p^2) was calculated to determine the effect size for the association between employment type (entrepreneur vs. employee) and blood pressure. Entrepreneurs and employees differed significantly regarding blood pressure (Pillai's Trace, $F(1, 319) = 5.33$, $p = .005$, $\eta_p^2 = .033$). Univariate analyses of covariance (ANCOVAs, again controlling for body mass index) revealed that entrepreneurs had significantly lower *systolic* and *diastolic blood pressure* ($F(1, 319) = 9.34$, $p = .002$, $\eta_p^2 = .029$ and $F(1, 319) = 8.57$, $p = .004$, $\eta_p^2 = .026$, respectively) compared with employees (see Figure 1). The mean systolic and diastolic blood pressures were 133.35 mmHg (*SE*=1.36) and

84.71 mmHg (*SE*=0.75) for entrepreneurs and 139.34 mmHg (*SE*=1.41) and 87.89 mmHg (*SE*=0.78) for employees. Analyses were repeated excluding those participants taking medication to lower their blood pressure and results remained unchanged.

Please insert Figure 1 here

To test hypotheses 1b and 2a (somatic diseases and mental disorders), logistic regressions were conducted to assess the association of employment type (entrepreneur vs. employee) with the prevalence rates of *somatic diseases* and *mental disorders*. In all logistic regressions the existence of a somatic disease/mental disorder was coded with "1" (vs. 0 for no disease/disorder) and employees were the reference group (coded 0) to which entrepreneurs (coded 1) were compared. Table 2 shows the prevalence of the various diseases and disorders in the two groups (entrepreneurs and employees) along with the estimated odds ratios.

Please insert Table 2 about here

Regarding *somatic diseases* entrepreneurs showed a lower somatic morbidity (*OR* = 0.41; *p* = .006) compared with employees and, in accordance with the results of blood pressure measurement, entrepreneurs also had a lower prevalence rate of hypertension (*OR* = 0.47; *p* = .018). In other words, entrepreneurs were 0.41 times as likely to have been suffering from at least one somatic disease during their lifetime and 0.47 times as likely to suffer from hypertension compared with employees. Entrepreneurs did not differ from employees with regard to gastrointestinal ulcers, diabetes, rheumatoid arthritis, low-back pain and shoulder/neck pain (Table 2).

With regard to *mental disorders,* logistic regression analyses revealed a lower overall mental morbidity for entrepreneurs (*OR* = 0.58; *p* = .022). That is, entrepreneurs were 0.58

times as likely to have been suffering from at least one mental disorder during their lifetime compared with employees. Furthermore, entrepreneurs showed a significantly lower 12-month prevalence of somatoform disorders (*OR* = 0.29; *p* = .011). No significant differences were found with regard to the prevalence rates of affective or anxiety disorders or alcohol abuse/dependence (Table 2).

Concerning Hypothesis 2b (well-being), we compared *life-satisfaction* between the entrepreneur and employee groups. A univariate analysis of variance (ANOVA) showed that, as predicted, entrepreneurs reported significantly higher life-satisfaction than employees ($F(1, 314) = 6.66$, $p = .01$, $\eta = .02$). While entrepreneurs reported a mean life satisfaction of 5.62 (*SE*=.09) employees' mean was 5.28 (*SE*=.10) on the 7-point Kunin-faces scale.

Referring to health-related behaviours (Hypothesis 3) entrepreneurs reported significantly fewer *physician visits* and fewer *sick days* compared with employees (*OR* = 0.20; 95% CI = 0.10-0.38; $p < .001$ and *OR* = 0.32; 95% CI = 0.20-0.52; $p < .001$; respectively). Visiting a physician in the past 12 months was coded 1, seeing no physician in the past 12 months was coded 0. Zero sick days were coded 0, any other number of days was coded 1. While 91.5% of employees (*n*=140) saw a physician in the last year, only 68.3% (*n*=110) entrepreneurs did so. Regarding sick days, 45.8% of the entrepreneurs (*n* = 70) vs. 72.0% of the employees (*n* = 116) were absent from work for at least one day in the last year.

Discussion

The present research aimed to contribute to our knowledge of entrepreneurs' health by comparing a national representative sample of entrepreneurs with a national representative sample of employees (holding occupational class, age, and gender constant) using objective health indicators, namely blood pressure, physician diagnosed somatic diseases, diagnosis of mental disorders, as well as self-reported well-being and behavioural indicators. To summarize our results, entrepreneurs exhibited better health on a number of the measures used. They showed significantly lower overall somatic and mental morbidity, lower blood pressure, lower prevalence rates of hypertension and somatoform disorders, as well as higher well-being and more favourable self-reported behavioural health indicators (fewer physician visits and sick days). For the rest of the measures used there were no significant differences between entrepreneurs and employees. Thus, our findings lend support to the view that an entrepreneurial career may have some health benefits (as suggested by prior studies by Bradley & Roberts, 2004; Kawakami et al., 1996; Korunka et al., 1993; Subramanian et al., 1987; Tetrick et al., 2000). Our findings are not in line with prior studies that found entrepreneurs to have worse health than employees (Buttner, 1992; Jamal, 1997; Lewin-Epstein & Yuchtman-Yaar, 1991; Parslow et al., 2004; Rau et al., 2008).

The results for general somatic and mental morbidity clearly corroborate our hypotheses of better entrepreneurs' compared with employees' health. The relatively low prevalence rate of specific diseases and disorders (gastrointestinal ulcers, diabetes, rheumatoid arthritis, affective disorders, anxiety disorders, substance abuse and dependency) and correspondingly low statistical power might have prevented us from discovering more associations with entrepreneurial status. In line with prior research, we found the expected differences for the risk factors of cardiovascular diseases (elevated blood pressure and hypertension), which seem particularly sensitive in capturing the influences of work-related stressors (e.g., Belkic et al., 2004; Theorell & Karasek, 1996). Although prevalence rates of

lower back and shoulder/neck pain were relatively high and higher in the employee sample compared with the entrepreneur sample, this difference did not reach statistical significance. However, the related group of somatoform disorders in which pain is a dominant symptom were significantly more prevalent in the employee group. This is in line with emerging research that found a lack of challenging work contributed to subsequent onset of pain disorders which predict higher mortality rates (e.g., Harkness, Macfarlane, Nahit, Silman & McBeth, 2004, McBeth et al., 2009). Thus, one might speculate and future research could test whether somatoform disorders (specifically pain disorders) do indeed serve as early indicators or risk factors and are perhaps specifically reflective of work-related stress.

We see the *strengths* of the present research to be the use of: objective health measures (clinically-examined blood pressure and standardized clinical diagnoses of diseases and mental disorders); a national representative sample; and the case-control design (i.e. matching a national representative sample of entrepreneurs with employees concerning occupational class, age and gender). Through the matching procedure, variables were held constant that could serve as likely alternative explanations for findings of worse health in entrepreneurs compared to employees in previous research.

Firstly, the matching with regard to occupational class insured that entrepreneurs were compared with employees that engaged in similar occupational tasks and activities. This is important for two reasons. It ensures that the observed health differences between entrepreneurs and employees are not better explained by systematic differences in occupational tasks and activities – other than those associated with the entrepreneurial status. Moreover, some work activities, or occupational classes, lend themselves more or less to entrepreneurial activity than others. For instance, we found no or only very few entrepreneurs in the chemical industry, paper processing, metal processing as well as social-work and education related occupations (Stabu75 codes 14 to 17, 10 and 86-89; Table 1). Thus, prior studies comparing convenience samples or even representative samples of entrepreneurs with

employees might have to some extent compared apples with oranges, because they have not taken occupational class into account. In so far as different occupational classes bear different health risks (Karsek & Theorell, 1990; Zimmerman, Christakis & Stoep, 2004), different conclusions concerning entrepreneurs' health status would be obtained. In line with this argument, Stephan et al. (2005) find entrepreneurs in the information technology industry to have higher job control, job demands and better self-reported health compared with restaurant entrepreneurs. This indicates that job characteristics and health vary with occupational class even within the group of entrepreneurs. However, compared with employee samples drawn from the same industry, entrepreneurs reported systematically higher job control and demands than employees.

Secondly, age and gender are related to health and entrepreneurs differ systematically in both variables from employees. They are on average older and more frequently male (see comparison of final sample with the remainder of the representative sample in the methods section). Because of the case-control design, the observed health differences between entrepreneurs and employees in the present study cannot be better explained by age and gender differences.

Altogether, our results can be interpreted as support for the notion that job control and active jobs (high control/high demand) do indeed have positive health consequences (e.g., Karasek & Theorell, 1990). More specifically, entrepreneurs whose jobs appear to be prototypical active jobs exhibited better rather than worse health compared with employees. Thus our findings are in line with the notion suggested by field and experimental research that the active job situation stimulates and challenges job incumbents likely leading to short-term activation and energy mobilization (rather than feelings of threat and stress responses) and over time to a state of allostatis (rather than allostatic load). Moreover, over time the active job situation is likely conducive to learning and the development of active coping mechanisms, which allow job incumbents to effectively deal with high demands and further

inhibit the development of job strain. Nevertheless, four *qualifications* should be kept in mind when interpreting the findings of our research.

1) The GHS survey did not measure job characteristics directly. Therefore our interpretations rest on an assumption of higher job control and job demands for entrepreneurs compared with employees. However, these assumptions are supported by consistent findings of previous research that entrepreneurs more often have higher job control and demands compared with employees. It is also possible that not knowing the job characteristics means we underestimate the effects of active jobs. This is because it is likely that not only the entrepreneurs, but also at least some of the employees in the analyzed sample might have had active jobs (and consequently would also profit from the health-benefits of these jobs). Moreover, some employees will have low strain jobs, which also offer health benefits. In population representative samples of employees, a mix of the four JDCM job types is typically observed (see occupation distribution of the four job types, Karasek & Theorell, 1990, also Karasek, Kawakami, Brisson, Houtman, Bongers, & Amick, 1998; Tsutsumi et al., 2006). The lower somatic and mental health observed in our matched employee sample is, thus, likely mainly due to the occurrence of passive and high-strain jobs (Amick et al., 2002; Karasek & Theorell, 1990). Nevertheless, future studies should measure these job characteristics directly. They might also measure entrepreneur-specific job characteristics (see also Wall et al., 1996). For instance, for entrepreneurs a health-relevant aspect of their psychosocial work environment might include the market they compete in. Dess and Beard (1984) suggested three dimensions that describe the immediate environment an organization operates in (munificence, dynamism, and complexity), which future research could use to capture entrepreneurs' psychosocial work environment more completely. Another entrepreneurship-specific job demand could be the number of employees one entrepreneur needs to manage and the kind of organizational structure he or she sets up to do so (e.g., wide vs. narrow spans of control).

2) An alternative explanation for the observation of fewer physician visits and sick days by entrepreneurs is that they may have less time to visit physicians and take sick days due to their long working hours and responsibility for their enterprises[5]. Although we cannot rule out this explanation, it could be reasoned that if entrepreneurs do not take good care of themselves by going to the doctor or taking sick days when they need to this should lead in the long-term to a higher prevalence of diseases and disorders. This is because they would not have been diagnosed early enough and their body would not have been given sufficient time to recover from illnesses increasing the likelihood of allostatic load. The overall somatic and mental morbidity rates are arguably such long-term health indicators in that they capture life-time prevalences of all somatic and mental disorders respectively. However, as we have seen the overall morbidity prevalences are lower in entrepreneurs compared with employees.

3) We used a sample of occupationally-stable participants, i.e. entrepreneurs and employees who were exposed to their jobs for at least five years. We attribute the observed health-differences in the two groups to the exposure to job characteristics. However, we cannot discount that the two groups might have differed from the beginning, i.e. that they self-selected into being an entrepreneur vs. being an employee and that this self-selection might have consequences for the analyzed health-status of the two groups. Thus, differences in personality variables may be a legitimate alternative explanation of our findings, which clearly can only be totally ruled out through prospective longitudinal studies. However, we feel it is useful to have a short discussion on the personality characteristics that entrepreneurs' exhibit and their potential health consequences.

Research on entrepreneurs' personality presents a somewhat contradictory picture in relation to possible health outcomes. For example it could be argued that if entrepreneurs exhibit greater emotional stability then this might be a protective factor for them against mental health problems. However, evidence on this is not conclusive, with one study finding no difference between entrepreneurs and employees in emotional stability (Chay, 1993) whilst

another showed entrepreneurs did have higher emotional stability (Brandstaetter, 1997). Where there is more consistent evidence is in findings that entrepreneurs are likely to be Type A personalities and this seems negatively associated with health (Boyd, 1984; Boyd & Webb, 1982; Kieschke & Schaarschmidt, 2003). Contradictory to our findings, this evidence suggests that we should have found worse health results for entrepreneurs.

Nevertheless, most specific to the active job hypothesis is a recent review that finds entrepreneurs differ from employees largely in task-specific personality orientations, i.e. specific traits that are related to the tasks of running a business such as self-efficacy and personal initiative (Rauch & Frese, 2007). Self-efficacy and proactive personality in turn have been found to moderate the relationship of active jobs and health as well as well-being (Parker & Sprigg, 1999; Schaubroek & Merritt, 1997). Thus, entrepreneurs might be better able to reap the health benefits of their jobs compared with employees and there is no doubt that future studies on entrepreneurs' health need to take these moderating effects of specific personality orientations into account. However, even if the above is true it does not necessarily explain away the effect of active jobs. To do so ignores the evidence that such personality orientations are malleable (Eden & Aviram, 1993). Specifically, first research supports the notion that an active job situation stimulates the development of self-efficacy and personal initiative (see Taris & Kompier, 2004 for a review). For instance, a multi-phase longitudinal study showed that job control and job complexity lead to subsequently higher personal initiative (Frese, Kring, Soose & Zempel, 1996). Thus, personality differences may not be an alternative explanation for our results but may be part of the mechanism through which such health benefits are realised. As most research in this area has been exclusively cross-sectional then as has been said, in the end such causation can only be established through prospective longitudinal studies.

4) As we restricted the sample to occupationally stable participants, our results may be biased by unhealthy persons leaving their job. In so far as this equally applies to entrepreneurs

and employees, such a selection effect would be less problematic for the present research. However, one may argue that entrepreneurs only after becoming self-employed realize how much personal responsibility they face, feel stressed by their job, and therefore leave self-employment and become employees (again). This is an alternative explanation, which we cannot discount based on the current cross-sectional data set. Findings from other studies, however, suggest that such an effect may not be very large. For instance, the large majority of those entrepreneurs who close their business are either intending to set up another business or are in fact already in the process of doing so (Stam, Audretsch & Meijaard, 2008; Stokes & Blackburn, 2002). Moreover, entrepreneurs stay self-employed (rather than re-enter into salaried or wage employment) although they have both lower initial earnings and lower long-term earnings compared with employees. This finding is explained with reference to the non-pecuniary benefits of entrepreneurs' vs. employees' jobs (Hamilton, 2002; Van Praag & Versloot, 2007 for a review). Taken together these findings correspond well with the active job hypothesis: Once a person starts working as an entrepreneur (in an active job) he or she experiences the challenge, the increased learning and eventually also increased feelings of self-efficacy, and therefore tends to stay – despite other disadvantages this job might have.

Conclusion

While reviewing the literature on entrepreneurs' health we felt that entrepreneurs are an under-researched population in occupational health psychology and studying them could yield useful insights regarding the active job hypothesis which in itself also appears to be under-researched (Theorell & Karasek, 1996). Moreover, in as much as working conditions and the nature of work appears to be changing (see Cascio, 1995; from mass production in large, hierarchically-organized factories to knowledge-intensive work in small companies with flat organizational structures) a larger percentage of the workforce will be working in active jobs in the future. Specifically, employees are increasingly empowered and continuously need to learn and expand their skills (increasing their job control), but are also

confronted with increased work intensity and demands for flexibility (increasing job demands). One might say that employees' jobs will become increasingly 'entrepreneurial' in the future. Hence researching entrepreneurs' jobs and their health consequences along with potential moderators (such as self-efficacy) can inform us on how we need to design such jobs and how we can assist people to reap the benefits of these jobs so that they feel positively challenged by them rather than overwhelmed.

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Footnotes

[1] Due to the varying operationalizations of high job strain across studies (e.g., job quadrants based on sample-median split of job control and job demand measures, multiplicative interaction, relative excess term), insights from research on the job strain hypothesis do not necessarily generalize to the active job hypothesis. For instance, only calculating job strain by means of a multiplicative interaction term would also test the active job hypothesis (in terms of good health in active jobs, see van Vegchel et al., 2005 for details). The multiplicative interaction term, however, is rarely used to calculate job strain (e.g., de Lange et al., 2003; van de Doef & Maes, 1999), which makes the evidence on job strain not directly relevant to the active job hypothesis.

[2] In more detail, the GHS-MHS drew on all respondents that were included in the GHS except for participants between 66 and 79 years of age as the measurement propertities of the CIDI to diagnose mental disorders had not been established for that age group (Jacobi et al., 2002). Thus, the starting sample of the GHS-MHS was N=6159 and the direct participation rate (if one was to ignore the stratified sampling procedure) was 67.9%. Additional analyses of non-responders in the GHS and GHS-MHS are provided by Potthoff et al. (1999) and Jacobi et al. (2002) and indicate no concerns for representativeness.

[3] Shift-workers were excluded in order not to bias the comparison of employees' and entrepreneurs health. Shift-work was more prevalent for employees and has strong negative health effects, which are partly caused by different disease mechanism than the ones outlined for chronic stress due to adverse job characteristics (e.g. Knutzsson & Boggild, 2000).

[4] Participants were excluded when they described their current occupational activity as 'currently not occupationally active/working'. Of the remaining participants we included those that wrote down to work for more than 5 years in their current job. The question that respondents answered was: The following question applies only if you are currently working. How long do you work in this job?

[5] Note that in Germany entrepreneurs are obliged to obtain medical insurance. Thus, differential access to health insurance by entrepreneurs and employees can be ruled out as an alternative explanation.

Appendix

Operationalization of 'entrepreneur' vs. 'employee' group based on the GHS self-report questionnaire (Solzenberg, 2000):

'In which occupational position are you currently mainly employed, respectively were you last mainly employed (if currently not working)?' Participants not currently working were excluded (see Method section.) The four headings (in italics) and 19 categories were (we inserted numbers in the front of the categories for ease of reading):

Worker: 1) Unskilled worker; 2) Semi-skilled worker; 3) Skilled worker; 4) Foreman, group leader, master craftsmen, head mason, brigadier;

Self-employed (including assisting family members): 5) Self-employed agriculturist, farmer; 6) Liberal profession, self-employed academic; 7) Other self-employed with up to 9 employees; 8) Other self-employed with 10 or more employees; 9) Assisting family members;

Salaried employee: 10) Salaried foreman and head-workman; 11) Employee with simple job (e.g. clerk, salesclerk, stenotypist); 12) Employee with skilled job (e.g. professional and clerical staff, accountants, tracers); 13) Highly skilled employee or managerial functions (e.g. head of departments, scientific assistant, registered manager); 14) Employee with wide-ranging managerial functions (e.g. director, CEO, members of executive boards of larger firm or associations),

Civil servant (including judges and professional soldiers): 15) Lower grade; 16) Middle grade; 17) Upper grade; 18) Highest grade;

19) *Other* (e.g., in vocational training, pupil, student, in compulsory military service, compulsory community service, intern).

Two of these 19 categories number 9 and 19 were excluded from further analyses (see method section). The remaining four categories presented under self-employment constitute the 'entrepreneur' group in our study and all other remaining categories the 'employee' group.

Table 1
Sample Description by Employment Type (Entrepreneur vs. Employee) and Occupational Class (according to German National Occupational Classification [Stabu75], Statistisches Bundesamt 1975, N = 298)

Occupational class	Code[1]	Sample *N (%)*	Entrepreneurs *n*	Employees *n*
Occupations in the country (dealing with plants, animals or forestry)	01-06	36 (12.1)	18	18
Wood processing and manufacturing of wooden goods	18	2 (0.7)	1	1
Locksmiths, mechanics and related occupations	25-30	22 (7.4)	11	11
Electricians	31	14 (4.7)	7	7
Textile and clothing occupations	35	2 (0.7)	1	1
Food processing and manufacturing occupations	40-42	10 (3.4)	5	5
Construction related occupations	44-47	6 (2.0)	3	3
Interior decorator, upholstery	48-49	6 (2.0)	3	3
Carpenter, joiners	50	6 (2.0)	3	3
Painters	51	2 (0.7)	1	1
Machinists, machine operators	54	2 (0.7)	1	1
Engineers, chemists, mathematicians, physicists	60-61	10 (3.4)	5	5
Technicians, draughtsmen and chemical, biological & other laboratory workers	62-63	6 (2.0)	3	3
Retail trade buying agents, sales clerks	68	54 (18.1)	27	27
Service agents (e.g., loan officers, health insurance officers, shipping officers, real estate agents)	69-70	16 (5.4)	8	8
Transportation occupations (e.g., engine drivers, truck drivers)	71-74	6 (2.0)	3	3
Organizational, public service and office occupations (e.g., management consultants, tax advisors, accountants, programmers, public service administrators)	75-78	38 (12.8)	19	19
Security service occupations (e.g. factory security, fire fighters, police)	79-81	6 (2.0)	3	3
Writers and artistic occupations	82-83	6 (2.0)	3	3
Health related professions (e.g. physicians, nurses)	84-85	24 (8.1)	12	12
Social workers, education-related, and other liberal arts occupations (e.g., teachers, vocational counselors, psychotherapists)	86-89	8 (2.7)	4	4
General service related occupations (e.g., hairdresser, waiters, cleaners)	90-93	16 (5.0)	8	8
Total		298 (100)	149	149
Mean age (SD) in years		46.2 (8.7)	46.4 (8.8)	46.0 (8.5)
n women (% of sample)		79 (26.5%)	35 (23.5%)	44 (29.5%)

Note. [1]Code of occupational class in the German national occupational classification (Stabu 1975, Statistisches Bundesamt 1975)

Table 2

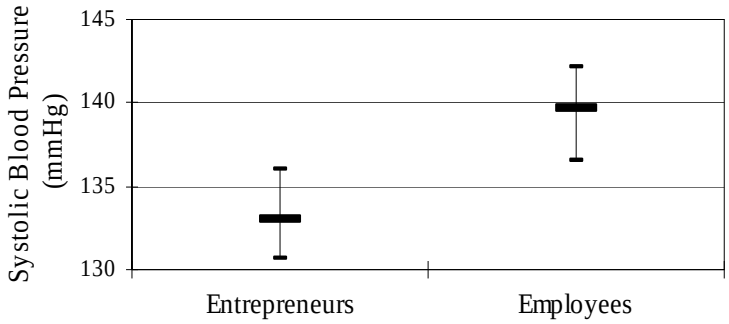
Logistic Regression Analyses: Frequency of Somatic Diseases and Mental Disorders in Entrepreneurs vs. Employees (GHS and GHS-MHS; N=314)[1]

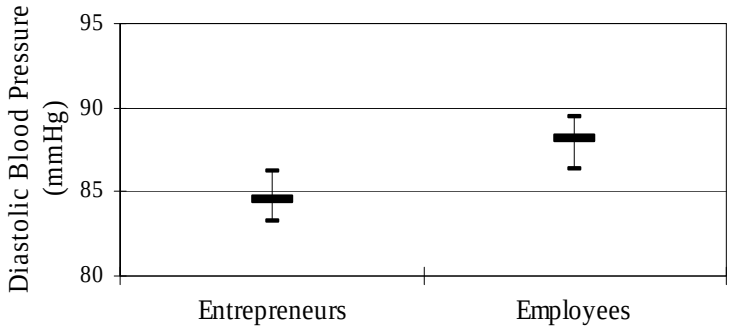
	Entrepreneurs		Employees				
	%w[1]	*n*%[2]	%w[1]	*n*%[2]	OR	95% CI	*P*
Somatic Diseases							
Somatic Morbidity[3]	62.4	68	80.2	77	0.41**	0.22 – 0.77	.006
Hypertension[4]	12.4	19	23.6	34	0.47*	0.25 – 0.88	.018
Gastrointestinal Ulcers	6.5	10	3.4	5	2.07	0.69 – 6.27	n.s.
Diabetes	1.9	3	2.0	3	1.07	0.22 – 5.23	n.s.
Rheumatoid Arthritis	11.6	17	11.3	16	1.02	0.50 – 2.11	n.s.
Lower Back Pain	50.6	82	52.9	81	0.91	0.58 – 1.41	n.s.
Shoulder/Neck Pain	39.1	63	41.8	64	0.90	0.58 – 1.41	n.s.
Mental Disorders							
Mental Morbidity[5]	29.0	47	41.2	63	0.58*	0.36 – 0.93	.022
Somatoform Disorders	3.7	6	11.2	17	0.29*	0.11 – 0.75	.011
Affective Disorders	10.6	17	11.1	17	0.96	0.47 – 1.94	n.s.
Anxiety	9.3	15	9.8	15	0.92	0.43 – 1.97	n.s.
Substance Abuse/Dep.	4.3	7	3.9	6	1.08	0.35 – 3.31	n.s.

Note. Employees were the reference class, [1]weighted data, [2]participants diagnosed with the corresponding disorder, differences in sample sizes due to missing values, [3]lifetime prevalence of any somatic disorder, [4]controlled for BMI, [5]lifetime prevalence of any mental disorder, OR = odds ratio, indicating increased or decreased odds of receiving a diagnosis as a result of a one unit change in the predictor variable, CI = confidence interval (95%), * $p < .05$, **, $p < .01$.

Figure Caption

Figure 1. Systolic and diastolic blood pressure by employment type (entrepreneurs vs. employees) controlled for effects of BMI (marginal means with 95% confidence intervals)


Systolic Blood Pressure (mmHg)
145
140
135
130
Entrepreneurs
Employees


Diastolic Blood Pressure (mmHg)
95
90
85
80
Entrepreneurs
Employees