



JENA ECONOMIC RESEARCH PAPERS



2012 – 063

A Physician With A Soul Of A Cook? Entrepreneurial Personality Across Occupations

by

Alina Sorgner

www.jenecon.de

ISSN 1864-7057

The JENA ECONOMIC RESEARCH PAPERS is a joint publication of the Friedrich Schiller University and the Max Planck Institute of Economics, Jena, Germany. For editorial correspondence please contact markus.pasche@uni-jena.de.

Impressum:

Friedrich Schiller University Jena
Carl-Zeiss-Str. 3
D-07743 Jena
www.uni-jena.de

Max Planck Institute of Economics
Kahlaische Str. 10
D-07745 Jena
www.econ.mpg.de

© by the author.

A Physician With A Soul Of A Cook?

Entrepreneurial Personality Across Occupations¹

Alina Sorgner

November 2012

Abstract

There is a debate in the literature backed by ambiguous empirical evidence whether personality is useful at predicting entrepreneurship behavior. However, little is known about the role of the context in the relationship between personality and entrepreneurship. This paper draws on the well-established psychological theory of vocational behavior, which emphasizes the crucial role of personality for peoples' vocational choices, in order to shed more light on the interplay between personality, occupational environment, and the decision to become self-employed. Empirical findings suggest that personality is associated with both vocational and entrepreneurial choices. An entrepreneurial personality profile is positively related to the choice of Holland's enterprising and artistic occupations, which contributes to above-average self-employment rates in these occupations. Personality also seems to play an important role in entrepreneurial choice, however, in a way which varies substantially across occupations.

JEL classification: L26, J24, J44

Keywords: Entrepreneurship, vocational choice, Big Five, occupational environment

Alina Sorgner
Friedrich Schiller University Jena
School of Economics and Business Administration
Chair of Business Dynamics, Innovation, and Economic Change
Carl-Zeiss-Str. 3, D-07743 Jena, Germany
Alina.Rusakova@uni-jena.de
Tel.: +49(0)3641-943-229
Fax: +49(0)3641-943-232

¹ The author is extremely grateful to Michael Fritsch, Eva Schmitt-Rodermund, and Rainer K. Silbereisen for their comments on the early version of this paper. The participants of the BABSON College Entrepreneurship Research Conference 2012, Fort Worth, TX, USA, and of the Jena Economic Research Seminar, Jena, Germany, have contributed significantly to this paper through fruitful discussions.

1. Introduction

The discussion on entrepreneurial personality has recently been revived in entrepreneurship literature (see, e.g., Zhao et al., 2010; Rauch and Frese, 2007; Zhao and Seibert, 2006). Empirical evidence suggests that personality plays an important role at all stages of entrepreneurial development. Non-cognitive skills, measured as the Big Five dimensions of personality, predict entrepreneurial intentions in early adolescence and adulthood (Schmitt-Rodermund, 2004; 2007; Obschonka et al., 2010), the decision to become an entrepreneur and to stay in self-employment (Caliendo et al., 2011; Brandstätter, 2011). There is evidence that personality traits are also associated with the survival of business ventures (Ciavarella et al., 2004), firm performance (Zhao et al., 2010), and habitual entrepreneurship (Obschonka et al., 2011).

Yet, a person-centric approach has been criticized for being unable to deal with probably the biggest issue in entrepreneurship research, namely, heterogeneity. For instance, Gartner (1985) argues that the person-centric approach is not useful to study entrepreneurship since entrepreneurs constitute a highly heterogeneous population, and the differences among entrepreneurs might be even larger than differences between entrepreneurs and non-entrepreneurs. Similarly, Blanchflower and Oswald (1998, p.51) conclude that “psychology apparently does not play a key role in determining who becomes an entrepreneur”. Moreover, Aldrich (1999, p.76) claims that “the research on personal traits seems to have reached an empirical dead end.” Finally, it has been stressed that entrepreneurial opportunities are more likely to be discovered on the basis of prior knowledge rather than searched for by certain entrepreneurial types of people (Shane, 2000; Venkataraman, 1997). Consequently, there is an observable shift in the entrepreneurship literature from the person-centric approach towards analyzing the sources and characteristics of entrepreneurial opportunities and the underlying cognitive processes of their discovering by economic agents (Shepherd and DeTienne, 2005; Eckhardt and Shane, 2003; Ward, 2004; Baron, 1998).

The present study provides new insights into the relationship between personality and entrepreneurship and enriches the ongoing discussion by introducing the psychological theory of vocational behavior which emphasizes the role of personality for people’s vocational choices (Holland, 1985; Filer, 1986; Schneider, 1987). Recent studies show that people are more likely to have a spell of dependent employment before they decide to become self-employed indicating that vocational choices do in many cases precede entrepreneurial choices

(Fritsch et al., 2012a; Müller, 2010). During occupation-specific training and experience people may acquire different levels of entrepreneurship-related human capital including a balanced skills set (Fritsch et al., 2012b), managerial skills (Kim et al., 2006), entrepreneurial values and attitudes through observing entrepreneurial role models among their peers and in professional networks (Bosma et al., 2012; Nanda and Sørensen, 2010). Hence, vocational choices appear to be important career choices that may contribute to our understanding of how entrepreneurial careers develop and emerge, since they are an important link between non-cognitive skills and entrepreneurial outcomes.

Moreover, the important role of personality for entrepreneurship behavior may be obscured by inappropriate aggregation across occupational environments. It is surprising, given ambiguous empirical evidence, that previous studies did not investigate how the context may alter the relationship between personality and entrepreneurial choice. The theory of vocational behavior implies that people within occupational environments tend to be rather homogeneous with regard to their personalities, which is the result of different selection mechanisms such as attraction-selection-attrition mechanism (Schneider, 1987). Moreover, people within occupations share similar context-specific requirements and conditions, such as occupation-specific tasks or the level of job opportunities on the occupation-specific labor market, among others. Hence, an investigation of the relationship between personality and entrepreneurship behavior can provide more precise results when accounting for an individual's occupational environment.

Thus, the present paper contributes to the existing literature in four ways. First, it introduces the psychological theory of vocational behavior (Holland, 1985) which provides new insights for entrepreneurship research. Second, based on empirical evidence, it emphasizes the role of occupational environments for the development of entrepreneurial careers by arguing that certain occupations are more likely to provide people, who are training for and working in them, with entrepreneurship-related human capital, values, attitudes, and role models that are necessary for entrepreneurship. Third, it empirically investigates whether people with a pronounced entrepreneurial personality are more likely to make different vocational choices than less entrepreneurial people. Finally, it tests for possible mediation and moderation effects of occupational context on the relationship between personality and entrepreneurial choice, and thus, empirically addresses the criticism of the person-centric approach (see, e.g., Gartner, 1989).

The remainder of the paper proceeds as follows. Section 2 summarizes the existent evidence on the relationship between personality and entrepreneurship and introduces the theory of vocational behavior. Section 3 introduces the data and method employed for the empirical analysis. Section 4 presents the results. Finally, Section 5 discusses possible implications of the results and concludes.

2. Theoretical background

2.1. Personality and Entrepreneurial Choice

A person-centric approach to the study of the relationship between personality and entrepreneurial choice suggests that personality traits of entrepreneurs are significantly different from those of non-entrepreneurs. Particularly, it has been emphasized that personality traits that match the tasks of entrepreneurs² can successfully predict entrepreneurship behavior in terms of business creation and success (Rauch and Frese, 2007). Accordingly, literature identifies personality traits that might foster successful accomplishment of entrepreneurial tasks. One can clearly identify two strands in the entrepreneurship literature that focus on personality issues. On the one hand, more narrowly defined traits, such as need for achievement (McClelland, 1961; Stewart and Roth, 2007), generalized self-efficacy, innovativeness (Schumpeter, 1934), stress tolerance (Patzelt and Shepherd, 2011), need for autonomy (Brandstätter, 1997), willingness to take risks (Caliendo et al., 2009), and proactive personality (Crant, 1996) are supposed to match entrepreneurial tasks and have been found to correlate significantly with entrepreneurial behavior. On the other hand, the Big Five model, as developed by Costa and McCrae (1992), has been related to entrepreneurship in several studies. According to this model, the human personality can be described by five broad dimensions: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. The empirical evidence suggests that self-employed individuals score relatively high on such dimensions of personality as openness to experience, extraversion, and conscientiousness, and that they score relatively low on agreeableness and neuroticism – a personality profile which is commonly referred to as an entrepreneurial personality (Zhao et al., 2010; Zhao and Seibert, 2006; Caliendo et al., 2011; Schmitt-Rodermund, 2004, 2007; Obschonka et al., 2010). Caliendo et al. (2011) systematically

² The literature defines different entrepreneurial tasks that include generating of ideas for new products or services, creation or recognition of opportunities, decision making under uncertainty, and acquiring resources, among others (for literature review, see Rauch and Frese, 2007).

analyze the influence of both narrowly and broadly defined personality traits on entrepreneurship behavior and show that both approaches are useful for the study of an entrepreneurial personality.

2.2. Personality and vocational choices

John Holland's (1985) prominent theoretical position explains people's vocational choices by the congruence between personal and environmental characteristics. Particularly, he argues that "the choice of a vocation is an expression of personality," and the occupational environments can be classified by personality types that flourish in them. Holland suggests six major types of occupational environments and people working in them: realistic (doers), investigative (thinkers), artistic (creators), social (helpers), enterprising (persuaders), and conventional (organizers), shortly RIASEC. These differ with regard to the tasks to be performed and the opportunities that they offer to people working in these environments (see Holland, 1985, pp.36-40). A growing body of literature provides support for Holland's theory by revealing a significant overlap of people's personalities (Big Five) and Holland's vocational types (Barrick et al., 2003; Larson et al., 2002). Moreover, it has been shown that adolescents tend to make their vocational choices based on the positive relationship between their self-description and various occupational stereotypes they held, supporting Holland's argument that people search for occupations that match their self-concepts (Hollander and Parker, 1972).

Empirical literature identifies a strong relationship between individual's personalities and tastes and the probability to enter certain occupations (see e.g. Filer, 1986; Krueger and Schkade, 2008; Cobb-Clark and Tan, 2011), which is probably due to a number of reasons. First, different people may have different utility functions due to their personalities, interests, values and talents, and, thus, evaluate attractiveness of a specific occupation differently. Second, the ability to perform different tasks appears to vary with personality (Borghans et al., 2008), such that people are more likely to choose occupations which tasks they can perform better. Third, occupational environments might also shape people's personalities to a certain extent, for instance, salespersons are more likely to be communicative and extraverted because of the requirements of their profession (Satterwhite et al., 2009).

Although personality appears to have strong association with people's vocational choices, it is not clear whether an entrepreneurial personality profile is related to the choice of certain occupational environments. There is an indication, however, that adolescents with a

pronounced entrepreneurial personality are more likely to demonstrate an enterprising variation of Holland's vocational interests (Schmitt-Rodermund, 2004). Moreover, an entrepreneurial personality appears to be significantly associated with early entrepreneurial competencies, such as early inventions, leadership, and early commercial activities (Obschonka et al., 2010). The enterprising occupations require, reward and are conducive for the development of competencies such as leadership, organization abilities, manipulating of others, self-confidence, extroversion, sociability, and responsibility (Holland, 1985, 39). People in these occupations tend to demonstrate enterprising values, such as money, status, and power. Therefore, it can be hypothesized that:

Hypothesis 1: Entrepreneurial personality is positively associated with the choice of Holland's enterprising occupations.

Vocational choices are career choices that people make rather early in their lives and that in many cases precede the decision to become an entrepreneur, since the majority of entrepreneurs appear to have spent a spell of employment in a certain occupation before they decided to set up an own business venture (Fritsch et al., 2012; Mueller, 2010; Shane, 2000). During occupation-specific training and employment people accumulate occupation-specific human capital, which can only hardly be transferred across occupations, especially in countries with dual education system,³ implying that a once made occupational choice partly predicts an individual's future career choices including the decision to become self-employed (Gathmann and Schönberg, 2010; Kambourov and Manovskii, 2009). Moreover, occupation-specific training and experience may provide people with entrepreneurship-related skills, for example, in managerial occupations people acquire skills necessary for coordination and administration of diverse activities in an own business venture (Kim et al., 2006; Boden and Nucci, 2000). Certain occupations appear to be supportive for acquisition of a balanced skills portfolio (Fritsch et al., 2012b) which is, in turn, of crucial importance for entrepreneurship (Lazear, 2004). Furthermore, an individual decision to become self-employed seems to be strongly associated with economic conditions on occupation-specific labor market, such as income and employment risks and self-employment rate (Rusakova and Fritsch, 2012). Finally, self-employment activities in certain occupations may be regulated by law (e.g.

³ In countries with the dual education system occupation-specific skills in many occupations are strongly regulated by national standards. Such regulations make the switch between occupations very costly, since new qualifications have to be acquired. Additionally, necessary conditions for self-employment in those occupations include an admission exam (e.g., master craftsman's diploma) and a comprehensive work experience in the chosen occupation.

physicians, architects, lawyers), have long traditions (e.g. trades), or be a widespread form of employment (e.g. artists). Hence, an individual's vocational choice appears to influence the decision to become self-employed in many ways.

Recent studies on the origins of human capital indicate that certain personality traits are significantly associated with the ability to accumulate entrepreneurship-relevant human capital. For instance, it has been shown that entrepreneurial personality profile is strongly related to such entrepreneurial skills as the competence in acquiring new financial and human resources, which founders possess when starting a business venture (Obschonka et al., 2011). Moreover, Stuetz et al. (2012) show that an entrepreneurial personality profile is significantly associated with a balanced skill set. Similarly, Astebro and Thompson (2011) show that both a balanced skill portfolio and entrepreneurial entry are related to certain personality traits which they call taste for variety. Hence, it appears likely that people with a pronounced entrepreneurial personality are looking for career environments that will allow them to accumulate entrepreneurship-relevant human capital and that are favorable for entrepreneurship. In other words, it seems plausible to assume that the relationship between personality and entrepreneurial entry is partly mediated by people's vocational choices. The following hypothesis is therefore proposed:

Hypothesis 2: The effect of personality on entrepreneurial choice is mediated by an individual's vocational choice.

The prevailing research on entrepreneurial personality proves which personality traits distinguish entrepreneurs from non-entrepreneurs, essentially assuming that all entrepreneurs are rather similar in their personality traits. However, it has been argued that entrepreneurs vary widely as they act in different environments where they discover or create different types of opportunities (Shane, 2000) and have very different reasons for becoming self-employed (Carter et al., 2003). Gartner (1985) even poses that the differences among entrepreneurs may be larger than the differences between entrepreneurs and non-entrepreneurs. Hence, it appears plausible that entrepreneurs differ with regard to personality traits depending on the environment in which they act.

The theory of vocational behavior provides a suitable framework for analyzing the relationship between personality and entrepreneurial choice within rather homogeneous environments. Particularly, in an extension of Holland's model, Schneider (1987) suggests an attraction-selection-attrition framework (ASA). According to this framework, attraction of people to certain career environments is a function of their personalities and interests. In this

selection process people that do not fit environments well tend to leave (attrition). Moreover, environments are supposed to influence the individual selection process by choosing people whose personalities and competencies fit them well, for instance, through recruitment processes. Thus, the ASA processes will yield certain types of individuals in working environments. Existing empirical evidence supports Schneider's argument that individuals who share the same occupation tend to be rather similar with regard to certain personality traits while personality traits differ across occupations (Satterwhite et al., 2009; Barrick et al., 2003; Tokar et al., 1998; Moutafi et al., 2007; Winkelmann and Winkelmann, 2008; Nieken and Störmer, 2010). Hence, it can be assumed that entrepreneurs in different occupations vary with regard to their personality characteristics.

Hypothesis 3: Entrepreneurs differ across occupational environments with regard to their personality.

Moreover, the question arises whether the relationship between personality and entrepreneurship behavior is universally valid irrespective of the environment in which a new business venture is launched. Particularly, the observed strong role played by personality traits in identifying who becomes an entrepreneur may be caused by inappropriate aggregation across occupations. Bates (1995) has shown that the determinants of self-employment entry vary largely across industries depending on entry barriers that are specific to a particular industry. Similarly, Baumol (1990) has argued that different entrepreneurial talents are likely to exploit entrepreneurial opportunities depending on the type of entrepreneurship. The likelihood of self-employment in enterprising occupations (broker, financier, etc.) depends on skills, knowledge and personality traits that are important for recognition and exploitation of opportunities that are common to enterprising occupations. However, these abilities and attitudes might not be the same as those needed for recognition of opportunities in investigative occupations (engineers, scientists, doctors). This is because depending on occupation, opportunity creation or recognition demands different levels of human capital, innovative ability, willingness to take risks and is associated with different level of uncertainty. For instance, setting up a medical practice by a physician is a significantly less risky business venture, than, for instance, launching a high-tech firm by an engineer. Moreover, financiers of new businesses may be more willing to provide capital to business founders whose business ideas have high chances to succeed, as in the case with a physician. Hence, potential entrepreneurs need different levels of the ability of persuasion to acquire necessary financial capital depending on the context in which they launch their

businesses. Furthermore, the reasons for becoming self-employed vary substantially (Carter et al., 2003). In occupations with low level of job opportunities, self-employment may be a choice out of necessity meaning that those people are more likely to become self-employed whose personality characteristics and abilities do not enable them to find a paid job. Finally, entrepreneurial entry in many liberal occupations is regulated by law implying that only individuals with high levels of profession-specific education, comprehensive work experience in the chosen occupation, and who successfully passed the admission exam (e.g. master craftsman's diploma), are allowed to become self-employed. Hence, personality is less likely to play a strong role for entrepreneurship in such regulated occupations, but rather the level of human capital. Therefore, it appears more likely that the relationship between personality and entrepreneurship behavior is moderated by the environment in which entrepreneurs act.

Hypothesis 4: Personality is associated with an entrepreneurial choice in a way which differs across occupational environments.

3. Data

The empirical analysis is based on the German Socio-Economic Panel (SOEP). The SOEP is an annual representative household survey of approximately 22,000 individuals living in Germany which contains detailed information on respondents' socio-economic situation, as well as personality traits (see Wagner et al., 2007). The sample under study includes individuals in age between 18 and 65 years old who actively participated in the labor market in time period between 2005 and 2009. The dependent variable is a binary variable which equals one if an individual is self-employed or freelancer in the survey year and it equals zero otherwise. After dropping all missing values, our sample consists of 46,489 individuals 4,789 of whom are self-employed (10.3 percent of the sample).

3.1. Measures of personality

The SOEP data implements a short item scale that measures the Big Five factors by asking three questions about each of these broad dimensions.⁴ This short inventory of questions was conceptualized based on the five-factor structure of the Big Five and is able to replicate the results of the 25-item Big Five inventory to a large extent (see Gerlitz and Schupp, 2005). Additionally, the conducted reliability test showed that the personality concept employed in the SOEP may be regarded as valid. For each of the fifteen items the

⁴ The scale was implemented in SOEP questionnaires in waves 2005 and 2009 based on research conducted by Costa and McCrae (1992).

SOEP respondents were asked to grade themselves on a seven-point Likert scale where the value 1 indicates that a given personality characteristic does not apply at all and the value 7 indicates that the characteristic applies perfectly. The Big Five dimensions of personality were then constructed as the mean values of individual scores on three corresponding scales. Since the data on the Big Five was available only in waves 2005 and 2009, the missing data for other waves is imputed from the wave 2005 (see Caliendo et al., 2011, who use this procedure for the same data), assuming that the basic personality traits remain stable over short periods of time (Cobb-Clark and Schurer, 2012).

Furthermore, the measure of an entrepreneurial personality fit is constructed based on the procedure described in Schmitt-Rodermund (2004; 2007). Particularly, this variable measures the deviation of individual scores on the Big Five scales from a certain entrepreneurial reference type that possesses traits that are commonly regarded as entrepreneurial. First, an entrepreneurial reference type has been defined as one who has the highest possible scores on the dimensions openness to experience, extraversion, and conscientiousness, and with the lowest possible scores on the dimensions neuroticism and agreeableness. In a next step, the squared values of the deviations from the reference value have been calculated for each of the Big Five dimensions. Third, the sum of the squared values of the deviations from the reference value for each of the Big Five dimensions results in an overall measure of a person's deviation from the entrepreneurial reference type. If a person matches this reference type perfectly, the measure of the entrepreneurial personality fit assumes the value of zero. The larger the sum of the squared deviations, the less a person matches the personality of the reference type. Fourth, the sum of the squared deviation is multiplied by -1 in order to have higher values of an entrepreneurial personality fit for more entrepreneurial people. Finally, this variable has been standardized. The advantage of the measure of an entrepreneurial personality fit over the single personality traits is that it accounts for the holistic structure of personality (Obschonka et al., 2010).

3.2. Holland's occupational types

The SOEP contains information about respondents' occupations at a 4-digit level of International Standard Classification of Occupations (ISCO'88). In order to assign one of the six Holland's occupational types to each occupational code available in the dataset the translation key from the Dictionary of Holland Occupational Codes (Gottfredson and Holland, 1996) was employed. Each occupation in the Dictionary of Holland Occupational Codes is assigned a three-letter code, whereas the first letter indicates Holland occupational type most

congruent with the particular occupation, the second letter indicates the second most suitable occupational type, and so on. In order to construct reasonably large groups of professions only classification according to the first most suitable occupational type is used in the present analysis. For instance, a profession of a musician is assigned an artistic-enterprising-social code in the Dictionary, but for the present analysis it is solely classified as an artistic occupational type. Table 1 contains sample occupations from ISCO'88 that were classified according to Holland occupational types.

Table 1: Sample occupations in Holland's occupational environments.

Holland's Occupational environment	Sample occupations from ISCO'88
Realistic	Building and trade workers, farmers, decorators, cooks, plumbers, cleaners, drivers
Investigative	Architects, engineers, medical doctors, computer professionals, psychologists
Artistic	Authors, journalists, sculptors, painters, musicians, photographers
Social	Hairdresser, teachers, social work professionals, physiotherapists
Enterprising	Business services agents, shop salespersons, insurance representatives, lawyers, managers
Conventional	Bookkeepers, accountants, computer equipment operators, finance clerks

3.3. Control variables

Control variables include variables that might have a significant effect on the probability of becoming an entrepreneur and include socio-demographic characteristics such as age, age squared, gender, marital status, and nationality. Moreover, human capital variables such as years of formal education and its squared value, and experienced years of unemployment are included in the model. Since role models of self-employment may significantly affect an individual's decision to become an entrepreneur, a variable for the presence of self-employed parents at individual's age of 15 has been constructed. Since self-employed people are assumed to act in rather uncertain environments and, therefore, are assumed to be less risk-averse than dependent employees, the measure of risk attitudes is included in the analysis. The risk measure is an experimentally validated variable which is implemented in SOEP as an 11-point Likert-type scale, where respondents have to assess themselves with regard to the following question: "Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?" (see Dohmen et al., 2005). Finally, control variables for industry (one-digit NACE codes), region ('Bundesländer'), and year are also included in the analysis.

4. Results

4.1. Descriptive analysis

The distribution of entrepreneurs and employees across Holland's occupational environments indicates strong differences with regard to the vocational choices of both groups (see Figure 1 and Table 2). The highest share of self-employed people is found, in accordance with expectations, in the enterprising occupational environment (35.8 percent), while the highest share of employees is observed in realistic occupations (35.5 percent). Furthermore, entrepreneurs are on average significantly more likely to choose investigative (15.7 percent) and artistic (2.7 percent) occupations, while employees can more often be found in conventional (13.8 percent) and social (18.05 percent) occupations.

Figure 1: Shares of entrepreneurs and employees in Holland's occupational types.

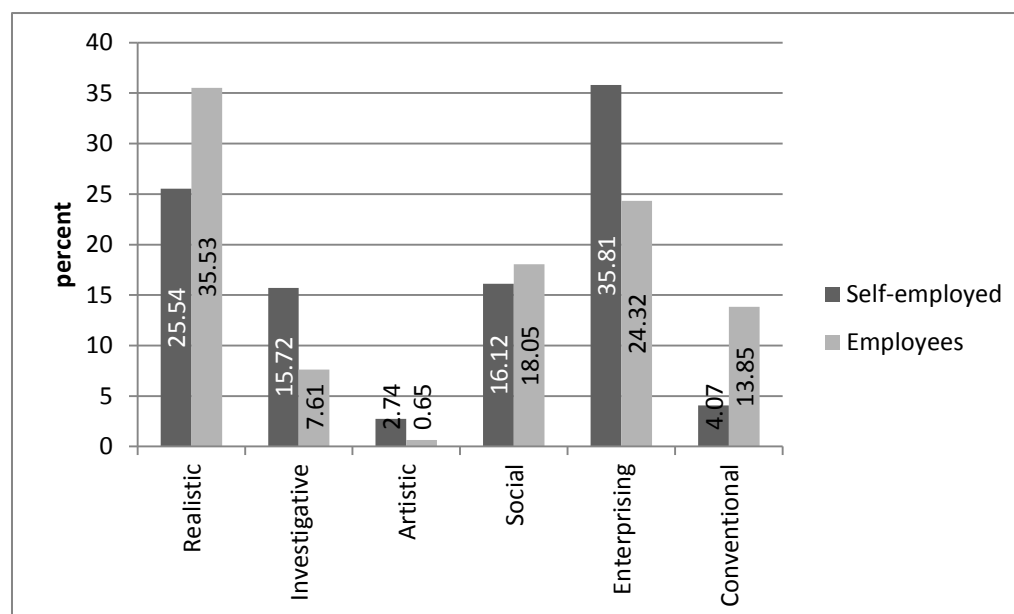


Table 2: Distribution of self-employed people and employees in Holland's occupational environments.

Holland's occupational type	Full sample, %	Self-employed, %	Employees, %	Self-employment rate, %	Number of observations, #
Realistic	34.5	25.54***	35.53	7.63	16,037
Investigative	8.45	15.72***	7.61	19.18	3,926
Artistic	0.86	2.74***	0.65	32.59	402
Social	17.85	16.12***	18.05	9.3	8,297
Enterprising	25.5	35.81***	24.32	14.47	1,715
Conventional	12.85	4.07***	13.85	3.27	5,972
Total	100	100	100	10.3	46,489

Notes: *t*-test of equal means as compared to the group of employees; *** $p < 0.01$.

Self-employment rate, defined as a ratio of self-employed people over dependently employed people within an occupation, also varies substantially across Holland occupational types. The highest self-employment rates are observed in artistic (32.5 percent), investigative (19.2 percent), and enterprising (14.5 percent) occupations. The self-employment rates in realistic (7.6 percent) and conventional (3.3 percent) occupations are much below the sample average of 10.3 percent. Overall, the descriptive evidence suggests that the distribution of entrepreneurs differs substantially from the distribution of employees across occupational environments.

Table 3: Descriptive statistics for the entrepreneurial personality fit.

Holland's occupational type	Full sample		Self-employed		Employees	
	Mean	SD	Mean	SD	Mean	SD
Realistic	-0.043	1.025	0.167***	0.999	-0.060	1.025
Investigative	0.116	0.960	0.270***	0.876	0.079	0.975
Artistic	0.338	0.932	0.262	0.827	0.374	0.978
Social	-0.003	0.951	0.140***	0.962	-0.018	0.948
Enterprising	0.070	0.992	0.316***	0.877	0.029	1.004
Conventional	-0.119	1.022	0.103***	0.844	-0.127	1.027
Total	0	1	0.232***	0.923	-0.027	1.005

Notes: *t*-test of equal means as compared to the group of employees: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Differences in distributions of entrepreneurs and employees across occupations may indicate that entrepreneurial types of people, i.e. those whose personalities are rather close to an entrepreneurial reference type, are more likely to be attracted by certain occupational environments that match their personalities. Table 3 contains mean values and standard deviations of the measure of an entrepreneurial personality fit for the groups of self-employed people and employees across Holland's occupational types as well as for the full sample. When looking at the full sample, people in investigative, artistic, and enterprising occupations score on average higher on the measure of an entrepreneurial personality fit than people in realistic, social and conventional environments. The same observation holds for the groups of self-employed people and employees pointing to a possible selection process of people with higher scores on entrepreneurial personality profile into certain occupational environments.

Moreover, the results of the *t*-test of equal means suggest that self-employed people do on average score significantly ($p < 0.01$) higher on the measure of entrepreneurial personality than dependent employees, although there is no statistically significant difference between entrepreneurs and employees in artistic occupations. Hence, there are indications in our data

that an entrepreneurial personality is associated with both people's vocational choices and the decision to become an entrepreneur. In the next step, the multivariate regression analysis should shed more light into this issue.

4.2. Multivariate analysis

In order to test whether entrepreneurial types are more likely to choose enterprising occupational environments, as stated in H1, we conduct multinomial logistic regression (Table 4). The predicted average marginal effects of independent variables on the probability of choosing one of the Holland's occupational types are reported for the ease of interpretation. The results for the full sample suggest that an entrepreneurial personality fit is significantly and positively associated with the probability of choosing enterprising ($p < 0.01$) and artistic ($p < 0.01$) occupations. There is a significant and negative relationship between an entrepreneurial personality fit and the probability of choosing realistic ($p < 0.01$) and conventional ($p < 0.05$) occupations. We do not find any significant relationship between an entrepreneurial personality fit and the propensity of choosing investigative and social occupations. This analysis is repeated for a restricted sample of employees, since the full sample also included entrepreneurs who may have distorted the results. The results remain largely unchanged in this specification; however, there are two exceptions. Particularly, in the sample of employees an entrepreneurial personality fit is positively associated with the choice of social occupations ($p < 0.05$), and there is no significant relationship for conventional occupations. Hence, the results provide support for the first hypothesis, since we observe that an entrepreneurial personality fit is positively associated with the choice of Holland enterprising occupations. Additionally, the findings suggest that artistic occupations are also rather attractive for people with entrepreneurial personality profiles.

After having stated that an entrepreneurial personality is associated with the choice of enterprising and artistic occupational environments, we test now whether vocational choices mediate the relationship between an entrepreneurial personality and entrepreneurial choice (H2). The following necessary conditions for establishing a mediation effect are fulfilled (Baron and Kenny, 1986): (1) the measure of an entrepreneurial personality affects individual's vocational choices (Table 4); (2) entrepreneurial personality affects entrepreneurial choice (column I in Table 5); (3) vocational choice is significantly associated with an entrepreneurial choice (column II in Table 5).

Table 4: Determinants of vocational choices. Multinomial logit regression estimates. Dependent variable: Holland's occupational types (RIASEC).

	Realistic		Investigative		Artistic		Social		Enterprising		Conventional	
		Robust standard error		Robust standard error		Robust standard error		Robust standard error		Robust standard error		Robust standard error
	dy/dx		dy/dx		dy/dx		dy/dx		dy/dx		dy/dx	
	Full sample											
Entrepreneurial personality fit	-0.020***	0.002	0.002	0.001	0.003***	0.001	0.003	0.002	0.017***	0.002	-0.004**	0.002
Age	-0.001***	0.000	-0.001***	0.000	0.000	0.000	0.001***	0.000	0.001***	0.000	0.000	0.000
Male	0.303***	0.003	0.039***	0.002	-0.001	0.001	-0.161***	0.003	-0.069***	0.004	-0.111***	0.003
Years of formal education	-0.062***	0.001	0.023***	0.000	0.002***	0.000	0.026***	0.001	0.013***	0.001	-0.003***	0.000
Either parents self-employed at age 15	-0.027***	0.006	0.006*	0.004	0.001	0.001	-0.002	0.005	0.010	0.006	0.012**	0.005
Foreigner	0.103***	0.008	-0.002	0.007	0.002	0.002	-0.009	0.009	-0.027***	0.010	-0.067***	0.008
Willingness to take risks	-0.006***	0.001	-0.002***	0.001	0.000	0.000	0.002***	0.001	0.008***	0.001	-0.002***	0.001
Log pseudolikelihood	-61,682.12											
Wald Chi²	13,951.5***											
Pseudo R²	0.1365											
Number of observations	46,489											
	Employees											
Entrepreneurial personality fit	-0.019***	0.002	0.001	0.001	0.002***	0.001	.004**	0.002	0.014***	0.002	-0.003	0.002
Age	-.001***	0.000	-0.001***	0.000	0.000**	0.000	.002***	0.000	0.0004*	0.000	0.000	0.000
Male	.311***	0.003	.040***	0.002	0.000	0.001	-.157***	0.004	-0.079***	0.004	-0.115***	0.003
Years of formal education	-0.064***	0.001	0.021***	0.000	0.002***	0.000	.029***	0.001	0.014***	0.001	-0.002***	0.001
Either parents self-employed at age 15	-0.040***	0.007	0.010***	0.004	0.002*	0.001	0.006	0.006	0.004	0.007	0.018***	0.005
Foreigner	.106***	0.008	-0.001	0.007	0.001	0.002	-0.01	0.009	-0.024**	0.010	-0.072***	0.009
Willingness to take risks	-.005***	0.001	-0.003***	0.001	0.000*	0.000	.003***	0.001	0.005***	0.001	-0.001	0.001
Log pseudolikelihood	-54,609.72											
Wald Chi²	12,403.98											
Pseudo R²	0.1402											
Number of observations	41,700											

Notes: Marginal effects are reported. *** p<0.01; ** p<0.05; * p<0.1

Table 5: Determinants of entrepreneurial choice. Logit regression estimates. Dependent variable: self-employment status (1=self-employed; 0=paid employee).

Variables	I		II	
	Coef.	Robust standard error	Coef.	Robust standard error
<i>Independent variable</i>				
Entrepreneurial personality fit	0.138***	0.018	0.122***	0.019
<i>Mediator variables</i>				
Realistic	-	-	-0.259***	0.064
Investigative	-	-	0.568***	0.065
Artistic	-	-	0.926***	0.146
Social (base outcome)	-	-	-	-
Enterprising	-	-	0.354***	0.052
Conventional	-	-	-1.103***	0.091
<i>Control variables</i>				
Alter	0.171***	0.013	0.169***	0.013
Alter, squared	-0.002***	0.0001	-0.002***	0.0001
Years of formal education	0.477***	0.073	0.439***	0.073
Years of formal education, squared	-0.012***	0.003	-0.013***	0.003
Male	0.418***	0.036	0.327***	0.039
Married	-0.051	0.038	-0.053	0.039
Foreigner	0.069	0.080	0.078	0.082
Either parents self-employed	0.565***	0.044	0.572***	0.045
Years of experienced unemployment	0.033***	0.010	0.042***	0.010
Willingness to take risks	0.155***	0.009	0.151***	0.009
Year	Yes		Yes	
Region	Yes		Yes	
Industry	Yes		Yes	
Intercept	-10.19***	0.566	-9.389***	0.579
Number of observations	46,489		46,489	
Log likelihood	-13,622		-13,305	
Wald Chi ²	3,150***		3,575***	
Pseudo R ²	0.116		0.137	

Notes: *** p<0.01, ** p<0.05, * p<0.1

The effect of the entrepreneurial personality fit becomes significantly lower ($p<0.01$) after the inclusion of variables for occupational types, and the pseudo R^2 increases from 11.6% to 13.7%. However, the mediation was not perfect since the effect of entrepreneurial personality fit remains statistically significant ($p<0.01$) after inclusion of variables controlling for vocational choice. Binary mediation model with bootstrapping⁵ was utilized in order to test the significance of the indirect effect of entrepreneurial personality fit on the probability of entrepreneurial choice. Since all occupational types proved to be significant in the base model (Table 5), they entered the mediation model simultaneously. The indirect effect (adjusted for all covariates from Table 5) was statistically significant ($p<0.01$), and the proportion of total

⁵ This analysis has been completed with the STATA command `binary_mediation` which allows binary dependent variables and mediators.

effect mediated was 25.2 percent. Hence, the second hypothesis cannot be fully confirmed, since the mediation was rather weak and the main effect of an entrepreneurial personality fit on entrepreneurial choice remained strong.

The third hypothesis, which states that self-employed people differ with regard to their personalities across occupational environments, is tested by means of a one-way analysis of variance. Particularly, we test whether the average values of the measure of an entrepreneurial personality fit for each Holland occupational type are significantly different. We find indeed significant differences since the F-statistic is 6.66 and has a significance level of 0.000. The Bartlett's test of equal variances yielded the χ^2 of 37.3 with the significance level of 0.000. Hence, we cannot accept an assumption that the variances are homogeneous. Additionally, Bonferroni multiple-comparison tests were conducted to determine the nature of such differences (Table 6).

Table 6: Results of the Bonferroni multiple-comparison test assessing potential differences in personality of self-employed people in Holland's occupational environments.

	Realistic	Investigative	Artistic	Social	Enterprising
Investigative	0.103 (0.238)				
Artistic	0.095 (1.000)	-0.008 (1.000)			
Social	-0.027 (1.000)	-0.130 (0.087)	-0.122 (1.000)		
Enterprising	0.149 (0.000)	0.046 (1.000)	0.054 (1.000)	0.176 (0.000)	
Conventional	-0.064 (1.000)	-0.167 (0.360)	-0.159 (1.000)	-0.037 (1.000)	-0.213 (0.033)

Notes: The numbers indicate the between-group differences in average values of the measure of an entrepreneurial personality fit. The Bonferroni-adjusted significance of the difference is reported in parentheses.

According to Table 6, self-employed people in enterprising occupations exhibit significantly higher scores on the measure of an entrepreneurial personality fit than self-employed people in realistic ($p < 0.00$), social ($p < 0.00$), and conventional ($p < 0.03$) occupations. Also, entrepreneurs in investigative occupations had a significantly ($p < 0.08$) higher value of an entrepreneurial personality fit than entrepreneurs in social occupations. Overall, the results of the one-way ANOVA indicate that the personality of self-employed people may vary substantially across occupations. This finding is in line with the theory of vocational behavior since it appears that people with a pronounced entrepreneurial personality are more likely to choose enterprising occupations independently of their employment status.

In order to test our fourth hypothesis, whether an entrepreneurial personality is differently associated with the probability of entrepreneurial choice within occupations, a logistic regression analysis is conducted (Table 7). An entrepreneurial personality fit appears to distinguish entrepreneurs from employees not only in the full sample, but also within occupations. However, this relationship is rather weak in social occupations ($p < 0.1$), and there is no significant relationship in artistic occupations. Moreover, the effect sizes have different magnitude across occupations. One possible explanation would be different challenges for entrepreneurship in various occupational environments. For instance, in occupations with high entry barriers personality may be less important for the decision to become self-employed than, for instance, access to financial or human capital. Another explanation is that rather different personality traits underlying the measure of an entrepreneurial personality fit are important for the decision to become self-employed depending on occupational environment in which a new business is launched. Hence, we replace an entrepreneurial personality fit by distinct Big Five dimensions of personality in order to control for possible differences in patterns of an entrepreneurial personality across occupations (Table 8). The findings do indeed suggest several differences in personality profile between self-employed people and employees who share a certain occupational environment, supporting our fourth hypothesis. Remarkably, personality traits even appear to have negative or positive effects on self-employment status depending on the occupational environment in which people work. For instance, the trait conscientiousness is positively associated with the self-employment status in investigative and enterprising occupations, but it has a negative effect in social occupations. Moreover, self-employment in artistic occupations is negatively associated with the dimension extraversion and is positively associated with agreeableness. Higher scores on neuroticism are positively related to self-employment in realistic occupations. However, openness to experience is significantly and positively associated with the probability of self-employment in all occupations with an exception of investigative occupations where the effect is not statistically significant.

With regard to other determinants of self-employment within occupations, several differences are obvious. For instance, the relationship between the years of formal education and the probability of self-employment is u-shaped in enterprising and conventional occupations suggesting that people with low and high levels of education are more likely to become self-employed in those occupations than people with the middle level of education. This is not very surprising given that self-employment in such occupational environments often do not require high levels of human capital. Differently, the relationship between years

Table 7: Determinants of entrepreneurial choice within occupations.

	Full sample	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Entrepreneurial personality fit	0.011*** (0.001)	0.005*** (0.002)	0.019*** (0.006)	-0.016 (0.027)	0.006* (0.003)	0.016*** (0.003)	0.005*** (0.002)
Age	0.0123*** (0.001)	0.0102*** (0.001)	0.0176*** (0.005)	0.0272 (0.021)	0.0197*** (0.002)	0.0124*** (0.002)	0.00240* (0.001)
Age ²	-0.0001*** (0.000)	-0.0001*** (0.000)	-0.0001* (0.000)	-0.0003 (0.000)	-0.0002*** (0.000)	-0.0001*** (0.000)	-0.00002 (0.000)
Years of education	0.036*** (0.005)	0.049*** (0.007)	0.075** (0.037)	0.291** (0.122)	0.067*** (0.015)	-0.026** (0.011)	-0.019*** (0.007)
Years of education, squared	-0.001*** (0.000)	-0.002*** (0.000)	-0.002 (0.001)	-0.010** (0.004)	-0.002*** (0.001)	0.001** (0.000)	0.001*** (0.000)
Male	0.029*** (0.003)	0.020*** (0.004)	-0.026** (0.013)	-0.076 (0.055)	0.012* (0.007)	0.078*** (0.007)	0.008** (0.004)
Married	-0.006** (0.003)	-0.006 (0.004)	0.013 (0.013)	-0.093* (0.055)	-0.009 (0.007)	-0.014* (0.007)	0.006* (0.004)
Either parents self-employed at age 15	0.059*** (0.005)	0.104*** (0.009)	0.0186 (0.016)	-0.079 (0.074)	0.0258** (0.010)	0.064*** (0.011)	0.016** (0.006)
Years of experienced unemployment	0.004*** (0.001)	-0.0002 (0.001)	0.013** (0.006)	0.055** (0.022)	0.007*** (0.002)	0.012*** (0.002)	0.003*** (0.001)
Willingness to take risks	0.012*** (0.001)	0.009*** (0.001)	0.014*** (0.003)	0.003 (0.012)	0.012*** (0.001)	0.018*** (0.001)	0.002** (0.001)
Intercept	-11.30*** (0.520)	-15.64*** (1.058)	-12.05*** (2.276)	-12.23*** (4.352)	-15.25*** (1.510)	-4.820*** (0.819)	-2.964 (2.583)
Number of observations	46,489	16,037	3,926	402	8,297	11,855	5,972
Log pseudolikelihood	-14,257	-3,903	-1,711	-237	-2,446	-4,487	-776
Chi ²	2,205***	733.9***	339.3***	20.6**	243***	767.4***	174.4***
Pseudo R2	0.0753	0.0971	0.109	0.0646	0.0477	0.0844	0.0972

Notes: results of logistic regression with robust standard errors in parentheses. Marginal effects are reported. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Determinants of entrepreneurial choice within occupations.

	Full sample	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Openness to experience	0.014*** (0.001)	0.009*** (0.002)	0.008 (0.006)	0.204*** (0.030)	0.006** (0.003)	0.017*** (0.003)	0.006*** (0.002)
Conscientiousness	0.001 (0.002)	0.004 (0.002)	0.026*** (0.007)	-0.048 (0.031)	-0.015*** (0.003)	0.00688* (0.004)	0.000 (0.002)
Extraversion	0.008*** (0.001)	0.003* (0.002)	0.017*** (0.006)	-0.062** (0.027)	0.014*** (0.003)	0.013*** (0.003)	-0.001 (0.001)
Agreeableness	-0.004*** (0.001)	-0.008*** (0.002)	0.008 (0.006)	0.063* (0.033)	0.001 (0.003)	-0.002 (0.003)	-0.002 (0.002)
Neuroticism	0.001 (0.001)	0.005*** (0.001)	-0.00924* (0.005)	0.012 (0.022)	-0.003 (0.003)	0.000 (0.003)	-0.001 (0.001)
Age	0.013*** (0.001)	0.009*** (0.001)	0.018*** (0.005)	0.045** (0.023)	0.020*** (0.002)	0.012*** (0.002)	0.003** (0.001)
Age ²	-0.0001*** (0.000)	-0.0001*** (0.000)	-0.0001** (0.000)	-0.001** (0.000)	-0.0002*** (0.000)	-0.0001*** (0.000)	-0.00002 (0.000)
Years of education	0.033*** (0.005)	0.046*** (0.007)	0.071* (0.037)	0.278** (0.114)	0.060*** (0.015)	-0.025** (0.011)	-0.019*** (0.007)
Years of education, squared	-0.001*** (0.000)	-0.001*** (0.000)	-0.002 (0.001)	-0.009** (0.004)	-0.002*** (0.001)	0.001** (0.000)	0.001*** (0.000)
Male	0.038*** (0.003)	0.024*** (0.004)	-0.011 (0.013)	-0.106* (0.057)	0.016** (0.007)	0.090*** (0.007)	0.009** (0.004)
Married	-0.004 (0.003)	-0.006 (0.004)	0.009 (0.013)	-0.048 (0.059)	-0.007 (0.006)	-0.0119* (0.007)	0.007* (0.004)
Either parents self- employed at age 15	0.059*** (0.005)	0.103*** (0.009)	0.019 (0.016)	-0.122* (0.070)	0.024** (0.010)	0.065*** (0.011)	0.016** (0.006)
Years of experienced unemployment	0.004*** (0.001)	0.000 (0.001)	0.015*** (0.006)	0.052*** (0.018)	0.007*** (0.002)	0.012*** (0.002)	0.003*** (0.001)
Willingness to take risks	0.011*** (0.001)	0.008*** (0.001)	0.013*** (0.003)	-0.009 (0.012)	0.009*** (0.001)	0.016*** (0.001)	0.002** (0.001)
Intercept	-12.32*** (0.553)	-16.41*** (1.125)	-14.22*** (2.420)	-18.31*** (4.963)	-15.07*** (1.586)	-6.572*** (0.900)	-3.200 (2.590)
Number of observations	46,489	16,037	3,926	402	8,297	11,855	5,972
Log pseudolikelihood	-14155	-3863	-1690	-208.2	-2420	-4451	-772.0
Chi ²	2,402***	820.3***	365.2***	74.83***	273.9***	830.8***	183.7***
Pseudo R2	0.0819	0.106	0.120	0.179	0.0576	0.0917	0.101

Notes: results of logistic regression with robust standard errors in parentheses. Marginal effects are reported. *** p<0.01, ** p<0.05, * p<0.1

of formal education and the likelihood of self-employment has a reversed u-shaped form in other occupational environments suggesting those people with the middle level of education have the highest probability to become self-employed. Remarkably, willingness to take risks

is positively associated with self-employment in all occupation with an exception of artistic occupations where this relationship is not statistically significant.

5. Concluding remarks

The present paper was motivated by the ongoing research on the role of personality for entrepreneurship behavior which assumes the existence of a certain personality profile that distinguishes entrepreneurs from non-entrepreneurs (see, e.g., Zhao et al., 2010). This research has a basic assumption that entrepreneurs are rather homogeneous with regard to their personality characteristics. However, critics of the personality approach argued that entrepreneurs may vary highly as they act in different contexts and discover or create different types of opportunities (Gartner, 1989; Aldrich, 1999). Gartner (1989) even claimed that differences among entrepreneurs might be higher than differences between entrepreneurs and non-entrepreneurs. Hence, one of the main aims of the present paper was to address this criticism in an empirical investigation of the relationship between personality and entrepreneurial choice taking into account the context in which an entrepreneur acts. For this purpose, this paper draws on a well-established psychological theory of vocational behavior (Holland, 1985; Schneider, 1987), which explains people's vocational choices by congruence of environmental and personal characteristics, and analyzes the relationship between personality, vocational choices, and the decision to become self-employed.

The findings shed more light on the scarcely investigated issue about the relationship between an entrepreneurial personality and career choices other than entrepreneurial choice. There are indications in the literature that pro-entrepreneurial personality might be conducive to accumulation of entrepreneurship-related human capital. For instance, it has been shown that an entrepreneurial personality profile (high openness to experiences, conscientiousness, extraversion, and low agreeableness and neuroticism) is related to entrepreneurial interests and abilities (Schmitt-Rodermund, 2004) and balanced skill set (Stützer et al., 2012). The present paper provides evidence about possible reasons behind this link. Particularly, it reveals that an entrepreneurial personality profile is strongly associated with the choice of Holland's enterprising and artistic occupations that appear to provide people, who are training for and working in them, with entrepreneurial attitudes, values, skills, and role models. Taking into account an important role of such an occupational context for the development of an individual's willingness and ability to become self-employed, the question arises whether occupational environments mediate the relationship between an entrepreneurial personality

and the entrepreneurial choice. In other words, there is a question whether the significant and positive effect of an entrepreneurial personality on entrepreneurship behavior observed in several empirical studies (Zhao et al., 2010) is due to selection of people with a certain personality profile into occupational environments that are especially conducive for entrepreneurship. Interestingly, the analysis presented in this paper could only reveal a very weak mediation suggesting that an entrepreneurial personality is related to the self-employment status independently of occupational environment in which a person acts. Entrepreneurial personality profile appears to bring about an additional advantage since pro-entrepreneurial types of people are more likely to make career choices that are conducive to the development of skills, values, and attitudes necessary for ending up in active entrepreneurship.

Nevertheless, even environments that seem less likely to be attractive for entrepreneurial personalities have a potential to become highly entrepreneurial. For instance, we find that investigative occupations (scientists, engineers, medical doctors, etc.) demonstrate above-average self-employment rates, although an entrepreneurial personality profile was not associated with the choice of investigative occupations, as in the case with enterprising and artistic occupations. It appears, therefore, that high levels of human capital held by people in investigative occupations may compensate for the absence of necessary psychological capital when it comes to the entrepreneurial choice.

Further, the present study has empirically addressed the claim raised by critics of a person-centric approach to the study of entrepreneurship about high variation of entrepreneurs across contexts (Gartner, 1989). It has been argued that entrepreneurs constitute a highly heterogeneous population since they act in very different environments, discover or create different types of opportunities, and have different motivations for self-employment. More specifically, the paper investigated whether entrepreneurs differ with regard to their personalities depending on the occupational environment where they work. The findings do indeed suggest significant differences with regard to an entrepreneurial personality profile of entrepreneurs across Holland's occupational types. Entrepreneurs with by far the highest scores on entrepreneurial personality act in enterprising occupations, while entrepreneurs in conventional occupations exhibit the lowest scores on this measure. This finding can, in part, be explained by the fact that enterprising occupations are more attractive for pro-entrepreneurial types, while people with a pronounced entrepreneurial personality are significantly less likely to choose a conventional occupation. This is because the tasks of

conventional occupations are less likely to fit an entrepreneurial personality. For instance, conventional occupations (e.g., accountant, actuary) set higher requirements on conforming behavior and precise skills, and suppose working with details rather than with ideas, while entrepreneurial personality appears to be attracted by environments that include tasks like creative thinking, leadership, organization, innovativeness, among others.

More interestingly, when we investigate the relationship between personality and entrepreneurial choice within occupations, the measure of an entrepreneurial personality fit appears to provide more robust results than the separate Big Five dimensions of personality. An entrepreneurial personality profile (Schmitt-Rodermund, 2004; 2007) was significantly and positively associated with the probability of self-employment status across occupational types with an exception of artistic occupations (e.g., artists, musicians, journalists). Among separate Big Five dimensions of personality only openness to experience had a significant and positive association with the probability of self-employment status across occupations (with an exception of investigative occupations), while other dimensions entered the model with the opposite signs depending on an occupation. There is an interesting finding that self-employment was not associated with an entrepreneurial personality within artistic occupations which emphasizes the specificity of opportunities and requirements for self-employment across contexts. Recently, the research paid an increased attention to artistic entrepreneurship (Sundbo, 2011) since artists (in a broad sense, including other creative people such as journalists or organizers of festivals) appear to be especially efficient in generating new and creative ideas which are a core element of entrepreneurship (Schumpeter, 1934). However, artistic entrepreneurs face several problems that are less common to non-artistic entrepreneurs, such as lack of entrepreneurial abilities in acquiring financial capital, lack of managerial experiences, problems with growth and exposure (Sundbo, 2011). Remarkably, an artist's personality may even be hindering for the development of a business project since artists are more focused on the creative idea rather than on its implementation. It is, therefore, not surprising that we find that more agreeable and less extraverted people in artistic occupations are more likely to become self-employed since they may be more sensitive to the market needs than their non-entrepreneurial peers, although the latter may be even more creative.

Among the Big Five dimensions of personality only openness to experience was positively associated with entrepreneurship across occupational environments. Interestingly, openness to experience is the personality dimension with the strongest empirical support in

relation to creativity (Batey and Furnham, 2006). Hence, entrepreneurship and creativity appear to have similar background, at least, in terms of personality predisposition. Feist (1998) in his study on the role of personality in artistic and scientific creativity found that openness to experience was most strongly related to creativity independently of one's occupation. Moreover, he reports that creative people in arts and science have rather different personality profiles. Similarly, the findings of the present study suggest that entrepreneurial creativity (e.g., new venture creation) is also associated with different personality traits depending on the context.

The study provides a number of insights for entrepreneurship education, career counselors, financiers of new business ventures, and individuals who consider becoming self-employed. First, there seem to be self-selection of students into certain disciplines with regard to their personalities. Pro-entrepreneurial individuals appear more likely to self-select into enterprising disciplines (e.g., business studies), and thus, they have an advantage over less-entrepreneurial students in terms of early accumulation of entrepreneurship-related human capital. Since personality traits are difficult to influence (Cobb-Clark and Schurer, 2012), the entrepreneurship education programs may aim at training and transferring of skills that may compensate for the lack of necessary psychological capital. Particularly, entrepreneurship courses may provide awareness of entrepreneur career options within one's occupation. This can in part be achieved by providing successful entrepreneurial role models within an individual's occupational environment, with whom people can associate themselves. A recent trend in developing entrepreneurship courses specially designed for students of non-entrepreneurial disciplines, such as arts, engineering or science students (Kuratko, 2005) appears to be a very promising initiative. Second, it has been shown that entrepreneurial opportunities that people recognize or create differ substantially depending on an individual's background and context (Shane, 2000). According to the person-environment fit theory (Schneider, 1987), a person with a personality profile that matches the chosen environment may be more alert to opportunities provided by this environment (Schneider, 1987). Hence, it may be the case that achieving a good match between an individual's personality and an occupational environment, for instance, through early career counseling, is important for alertness to entrepreneurial opportunities in a given occupation. Third, the assessment of an entrepreneurial personality should involve an individual's occupational type. Those people who score rather low on personality traits that one could think of as entrepreneurial may become entrepreneurs in environments that do not set high requirements on these particular traits, given that they have a certain expertise in the chosen environment.

In summary, this study has shown that the personality approach might be helpful in explaining the phenomenon of entrepreneurship and deserves closer attention. The challenge for the future research and practice will be in considering the role of the context when studying or assessing the role of personality for entrepreneurial outcomes.

REFERENCES

- Aldrich, Howard E. (1999): *Organizations Evolving*. Thousand Oaks, CA: Sage.
- Åstebro, Thomas and Peter Thompson (2011): Entrepreneurs, Jacks of all trades or Hobos? *Research Policy*, 40, 637–649.
- Baron, R.A. (1998): Cognitive mechanisms in entrepreneurship: why and when entrepreneurs think differently than other people? *Journal of Business Venturing*, 13, 275-294.
- 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*, 51, 1173-1182.
- Barrick, Murray R., Michael K. Mount and Rashmi Gupta (2003): Meta-analysis of the relationship between the five-factor model of personality and Holland's occupational types, *Personnel Psychology*, 56(1), 45-74.
- Batey, Mark and Adrian Furnham (2006): Creativity, Intelligence, and Personality: A Critical Review of the Scattered Literature. *Genetic, Social, and General Psychology Monographs*, 132(4), 355-429.
- Bates, Timothy (1995): Self-employment entry across industries, *Journal of Business Venturing*, 10(2), 143-156.
- Baumol, William J. (1990): Entrepreneurship: Productive, Unproductive, and Destructive. *Journal of Political Economy*, 98(5), 893-921.
- Blanchflower, David G. and Andrew Oswald (1998): What Makes an Entrepreneur? *Journal of Labour Economics*, 16, 26–60.
- Boden, Richard J., and Alfred R. Nucci (2000): On the survival prospects of men's and women's new business ventures, *Journal of Business Venturing*, 15(4), 347-362.
- Borghans, Lex, Baster Weel, and Bruce A. Weinberg (2008): Interpersonal Styles and Labor Market Outcomes, *Journal of Human Resources*, 43, 815–858.
- Bosma, Niels, Joland Hessels, Veronique Schutjens, Mirjam Van Praag, and Ingrid Verheul (2012): Entrepreneurship and Role Models, *Journal of Economic Psychology*, 33(2), 410-424.
- Brandstätter, Hermann (1997): Becoming an Entrepreneur—A Question of Personality Structure? *Journal of Economic Psychology*, 18, 157–177.
- Brandstätter, Hermann (2011): Personality aspects of entrepreneurship: A look at five meta-analyses, *Personality and Individual Differences*, 51(3), 222-230.
- Caliendo, Marco, Frank M. Fossen, and Alexander Kritikos (2009): Risk Attitudes of Nascent Entrepreneurs—New Evidence from an Experimentally Validated Survey, *Small Business Economics*, 32, 153–167.
- Caliendo, Marco, Frank Fossen and Alexander Kritikos (2011): Personality Characteristics and the Decision to Become and Stay Self-Employed, *DIW Discussion Papers*, #1113, 2011.
- Carter, Nancy M., William B. Gartner, Kelly G. Shaver, and Elizabeth J. Gatewood (2003): The career reasons of nascent entrepreneurs, *Journal of Business Venturing*, 18(1), 13-39.
- Ciavarella, Mark A., Ann K. Buchholtz, Christine M. Riordan, Robert D. Gatewood, and Garnett S. Stokes (2004): The Big Five and venture survival: Is there a linkage? *Journal of Business Venturing*, 19, 465-483.
- Cobb-Clark, Deborah A. and Michelle Tan (2010): Noncognitive Skills, Occupational Attainment, and Relative Wages, *Labour Economics*, 18, 1-13.
- Cobb-Clark, Deborah A. and Stefanie Schurer (2012): The Stability of Big-Five Personality Traits, *Economic Letters*, 115, 11-15.
- Costa, Paul T. Jr. and Robert R. McCrae (1992): *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five Factor Inventory (NEO-FFI) Professional Manual*. Odessa, FL: PAR.

- Crant, J. Michael (1996): The Proactive Personality Scale as a Predictor of Entrepreneurial Intentions, *Journal of Small Business Management*, 34(3), 42-49.
- Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp, and G.G. Wagner (2011): Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences. *Journal of the European Economic Association*, 9(3), 522-550.
- Eckhardt, Jonathan T. and Scott A. Shane (2003): Opportunities and Entrepreneurship. *Journal of Management*, 29(3), 333-349.
- Feist, Gregory J. (1998): A Meta-Analysis of Personality in Scientific and Artistic Creativity, *Personality and Social Psychology Review*, 2(4), 290-309.
- Filer, Randall K. (1986): The Role of Personality and Tastes in Determining Occupational Structure, *Industrial and Labor Relations Review*, 39, 412-424.
- Fritsch, Michael, Alexander Kritikos, and Alina Rusakova (2012a): Who Starts a Business and Who is Self-employed in Germany? IZA Discussion Paper #6326.
- Fritsch, Michael, Elisabeth Bublitz, and Alina Rusakova (2012b): Berufstätigkeit und Entrepreneurial Choice – Welchen Einfluss hat die Berufstätigkeit auf die Entscheidung zur unternehmerischen Selbständigkeit? In: Köhler, Christoph and Alexandra Krause (eds.): *Arbeit als Ware? Zur Theorie flexibler Arbeitsmärkte*, Bielefeld: transcript.
- Gartner, William B. (1985): A conceptual Framework for Describing the Phenomenon of New Venture Creation. *Academy of Management Review*, 10, 696-706.
- Gathmann, Cristina and Uta Schönberg (2010): How General is Human Capital? A Task-Based Approach. *Journal of Labor Economics*, 28(1), 1-49.
- Gerlitz, Jean-Yves and Jürgen Schupp (2005): *Zur Erhebung der Big-Five-basierten Persönlichkeitsmerkmale im SOEP*, Research Notes. Berlin: German
- Gottfredson, Gary D. and John L. Holland (1996): Dictionary of Holland occupational codes, Psychological Assessment Resources, Odessa.
- Holland, John L. (1985): *Making Vocational Choices: A Theory of Careers*. Englewood Cliffs, NJ: Prentice-Hall.
- Hollander, Melvyn A. and Harry J. Parker (1972): Occupational stereotypes and self-descriptions: Their relationship to vocational choice, *Journal of Vocational Behavior*, 2(1), 57-65.
- Kambourov, Gueorgui and Manovskii, Iouri (2009): Occupational Specificity of Human Capital, *International Economic Review*, 50(1), 63-115.
- Kim, Phillip H., Howard E. Aldrich, and Lisa A. Keister (2006): Access (Not) Denied: The Impact of Financial, Human, and Cultural Capital on Entrepreneurial Entry in the United States. *Small Business Economics*, 27, 5-22.
- Krueger, Alan B. and David Schkade (2008): Sorting in the Labor Market: Do Gregarious Workers Flock to Interactive Jobs? *Journal of Human Resources*, 43, 861-865.
- Kuratko, Donald F. (2005): The Emergence of Entrepreneurship Education: Development, Trends, and Challenges. *Entrepreneurship: Theory and Practice*, 29(5), 577-598.
- Larson, L.M., P.J. Rottinghaus, and F.H. Borgen (2002): Meta-analyses of Big Six Interests and Big Five Personality Factors, *Journal of Vocational Behavior*, 61(2), 217-239.
- Lazear, Edward P. (2004): Balanced Skills and Entrepreneurship, *The American Economic Review*, 94, 208-211.
- McClelland, David C. (1961): *The achieving society*. Princeton, N.J.: D. Van Nostrand.
- Moutafi, Joanna, Adrian Furnham and John Crump (2007): Is Managerial Level Related to Personality? *British Journal of Management*, 18(3), 272-280.
- Mueller, Kathrin (2010): Academic spin-off's transfer speed – Analyzing the time from leaving university to venture. *Research Policy*, 39(2), 189-199.
- Nanda, Ramana and Jesper B. Sørensen (2010): Workplace peers and entrepreneurship. *Management Science*, 56(7), 1116-1126..
- Nieken, Petra and Susi Störmer (2010): Personality as Predictor of Occupational Choice:

- Empirical Evidence from Germany, *Diskussionspapiere des Schwerpunktes Unternehmensführung am Fachbereich BWL*, 2(8).
- Obschonka, Martin, Rainer K. Silbereisen, and Eva Schmitt-Rodermund (2010): Entrepreneurial Intention as Developmental Outcome, *Journal of Vocational Behavior*, 77, 63-72.
- Obschonka, Martin, Rainer K. Silbereisen, Eva Schmitt-Rodermund, and Michael Stuetzer (2011): Nascent entrepreneurship and the developing individual: Early entrepreneurial competence in adolescence and venture creation success during the career, *Journal of Vocational Behavior*, 79, 121-133.
- Patzelt, Holger and Dean A. Shepherd (2011): Recognizing Opportunities for Sustainable Development, *Entrepreneurship Theory and Practice*, 35 (4), 631-652.
- Rauch, Andreas and Michael Frese (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*, 16, 353-385.
- Rusakova, Alina and Michael Fritsch (2012): The Role of Occupational Environments for Entrepreneurial Entry, paper presented at BABSON College Entrepreneurship Research Conference 2012, Fort Worth, TX, USA.
- Satterwhite, Robert C., John W. Fleenor, Phillip W. Braddy, Jack Feldman, and Linda Hoopes (2009): A Case for Homogeneity of Personality at the Occupational Level. *International Journal of Selection and Assessment*, 17(2), 154-164.
- Schmitt-Rodermund, Eva (2007): The Long Way to Entrepreneurship. Personality, Parenting, Early Interests and Competencies for Entrepreneurial Activity Among the *Termites*, In: Rainer K. Silbereisen and Richard M. lerner (eds.), *Approaches to Positive Youth Development*, 205-224. Thousand Oaks: Sage.
- Schmitt-Rodermund, Eva (2004): Pathways to Successful Entrepreneurship: Personality, Parenting, Entrepreneurial Competence, and Interests, *Journal of Vocational Behavior*, 65, 498-518.
- Schneider, Benjamin, 1987: The People Make the Place, *Personnel Psychology*, 40, 437-453.
- Schumpeter, Joseph A. (1934): *The theory of economic development*. Cambridge, Mass.: Harvard University Press.
- Shane, Scott (2000): Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, 11(4), 448-469.
- Shepherd, Dean A. and Dawn R. DeTienne (2005): Prior Knowledge, Potential Financial Reward, and Opportunity Identification, *Entrepreneurship: Theory and Practice*, 29(1), 91-112.
- Stewart Jr., Wayne H. and Philip L. Roth (2007): A Meta-Analysis of Achievement Motivation Differences between Entrepreneurs and Managers, *Journal of Small Business Management*, 45(4), 401-421.
- Stuetzer, Michael, Martin Obschonka, and Eva Schmitt-Rodermund (2012, in press): Balanced skills among nascent entrepreneurs, *Small Business Economics*. doi: 10.1007/s11187-012-9423-2.
- Sundbo, Jon (2011): Creative artists and entrepreneurship. In: Hindle, K., & Klyver, K. (Eds.) *Handbook of Research on New Venture Creation*. Cheltenham: Edward Elgar Publishing, Incorporated, 328-343.
- Tokar, David M., Ann R. Fischer and Linda Mezzydlo Subich (1998): Personality and Vocational Behavior: A Selective Review of the Literature, 1993-1997, *Journal of Vocational Behavior*, 53(2), 115-153.
- Venkataraman, S. (1997): The distinctive domain of entrepreneurship research: an editor's perspective. In: Katz, J. and R. Brockhaus (eds.): *Advances in Entrepreneurship, Firm Emergence, and Growth*. JAI Press, Greenwich, CT.

- Wagner, Gert G., Joachim R. Frick and Juergen Schupp (2007): The German Socio-Economic Panel Study (SOEP) – Evolution, Scope and Enhancements, *SOEPpaper*, #1.
- Ward, Thomas B. (2004): Cognition, Creativity, and Entrepreneurship. *Journal of Business Venturing*, 19, 173-188.
- Winkelmann, Liliana and Rainer Winkelmann (2008): Personality, work and satisfaction: Evidence from the German Socio-Economic Panel, *The Journal of Positive Psychology*, 3(4), 266-275.
- Zhao, Hao and Scott E. Seibert (2006): The Big-Five Personality Dimensions and Entrepreneurial Status: A Meta-Analytical Review, *Journal of Applied Psychology*, 91, 259–271.
- Zhao, Hao, Scott E. Seibert and G. T. Lumpkin (2010): The Relationship of Personality to Entrepreneurial Intentions and Performance: A Meta-Analytic Review, *Journal of Management*, 36(2), 381-404.