

“I see a worthwhile need to be met and I make trial after trial until it comes. What it boils down to is one per cent inspiration and ninety-nine per cent perspiration.”

Thomas Edison, 1929¹

1. Introduction

Extensive research on entrepreneurship has explored the effects of enduring personality traits which include Need for Achievement, Risk Taking, Autonomy, Locus of Control, and Self-Efficacy (Shane & Nicolaou 2014; Rauch & Frese 2007a; Zhao & Seibert 2006; Zhao, Seibert, & Lumpkin 2010) as well as the effects of a variety of non-personality differences such as gender, business experience, prior knowledge, education, network activities, and even parenting style (Jo & Lee 1996; Lee & Tsang 2001; Schmitt-Rodermund 2004; Shane 2004). Separately, a distinct, recently elucidated personality trait, “Grit,” has been defined as “the tendency to pursue long-term challenging goals with perseverance and passion” (Duckworth et al. 2011, p. 175) or “trait-level perseverance and passion for long-term goals” (Duckworth & Quinn 2009, p. 166; Duckworth et al. 2007). The present paper extends existing research by relating Grit to business venturing and specifically to entrepreneurial success by testing the assumption held by many and made explicit in Edison’s quote that perseverance and passion are essential to entrepreneurial success.

In the literature review that follows we summarize research and theory on personality including its hierarchical trait structure, and relationships between personality traits and entrepreneurship. We then proceed to review the nascent literature on trait Grit and report a study which links Grit to firm-level innovativeness and entrepreneurial success.

¹ Quoted in James D. Newton 1987. *Uncommon friends: Life with Thomas Edison, Henry Ford, Harvey Firestone, Alexis Carrel and Charles Lindbergh*, Harcourt, New York, NY, p. 24.

2. Theory and hypotheses development

2. 1. The structure of personality

Over the past two decades or so personality psychology, the study of “an individual’s characteristic pattern of thought, emotion, and behavior, together with the psychological mechanisms—hidden or not—behind those patterns” (Funder 2001, p. 198), has achieved great progress in developing theories, measures, and descriptions of enduring individual differences in cross-situational behaviors and responses to the environment (John, Naumann & Soto 2008). This progress includes reaching a general consensus that five broad factors or “domains” (Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness) capture much of the meaningful variance in the innumerable traits that had been proposed over more than a century of personality research and theory (John et al. 2008).

The identification of those five broad domains, however, does not negate the validity or the usefulness of narrower, more specific traits or “facets”. In fact, most frameworks of personality structure specifically recognize that each of the five broad domains comprise multiple facets—each describing consequential subdomains of personality (Costa & McCrae 1995; DeYoung, Quilty & Peterson 2007). These facets describe narrower patterns of behavior and responses to the environment and, while they share substantial variance with a domain or a combination of domains from the Big Five structure, they capture both shared variance and meaningful unique variance in patterns of behavior and patterns of responses to the environment. It follows logically, and has been demonstrated empirically, that facets are better predictors of specific behaviors than are broad domains (Ashton et al. 1995). While some facets are clearly related to a single higher-level domain, others share substantial variance with more than one domain. Costa and McCrae (1995) have acknowledged such “interstitial” or compound traits, suggesting that “there are traits that appear to lie within two or more domains.

In the language of factor analysis, personality cannot be adequately described by simple structure; some traits load on more than one factor” (Costa & McCrae 1995, p. 25).

2. 2. *Entrepreneurial personality*

The notion that entrepreneurs have distinct personality profiles that predispose them toward venturing or enable them to achieve success in new ventures has interested researchers for decades (for example, McClelland 1965; Palmer 1971). A large body of literature has accumulated exploring personality-entrepreneurship linkages. Some earlier reviews questioned the proposition that entrepreneurs have distinct personality traits or that their personality predicts entrepreneurial behaviors (Brockhaus & Horwitz 1986; Gartner 1989), while more recent research and syntheses— building in part on theoretical and methodological advances in personality psychology itself— have in fact identified important relationships between traits and entrepreneurship that are robust across samples and methods (Rauch & Frese 2007b; Zhao & Seibert 2006; Zhao et al. 2010).

The dependent variables in the extant literature are heterogeneous. The broad rubric of “entrepreneurship” covers variables related to the creation of new ventures (such as “entrepreneurial intentions”), the success of new ventures (“entrepreneurial performance” and venture endurance or “venture survival” (Ciavarella et al. 2004; Zhao et al. 2010)) as well as variables that are different from, but related to—and sometimes conflated with— entrepreneurship, such as “self employment” (Beugelsdijk & Noorderhaven 2005) and persistence in self-employment (Patel & Thatcher 2012). Baron and Shane (2008) offer a useful framework for synthesizing these diverse perspectives on “entrepreneurship” within a process model of successive stages that encompasses the recognition of an opportunity, the decision to proceed toward a new venture, the actual launch of that venture, and the final harvesting of the rewards of the venture (Baron & Shane 2008, pp. 13-14).

2. 2. 1. *The Big Five (domains) and entrepreneurship.* As noted, domains are perceived as the broad traits that define the high-level structure in a reduced personality space and there is general agreement that five broad domains are adequate to describing variance in individual differences at that summary level. Regarding studies of the personality-entrepreneurship relationship, two major meta-analyses of the topic can be found. Zhao and Seibert (2006) who examined the relationship of the five domains to entrepreneurship status, and Zhao et al. (2010) who examined the relationship of personality to entrepreneurial intentions and performance. Both meta-analyses assigned traits from earlier studies to either of the five domains—many of which were not direct measures of one of the five domains. Need for Achievement, for example, was categorized as a measure of Conscientiousness, while Sensitivity and Abstraction were coded as markers of Openness to Experience). Across 23 studies Zhao and Seibert (2006) found that Conscientiousness and Openness-to-Experience had positive relationships with Entrepreneurship Status, while Neuroticism and Agreeableness had negative relationships with Entrepreneurial Status by comparing entrepreneurs, (that is, “someone who is the founder, owner, and manager of a small business and whose principal purpose is growth” (Zhao & Seibert 2006, p. 263)) with “managers”. However, Extraversion could not be related to Entrepreneurial Status. The effects sizes for each trait were small but the multivariate relationship for all five traits was “moderate” ($R = 0.37$).

Zhao et al. (2010), who performed a meta-analysis of the relationships between the five high-level domains (the Big Five) and entrepreneurial intentions and entrepreneurial performance found that Openness-to-Experience and Conscientiousness were the traits most closely and consistently related to entrepreneurial intention and entrepreneurial performance. They also found that Emotional Stability (versus Neuroticism) and Extraversion were related

to both intentions and performance. In addition, they examined the relationships between Risk Propensity and both; entrepreneurial intentions and entrepreneurial success, finding that Risk Propensity was positively related to entrepreneurial intentions but unrelated to entrepreneurial success.

2. 2. 2. *Personality facets and entrepreneurship.* Separate from the Big Five domains, a variety of narrower facets have also been related to entrepreneurship across decades of research. Several traits recur across studies and tie on McClelland's (1965) Need to Achieve as a predictor of entrepreneurial occupations. A meta-analysis conducted by Stewart and Roth (2007), for instance, indicates that achievement-motivation is substantially higher among entrepreneurs than among managers. Similarly, Rauch and Frese (2007a,b), who reviewed the literature linking several personality traits to entrepreneurship, suggest that Need for Achievement, Risk Taking, Innovativeness, Autonomy, Locus of Control and Self-Efficacy all directly relate to entrepreneurship. Highlighting the advantages of measuring narrower, more specific facets of personality, Runch and Frese (2007b) conclude that "entrepreneur research cannot develop a consistent theory about entrepreneurship if it does not take personality variables into account" (Rauch & Frese 2007b, p. 375).

2. 2. 3. *Entrepreneur-specific personality profiles.* Another, somewhat distinct approach to understanding individual difference and their relationship to entrepreneurship has been the development of entrepreneurship-specific constructs and measures purported to gauge entrepreneurial propensity and aptitude. In the academic literature, for example, the "Entrepreneurial Aptitude Test" ("Test di Attitudine Imprenditoriale," or TAI) includes measures of eight subordinate aptitude factors: goal orientation; leadership; adaptability; need for achievement; need for empowerment; innovation; flexibility; and autonomy (Cubico et al.

2010). The popular and trade literatures on entrepreneurship also offer a variety of measures of entrepreneurial ability and fit. Strauss (2012), for example, offers a 21-item unidimensional test of “Entrepreneurship IQ,” the “temperament and skills” required to be a successful entrepreneur (Strauss 2012, pp. 6–9).

Essentially, literature on entrepreneurship has tried to identify cognitive and non-cognitive traits and abilities that define entrepreneurs. These include entrepreneurs’ ability to detect opportunities, make quick decisions under conditions of uncertainty and limited time, as well as to work harder than most of their employees and to possess a wide variety of skills, (including for example, leadership and innovativeness) (Sarasvathy 2001; Shane 2004).

2. 3. *Grit*

Within that understanding of a hierarchical structure in which broad domains subsume numerous more specific facets, recent research and empirics have defined, measured, and clarified the role of Grit, (that is, “the perseverance and passion for long-term goals.”) (Duckworth et al. 2007, p. 1087) as a distinct facet of personality. Grit itself includes two subordinate dimensions: Consistency of Interests (or “Passion”) and Perseverance of Effort (or “Tenacity”) and has been related to success in a variety of domains. Duckworth et al. (2007) showed that Grit is a robust predictor of educational achievement (including level of education completed, grade point average,) and military perseverance (retention of first-year cadets at the United States Military Academy). Grit has also been linked to higher earnings (Díaz, Arias, & Tudela 2012) and has been shown to predispose individuals away from deleterious life outcomes including internet addiction, excessive consumer spending, and gambling (Maddi et al. 2013).

Most intriguingly however, those positive effects of Grit on life outcomes are beyond the effects explained by either IQ or the domains within the Five Factor Model. Duckworth

and her colleagues demonstrated that Grit predicted academic achievement better than IQ, board scores or, from the “Big Five” domains, Conscientiousness (Duckworth et al. 2007; Duckworth and Quinn 2009; Duckworth & Seligman 2005). Grit specifically offers significant marginal predictive power beyond that of Conscientiousness. For example, Díaz et al. (2012) showed that Grit but not Conscientiousness had significant predictive power with regard to earnings after schooling.

The identification and study of trait Grit has taken place within Positive Psychology, “the scientific study of ordinary human strengths and virtues” (Sheldon & King 2001, p.216) or “the use of psychological theory, research, and intervention techniques to understand the positive, adaptive, creative, and emotionally fulfilling aspects of human behavior” (Compton & Hoffman 2013, p. 1). Grit has been discussed as a central aspect of “character” (Tough 2012) and “hardiness” which, together with emotional flexibility, is perceived to be vital to “executive emotional intelligence” (Cooper & Sawaf 1997). In other areas of positive psychology, Singh and Jha (2008) related Grit to happiness and life satisfaction and Duckworth, Quinn and Seligman (2009) showed that Grit was a strong predictor of teacher effectiveness.

2. 4. *Grit and conscientiousness*

Grit, although closely related to the broad personality domain Conscientiousness ($r = 0.77, p < 0.001$; Duckworth et al. 2007, p. 1093) and inversely related with Neuroticism ($r = -0.38$; Duckworth et al. 2007 p. 1093) is nevertheless distinct from Conscientiousness as “Grit overlaps with achievement aspects of Conscientiousness but differs in its emphasis on long-term stamina rather than short-term intensity” (Duckworth et al., 2007 p. 1089). The authors maintain that “The gritty individual not only finishes tasks at hand but pursues a given aim over years” (Duckworth et al. 2007, p. 1089).

Roberts et al. (2009) who reviewed the domain Conscientiousness found that it is a very broad construct and suggest that “The term conscientiousness, being somewhat broad and ambiguous in meaning, is better suited to represent the family of traits that define this domain... [and] is best considered a broad domain of traits, not a unitary construct” (Roberts et al. 2009, p. 369–370). Conscientiousness encompasses facets such as, from the NEO Personality Inventory: Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, Deliberation (Costa & McCrae 1992). A factor analysis from seven major conscientiousness scales and facet scores conducted by Roberts et al. (2005) identified six factors: Industriousness, Order, Self-Control, Responsibility, Traditionalism, and Virtue.

Thus, while Grit’s place in the hierarchical structure of personality may well be a facet of Conscientiousness, Grit also encompasses unique content related to *long-term* diligence as well as *passion* for a goal which distinguishes it from definitions of Conscientiousness and its previously-identified facets that emphasize short-term concentration and impulse control, achievement orientation, and conformance with expectations and tradition. Whether or not Grit overlaps with or is subordinate to Conscientiousness, it has been demonstrated to offer important explanatory power in variables related to long-term tenacity and passion for goals across time—which is a distinctive power that is also likely to explain success in the entrepreneurial context.

We expect that the two dimensions of Grit – Perseverance of Effort (or “Tenacity”) and Consistency of Interests (or “Passion”) can be related to innovation success and firm performance particularly because individuals react differently to adversities and success in entrepreneurial contexts (Markman, Baron, & Balkin 2005; Stoltz 1997). Perseverance—including attributes like hard work, diligence, finishing whatever one begins—has been related to stress endurance when coping with setbacks and accomplishments that individuals eventually realize (Bandura 1997). It determines the level of effort that individuals put forth

while pursuing their endeavors, it represents their endurance and resilience when facing setbacks and repeated failures (Eisenberger & Leonard 1980). Extending this established notion of Perseverance Duckworth et al.'s (2007) definition of Grit also includes the passion for long-term goals or "Consistency of Interests": Grit is thus defined "...as perseverance and passion for long-term goals. Grit entails working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress. The gritty individual approaches achievement as a marathon; his or her advantage is stamina. Whereas disappointment or boredom signals to others that it is time to change trajectory and cut losses, the gritty individual stays the course." (Duckworth et al. 2007, p. 1087–1088). The consistency of interests scale that Duckworth et al. (2007) developed uses items like (reversely coded) "I have been obsessed with a certain idea or project for a short time but later lost interest", "I have difficulty maintaining my focus on projects that take more than a few months to complete", or "I often set a goal but later choose to pursue a different one" (Duckworth et al. 2007, p. 1090).

Although being conceptually different, the two central components of Grit (that is, perseverance of effort and consistency of interest) have so far been treated indistinctively, which means that no subscale-specific effects have been studied adequately (Duckworth et al. 2011; Duckworth et al. 2007; Nambisan & Baron 2013; Silvia et al. 2013). This is particularly intriguing in the context of innovation, in which the differentiation between perseverance of effort and consistency of interest might be an important one.

Since innovation is assumed a risky and daunting task, we believe that once an innovation goal has been set, perseverance should predict higher efforts to attain this goal. In further consequence, we argue that entrepreneurs who score high on perseverance of effort are more successful in their innovation efforts and their companies perform better.

We therefore expect that

H1: Perseverance of effort is positively related to innovation success

and

H2: Perseverance of effort is positively related to organization performance.

Furthermore, we believe that the second component of Grit (that is, consistency of interest) is negatively related to innovation performance. This notion is grounded in the circumstance that innovation requires a challenge of the status quo for new ideas to be introduced.

Hence, we argue that consistency of interest can stand in contrast to innovation for two reasons. First, consistency of interest should be detrimental to innovation as we believe that individuals who often change their interests or decide to pursue new objectives should be more innovative than those who stay the course. People who change their interest more often, will more likely try different things, change ideas, objectives, and approaches. The change of interests will be more likely associated with March's (1991) notion of exploration as 'search, variation, risk-taking, experimentation, play, flexibility, discovery, and innovation' (p. 71).

Second, innovation is related to uncertainty and requires experimentation (Thomke S., 2003). The tension between perseverance and quickly adapting and changing a business model or a product has been described and popularized by Ries (2011) in his New York Times bestseller "The Lean Startup". The term "pivoting" thereby describes a fast and major change "designed to test a new fundamental hypothesis about the product, business model, and engine of growth" (p. 178). Especially in entrepreneurship and innovation literature "pivoting" has become a central concept (e.g. Ismail et al. 2014, Keese, 2014, Contamessa and Montagna, 2015) that describes how entrepreneurs and innovators "translate their vision into falsifiable business model hypotheses, then test the hypotheses using a series of "minimum viable products," each of which represents the smallest set of features/activities needed to rigorously validate a concept. Based on test feedback, entrepreneurs must then decide whether to

persevere with their business model, "pivot" by changing some model elements, or abandon the startup." (Eisenmann et al. 2011). Pivoting, as a behavior of quickly changing an idea, a product or a business model according to changing circumstances is considered as a prerequisite for innovation success in a dynamic and uncertain environment.

This argumentation, however, does not necessarily apply when it comes to company performance. It is well conceivable that companies of entrepreneurs who score high on consistency of interest perform well, as organizations which focus their efforts on specific tasks for a long time should become more efficient and productive in their resource allocation. Individuals with a high consistency of interest will be more efficient than their competitors as "being obsessed with a certain idea", "maintaining focus on projects", pursuing *one* goal in the long run, or not being distracted by new ideas or projects leads to more efficiency and disciplined execution. Thus, with less distraction, more focus in the pursuit of *one* goal, consistency of interest will lead to more efficiency in implementation and execution. Thus, consistency of interest is expected to be positively related to company performance.

H3: Consistency of interest is negatively related to innovation success
and

H4: Consistency of interest is positively related to organization performance.

Consistency of interest could, however, have an indirect effect on organizational performance via innovation success as innovation is a key source of competitive advantage and sustained success (Rosenbusch, Brinckmann, & Bausch 2011). Particularly in the case of small and medium-sized enterprises it has been argued that they benefit more from innovation than their larger counterparts, as they are more agile and have a less hierarchical and faster decision-making structure (Nooteboom 1994; Vossen 1998). Building on a wealth of studies that find a

positive relationship between innovation and performance in SMEs (for a review see for example the meta-analysis of Rosenbusch et al. 2011)), we expect that

H5: Innovation success is positively related to organization performance.

3. Data and analysis

3.1. Data

We collected data using an online survey in which a questionnaire was sent out to 1500 potential respondents that have been chosen randomly from a purchased list of organizations. In total, 281 usable questionnaires were completed. Grit was measured using the original, 12-item Grit scale developed by Duckworth, et al. (2007). Innovation success was measured by asking our respondents to indicate how well they think their organizations performs in terms of innovativeness, the launch of new products, the introduction and use of new technologies, as well as the success-rate of their new products, services or processes (“How innovative is your company compared to your strongest competitors?”, “How do you evaluate your company’s performance regarding the launch of new products compared to your strongest competitors?”, “How do you evaluate your company’s performance regarding the introduction and use of new technologies compared to your strongest competitors?” and “How do you evaluate the success-rate of your company’s new products, services or processes?”). Each item was measured on a five point Likert-type scale ranging from 1= much worse to 5= much better.

To measure New Venture “Success” we asked our respondents to evaluate their organization in terms of growth, profitability and it’s general competitive position in comparison to their strongest competitors (“How do you evaluate your company’s performance regarding growth in comparison to your strongest competitors?”, “How do you evaluate your company’s performance in terms of profitability in comparison to your strongest competitors?” and “How do you evaluate your company’s general competitive position in comparison to your

strongest competitors?”). Again we employed a five point Likert-type scale ranging from 1= much worse to 5= much better to measure each item.

For testing our survey instrument we followed the suggestion of Churchill (1995) and conducted a two-step pre-test. Following some minor adoptions in the wording, we finalized the questionnaire according to the recommendations of Dillman (2000). We then tested the incoming questionnaires for non-response bias by comparing the questionnaires of early and late respondents as suggested by Armstrong and Overton (1977). The results of the test indicate no major non-response bias problem in our data as there are no significant differences between early and late respondents. Finally, we also applied Berdie and Anderson’s (1976) item response-rate index to assess whether item non-response bias poses a problem in our data (Berdie & Anderson 1976). Observing only 2.4 percent missing values we conclude that item non-response bias is not a serious problem.

3. 2. Analysis

Table 1 provides information on gender, education and job tenure of our respondents, as well as their organization’s size and industry type.

>> insert table 1 here <<

For assessing our theoretical assumptions, we chose to apply variance-based structural-equation-modeling (SEM) with SmartPLS (Ringle, Wende, & Will 2005). Despite missing a global Fit index like RMSEA—even though Tenenhaus et al. (2005) developed a Goodnes of Fit index for diagnostic purposes (Wetzels et al. 2009, p. 182) rather than formal testing (Tannenhaus et al. 2005)—we chose this method based on several conveniences: 1) PLS is suited for testing complex models due to the block wise estimation (Haenlein & Kaplan 2004),

2) sample size requirements are lower than with covariance based structural equation modeling (Fornell & Bookstien 1982; Haenlein & Kaplan 2004; Tannenhaus et al. 2005), 3) the accuracy of reflective measurement models is comparable to the results of covariance-based approaches (Vilares et al. 2010) and 4) it is particularly suitable for our study since PLS optimizes the dependent variables locally rather than the whole structural model at once, thereby indicating a higher predictive character for explaining innovation and performance.

Before the analysis of our model however, we tested our data for common method bias. Since we gathered our dependent and independent variables from the same respondents at a particular time with the same survey instrument, the risk of common method bias due to consistency motives of social desirability exists (Podsakoff et al. 2003) To work against a potential common method bias, we first measured our cognitive constructs as latent variables (Harrison et al., 1996), second, we separated the variable blocks and third, the consistency of interests scale was reversely coded (Podsakoff et al. 2012). To test for common method bias, we applied two different tests, as suggested by literature. At first we conducted Harman's single factor test as suggested by Podsakoff and Organ (1986). The global factor analysis indicates four different and independent factors that combined explain 61.93 percent of variance—the highest single factor accounting for 27.12 percent of variance—which indicates that Common Method Bias is not a serious problem in our sample. As Harman's single factor test was criticized, we additionally applied the so-called ad hoc approach, which, according to Podsakoff et al. (2003) is a stricter method for testing for common method bias. We followed the guidelines developed by Liang et al. (2007) and tested for common method bias using PLS. The resulting ratio of method variance to substantive variance of 22.3 to 1 (see Appendix 2) leads us to assume that common method variance or bias is not a serious problem in our data.

Since the evaluation of PLS models generally requires three sets of methodological considerations (that is 1) testing the reliability and validity of the applied measures, 2) testing

the relationships between the measures and the constructs and 3) interpreting the relationships between the constructs (Hulland 1999), we began by evaluating factor loadings, Composite Reliability, as well as Average Variance Extracted (Henseler, Ringle & Sinkovics 2009).

When assessing the originally proposed GRIT scale, six items showed low loadings. These items were deleted (Appendix 1 shows all items used in the analysis). Afterwards the results of the evaluation indicate that all but three manifest indicators have loadings above or equal to the recommended value of 0.7. Based on their strong theoretical rationale, and the fact that the three remaining indicators have loadings close to the recommended threshold of 0.7 (the loadings were 0.690, 0.682, and 0.647), we decided to keep all indicators in our model. We did this also in accordance with Hulland (1999) who suggests that only items with loadings of 0.4 or less should be excluded with certainty.

Assuming indicator reliability for all our latent variables, we assessed construct reliability by computing Composite Reliability. Aiming at 0.7 as the basic threshold (Henseler et al., 2009) we found that our Composite Reliability measures were all above 0.7. Construct validity was assessed by examining Average Variance Extracted (AVE). Our assessment shows that all AVE values are clearly above the recommended minimum threshold of 0.5 as suggested by literature (Götz & Liehr-Gobbers 2004; Henseler et al. 2009; Hulland 1999). For details with regards to the validity and reliability of the measurement models, please see Appendix 3.

In a next step we proceeded with the assessment of Discriminant Validity on indicator level with cross loadings assessment (for details see Appendix 4), and on latent variable level with the Fornell-Larcker criterion (for details see Appendix 5) (Hulland 1999; Henseler et al. 2009)). As the assessment showed, Discriminant Validity is given. After ensuring that our model is valid and reliable we could proceed to the next step, which is to and evaluate our structural model.

The figure 1 below shows the estimations obtained from PLS structural equation modeling. The R^2 value of our dependent variable “performance” of 0.270 indicates that our model explains a moderate share of variance (Chin 1998; Henseler et al. 2009). Our empirical data reconstructs the theoretical model, as the Stone-Geisser criterion shows. All Q^2 values are above the recommended value of $Q^2 > 0$ (Fornell & Cha 1994; Tenenhaus et al. 2005).

>> insert figure 1 here <<

Applying the only global fit index for PLS variance-based structural-equation-modeling (that is the Goodness of Fit index developed by Tenenhaus et al. (2005) yielded a *GoF* value of 0.33 which, according to Wetzels et al. (2009) indicates a substantially good model fit from which we could start to evaluate our proposed hypotheses.

4. Results

Hypothesis 1 suggests that perseverance of effort is positively related to innovation success. This hypothesis can be confirmed as the path coefficient is significant and strongly positive with a value of 0.296** and an f^2 value of 0.095, which indicates a moderate effect size. The path from perseverance of effort to performance is not significant; hence, hypothesis 2 is rejected. The path coefficient from “consistency of interests” on “innovation” is significant and negative and, according to literature (Chin 1998; Henseler et al. 2009), quite strong as the path coefficient is - 0.153*² and the effect size f^2 is 0.02. This result indicates a low to medium negative effect from consistency of interests on innovation. Hence, hypothesis 3 is confirmed. Also hypothesis 4 finds support. The path coefficient is significant at a 10 percent level ($\beta =$

² †p<0.1; * p<0.05; ** p<0.01; *** p<0.001

0.111; $f^2 = 0.02$) and positive, indicating that increased consistency of interests positively affects performance. The strongest empirical support is found for the relationship from innovation to performance, supporting hypothesis 5. The high path coefficient value of 0.515*** and the f^2 value of 0.31 indicates a strong effect from “innovation” on “performance”.

As the effect of perseverance of effort on company performance is not significant and the effect of consistency of interest on performance is weak and significant only on a 10 percent level, the possibility for a mediation effect exists.

A major argument for using PLS SEM is that no distributional assumptions are made. Consequently we applied the bootstrapping-based mediation-test approach as suggested by Preacher and Hayes (2008). Therefore we used the latent variable scores provided by SmartPLS and calculated the mediation effects in SPSS. The results of our regression analysis show, that perseverance of effort is positively related to performance ($B = 0.175$; $t(284) = 2.9882$; $p = 0.003$; c-path) and positively related to innovation ($B = 0.281$; $t(284) = 4.9297$; $p = 0.000$; a-path). The path from innovation on performance is strongly significant and positive ($B = 0.497$; $t(284) = 9.3142$; $p = 0.000$; b-path). For calculating the mediation we applied bias-corrected confidence estimates (Preacher & Hayes 2004; MacKinnon et al. 2004) and run the procedure with a 95 percent confidence interval with 5.000 bootstrap-resamples as suggested by Preacher and Hayes (2008). The results indicate 1) a significant mediation ($B = 0.1402$; $CI = 0.0742$ to 0.2312) and 2) they indicate a full mediation, as the c' path becomes insignificant ($B = 0.0351$; $t(284) = 0.6574$; $p = 0.511$). We find no empirical evidence however, for mediation of “consistency of interests”.

5. Conclusion

It has been asserted that “entrepreneurship is fundamentally personal” (Baum et al., 2007 p. 1). The current research tests the relationship between a fairly recently explicated personality

trait—trait Grit with its two components “Consistency of interest” and “Perseverance of efforts”—and innovation and entrepreneurial success. We found support for our assumption that the two components, that in previous literature have not been treated separately (Duckworth et al. 2011; Duckworth et al. 2007; Nambisan and Baron 2013; Silvia et al. 2013), have different effects on innovation and performance. Grit has received interest in recent entrepreneurship literature (Nambisan & Baron 2013). [So far, however, the effects of Grit on innovation and performance in an organizational context have not been tested empirically \(Nambisan & Baron, 2013\). Previous studies on the impact of broad personality traits \(e.g. the Big Five\) on entrepreneurial success have produced little consensus \(e.g. Baron, Frese and Baum, 2007\). Although some meta-analyses could find some effects of personality traits on entrepreneurial success \(e.g. Brandstätter, 2011\) it has also found that narrow personality traits predict outcomes better than broad traits \(Rauch and Frese, 2007\). Hence, accepting a hierarchical understanding of personality, which assumes that broad domains consist of more specific facets \(see for example Mooradian et al., 2007\), the use of grit as such a distinct facet of personality should be better able to predict entrepreneurial or organizational success.](#) With this study we contribute to a better understanding of the role of personality traits for entrepreneurial success by (a) showing that perseverance of effort is an important predictor of innovation success as it indirectly—through innovation success—influences performance, and that (b) consistency of interest negatively influences innovation success but positively affects performance. The finding that the two components of the construct can have different effects is in itself an important contribution to the literature on Grit—since previous studies, though acknowledging that the two components are conceptually different, have not treated them so empirically.

This study also has some important implications for entrepreneurship research. First, it has been shown that Grit influences innovation and performance in an entrepreneurial context.

The construct Grit has been introduced very recently (Duckworth et al. 2007) and future studies should aim at studying its effect on other important constructs in entrepreneurship literature such as orientations (for example entrepreneurial orientation (Lumpkin & Dess 1996), long-term orientation (Brigham et al. 2013), commitment (for example organizational commitment, the influence on employee's commitment through contagion effects (Breugst et al. 2012), or other outcome variables (for example opportunity identification, venture formation, venture growth). Especially in the context of innovation it could be interesting to see whether the two Grit components influence exploration and exploitation (or ambidexterity) success (He & Wong 2004; March 1991) in different ways.

As most empirical work, this study is of course not free of limitations. First, we used self-reported instruments whose limitations are well known. The Grit scale, as Duckworth et al. (2007) note, is relatively transparent and therefore vulnerable to social desirable answers. While we assured anonymity to our respondents, a social desirability bias could not be excluded completely. Future studies therefore should try to use other measures. Second, we used self-reported innovation and company performance data and data were collected from a single source. While we took several measures to exclude a common method bias and our empirical tests did not indicate one, other measures and data collection methods would be preferable (for example objective performance, patent counts). Third, innovation is a broad construct. It could well be that the two Grit components are related differently to different types of innovation. Exploratory innovation is more risky and more long-term than incremental innovation. Hence, perseverance of efforts and consistency of interests might affect different types of innovation in different ways. By studying the impact of Grit on these variables and other entrepreneurship-related constructs (for example entrepreneurial orientation), such research might provide important, new insights in the role of entrepreneurial traits for entrepreneurial attitudes, behaviors, and success.

Appendix A. Means and Standard Deviations of the Scale Items

Items	Mean	STDV
<i>Consistency of interest</i>		
My interests change from year to year (RC)	3.86	0.993
I have been obsessed with a certain idea or project for a short time but later lost interest (RC)	3.75	3.75
I become interested in new pursuits every few months	3.39	1.148
<i>Perseverance of effort</i>		
I am diligent	4.39	0.768
I finish whatever I begin	4.31	0.767
I am a hard worker	4.01	0.918
<i>Innovation success</i>		
Introduction of new products and services	3.55	0.880
Use of new technologies	3.33	0.968
Success rate of new products and services	3.48	0.824
Innovativeness	3.69	0.890
<i>Company performance</i>		
General competitive position	3.51	0.753
Growth	3.21	0.803
Profitability	3.40	0.887

Appendix B. Common Method Bias Testing

Construct	Indicator	Loading	Loading ²	Method factor loading	Method factor loading ²
Consistency of interests	CoI_1	0.700	0.490	0.257	0.066
	CoI_2	0.908	0.824	0.322	0.104
	CoI_3	0.848	0.719	0.234	0.055
Perseverance of effort	PoE_1	0.648	0.420	-0.050	0.003
	PoE_2	0.537	0.288	0.053	0.003
	PoE_3	0.697	0.486	0.056	0.003
Innovation	Inn_1	0.744	0.554	-0.102	0.010
	Inn_2	0.730	0.533	-0.020	0.000
	Inn_3	0.738	0.545	-0.002	0.000
	Inn_4	0.593	0.352	-0.201	0.040
Performance	Per_1	0.604	0.365	-0.046	0.002
	Per_2	0.655	0.430	-0.017	0.000
	Per_3	0.643	0.413	0.038	0.001
Sum		9.045	6.418	0.522	0.288
Mean		0.696	0.494	0.040	0.022

Appendix C. Scale properties

Validity and reliability of the measurement models						
Construct	Item	Loading	T-Value	Significance	Composite reliability	AVE
Consistency of interests	CoI_1	0.690	4.810	***	0.797	0.569
	CoI_2	0.848	6.691	***		
	CoI_3	0.715	5.283	***		
Perseverance of effort	PoE_1	0.895	25.560	***	0.812	0.594
	PoE_2	0.719	9.552	***		
	PoE_3	0.682	7.441	***		
Innovation	Inn_1	0.840	35.640	***	0.869	0.624
	Inn_2	0.830	33.141	***		
	Inn_3	0.713	17.635	***		
	Inn_4	0.771	21.350	***		
Performance	Per_1	0.851	18.062	***	0.817	0.602
	Per_2	0.814	24.355	***		
	Per_3	0.647	7.725	***		

Appendix D. Cross-loadings

Cross-loadings					
Items	Consistency of interests	Perseverance of effort	Innovation	Performance	
CoI_1	0.690	0.152	-0.065	0.041	
CoI_2	0.848	0.013	-0.117	0.051	
CoI_3	0.715	0.109	-0.088	0.015	
PoE_1	0.050	0.895	0.258	0.202	
PoE_2	0.179	0.719	0.180	0.100	
PoE_3	0.029	0.682	0.203	0.067	
Inn_1	-0.073	0.224	0.840	0.458	
Inn_2	-0.128	0.213	0.830	0.339	
Inn_3	-0.005	0.258	0.713	0.365	
Inn_4	-0.167	0.199	0.771	0.427	
Per_1	0.110	0.155	0.431	0.851	
Per_2	0.006	0.163	0.430	0.814	
Per_3	-0.059	0.054	0.293	0.647	

Appendix 5. Fornell and Larcker Criterion

Fornell and Larcker Criterion					
AVE	Construct	Consistency of interests	Perseverance of effort	Innovation	Performance

0.569	Consistency of interests	1			
	Perseverance				
0.594	of effort	0.015	1		
0.625	Innovation	0.002	0.257	1	
0.602	Performance	0.010	0.079	0.030	1

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