The Entrepreneurial Personality: A New Framework and Construct for Entrepreneurship Research and Practice

Ph.D. Thesis

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Declaration

I confirm that the work presented in this thesis is my own and that the work of other persons is appropriately acknowledged.

Gorkan Ahmetoglu

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Abstract

The aim of this thesis was to investigate individual differences in entrepreneurial personality and their relationship to performance criteria. Specifically, three main objectives were proposed: (a) to develop a theoretical framework of the entrepreneurial personality, based on the principles of differential psychology, (b) to test how this personality construct related to other trait measures of personality, and (c) to assess how this personality construct related to performance outcomes. To this end, the current thesis presented an alternative framework for investigating the entrepreneurial personality, not currently present in entrepreneurship research. The framework followed a critical review of the entrepreneurship literature and a content analysis of the meaning of the concept. Based on this content analysis, a new operational definition of entrepreneurship was proposed: *entrepreneurship is an activity related to innovation, recognition and exploitation of opportunities, and creation of value.* In this framework, three main tenants were present: 1) the entrepreneurial behaviours identified by the content analysis cannot be exclusive to business founders, 2) there are individual differences in the tendency and ability to engage in these behaviours, 3) individuals who have a greater tendency and ability to engage in these entrepreneurial behaviours, are by definition, perceived as more entrepreneurial. Thus this operational definition provided a basis for a theoretical framework for distinguishing between more and less entrepreneurial individuals. In order to empirically investigate individual differences in entrepreneurial personality, a psychometric approach was undertaken, where a self-report inventory of entrepreneurial tendencies and abilities (META) was developed. The reliability and factor structure of this measure were established, and its construct validity in relation to a multitude of trait

measures, including the Big Five personality traits, Trait Emotional Intelligence, Core Self-Evaluations, Locus of Control, Primary and Secondary Psychopathy, Machiavellianism, Vocational Interests, General Mental Ability, Divergent Thinking, as well as relevant demographic variables, was established. Furthermore, META was consistently found to be the single best predictor of performance outcomes across nine studies, including number of businesses started, corporate entrepreneurship, social entrepreneurship, innovative entrepreneurship, creative achievements within arts and sciences, task and contextual performance, income, engagement, and intentions to quit a current job. META was found to positively and moderately predict these performance outcomes, over and above (incrementally) established psychometric tests.

In sum, the results of the doctoral thesis have important theoretical and practical implications for entrepreneurship research and practice. Specifically, the thesis provided a) a new theoretical framework for researching the entrepreneurial personality, b) support for the distinctness of this personality construct in relation to other trait constructs, c) demonstrated that this construct may be able to explain significant performance differences between individuals on criteria that are likely to be of substantial importance for individuals, organisations, and governments alike. The implications of a theoretical understanding and measurement of the entrepreneurial personality can be of practical importance for researchers concerned with investigating the entrepreneurial personality concept, organisations concerned with increasing their competitive advantage through human resources practices of selecting, developing, and managing entrepreneurial individuals, and for individuals and government bodies concerned with increasing the potential of start-ups and business founders to be successful in their new and established

ventures by assessing the entrepreneurial tendencies of founders and their team, and customizing intervention strategies in more informed ways.

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Chapter 1: Psychological Approach to Entrepreneurship

1.1. Introduction

Entrepreneurship is thought to be a major source of employment, economic growth, and technological progress (Kuratko, 2003; Reynolds, Bygrave, & Autio, 2004). Writers in both the scholarly literature (e.g., Hisrich, Langan-Fox, & Grant, 2007) and popular press (e.g., Wooldridge, 2009) have argued that entrepreneurship is an essential feature of high-performing firms. Indeed, entrepreneurship is today supported by political leaders, championed by powerful pressure groups, and embraced by the rising generation (Wooldridge, 2009). Furthermore, governments are increasingly viewing entrepreneurship as a means to grow national assets, increase the wealth of its citizens, and even exert political influence on the world stage (Hughes, 2008). Even public sectors view entrepreneurship as a means to become more efficient and effective (Chell, 2008).

With this in mind, a deeper understanding of the 'drivers' of entrepreneurship is no doubt of fundamental value to businesses, economies, and society at large. It is not surprising, therefore, that the field occupies a large body of literature, despite having emerged only in the last 20 or 25 years (Baron & Henry, 2010; Hisrich, et al., 2007). Entrepreneurship has been studied at several different levels of analysis, including the individual, the organisational, the national, and the international (Shane, 2008), and in different academic disciplines, comprising economics, business, and sociology (Hisrich et al., 2007). Whilst these disciplines often look at entrepreneurship from a macro-level of

analysis, the most common denominator of entrepreneurship research arguably remains at the individual level – at the micro-level of analysis (Baum, Frese, Baron, & Katz, 2007). Research at this level is concerned with understanding the role of the person in the process of entrepreneurship (Hisrich et al., 2007), and consequently, the identification of the psychological characteristics of the people behind entrepreneurship. Past research within the field has almost ubiquitously focused on a particular subgroup of individuals and their psychological traits – namely 'entrepreneurs' (Zhao & Siebert, 2006).

The basic assumption held by the psychological approach is that entrepreneurship "is fundamentally personal" (Baum, Frese, Baron, & Katz, 2007, p. 1), that is, it is the result of individuals' actions. For instance, Kizner (1997) argues that entrepreneurs - through creativity, hard work, and a willingness to accept financial risk - innovate, pursue new opportunities, and create value for others. Accordingly, in the literature, entrepreneurs have often been described as a "unique population" (Baron & Henry, 2010; p. 268), or special breed (Stanworth & Kaufman, 1996). Some authors have even argued that the entrepreneur is "the single most important player in a modern economy" (Lazear, 2004, p. 1). Consequently, individuals have been depicted as playing a key role in the macro-level entrepreneurship process (Baron & Henry, 2010), and widespread research efforts have focused on understanding the psychological characteristics, or 'traits', of entrepreneurs (Rauch & Frese, 2007). This line of research is most commonly referred to as the 'trait approach' to entrepreneurship (Gartner, 1988; McClelland, 1965). Figure 1 depicts the conceptual idea of the key role of the individual in the macro-level outcomes discussed in other disciplines, demonstrating the importance of the study of the person in entrepreneurship.

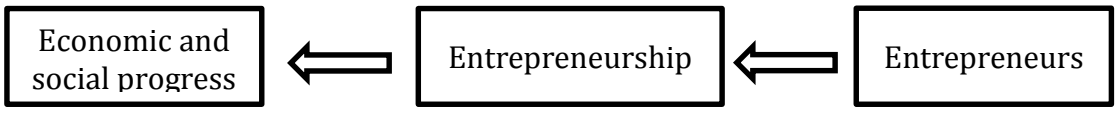

Figure 1. The individual level approach to entrepreneurship

The 'Trait Approach' to Entrepreneurship

Research on the trait approach stretches back several decades (e.g. McClelland; 1961). Numerous psychological traits have been investigated in research, with a primary focus on personality dimensions (Brandstatter, 2011). Chell (2008) refers to such efforts as the search for the 'entrepreneurial personality'. Methods of investigating the entrepreneurial personality have most commonly comprised examining individual differences between entrepreneurs and non-entrepreneurs, as well as between more and less successful entrepreneurs (e.g. Baum, Frese, Baron, & Katz, 2007; Rauch & Frese, 2007; Stewart & Roth, 2001, 2007; Zhao & Seibert, 2006, Zhao, Seibert, & Lumpkin, 2010). Two broad research questions have, therefore, been the focus of research (cf. Baron, 2002):

1. Why do some people but not others become entrepreneurs?
2. Why do some people make more successful entrepreneurs than others?

Inconsistencies in the Trait Approach

Despite the increased interest in research, and hundreds of studies conducted in the field, attempts to distinguish entrepreneurs from non-entrepreneurs (and successful from non-successful ones) in terms of their personality characteristics have received mixed support (Chell, 2008; Cromie, 2000; Hisrich, 2000; Hisrich et al., 2007; Miner &

Raju, 2004). Indeed, initial narrative reviews in the 1980s and 1990s found little evidence for a relationship between personality and entrepreneurial status, which led Aldrich (1999, p.76) to conclude that "research on personal traits seems to have reached an empirical dead end." Although some recent meta-analyses have contested these initial views by showing significant relations between personality and entrepreneurship (e.g. Collins, Hanges, & Locke, 2004; Rauch & Frese, 2007; Stewart & Roth, 2001, 2007; Zhao & Siebert, 2006), there remains an overarching disagreement in the literature as to the usefulness of personality as a construct in entrepreneurship research (Chell, 2008; Ciavarella, Bucholtz, Riordan, Gatewood, & Stokes, 2004; Hisrich et al., 2007; Miner & Raju, 2004, Shane, 2008).[1] For instance, Chell (2008; p. 88) notes that "there seems to be little agreement regarding the profile of the entrepreneur". In line, Reynolds (2007) suggests that most differences between entrepreneurs and the rest of the population are attributable to demographic (e.g. age, race, gender) rather than psychological factors. Baum, Frese, and Baron (2007, p xiii) further state that "the psychological factors and relationships that play a role in successful entrepreneurship are not clear".

A number of explanations have been put forward to account for these discrepancies found in the trait approach. For instance, Hisrich et al. (2007) in their review, list factors including: a) relatively limited interest from psychologists, b) limited empirical research on the topic (cf. Rauch & Frese, 2007), c) methodological shortcomings in research (Chandler & Lyon, 2001; Gregoire, Noel, Dery, & Bechard, 2004), and d) lack of definitional clarity and convergence toward a single paradigm

[1] Some of the limitations of these meta-analyses will be discussed further in below sections.

(Burg, Georges, & Rome, 2014; Davidsson, 2008).[2] Although it is beyond the scope of this thesis to cover each in detail, the limitations of previous research will be outlined within a theoretical framework provided in the current Chapter. In particular, this framework contends that a lack of definitional and theoretical precision (i.e. point d above) can be used to explain many of the key impediments in the literature.

The current thesis, therefore, is structured in the following way: Chapter 1 presents a critical evaluation of the theoretical and empirical challenges with the most widely used definition of entrepreneurship in the literature – that of business creation. The critical evaluation demonstrates that this definition fails to provide a reliable and comprehensive taxonomy of entrepreneurial activities and behaviours that can be empirically linked to economic outcomes (e.g. Reynolds et al., 2004), and significantly limits the ability of researchers to investigate individual differences in entrepreneurial activities. Following from this evaluation, a new theoretical framework and operational definition of entrepreneurial activity is offered, based on a content analysis of the entrepreneurship literature dealing with the meaning of the concept. The aim of this operational definition is to provide the field with a taxonomy for researching individual differences in entrepreneurial activity and behaviour. In order to empirically assess these individual differences, Chapter 2 outlines the development a psychometric measure of entrepreneurial tendencies and abilities to engage in these activities and behaviours. This empirical research conducted over 10 studies was aimed to investigate how individual differences in entrepreneurial tendencies and abilities, as measured by the psychometric test, related to a wide range of entrepreneurial, business, and creative outcomes, as well

[2] Detailing these issues are beyond the scope of this doctoral thesis; readers are referred to the original sources for detailed discussions on each of these issues.

as other psychological constructs. Chapter 3 discusses the implications of the thesis for new theoretical and empirical avenues in entrepreneurship research and practical implications of using the psychometric tests for researchers and practitioners in applied settings. Figure 1 presents the flow of the thesis.

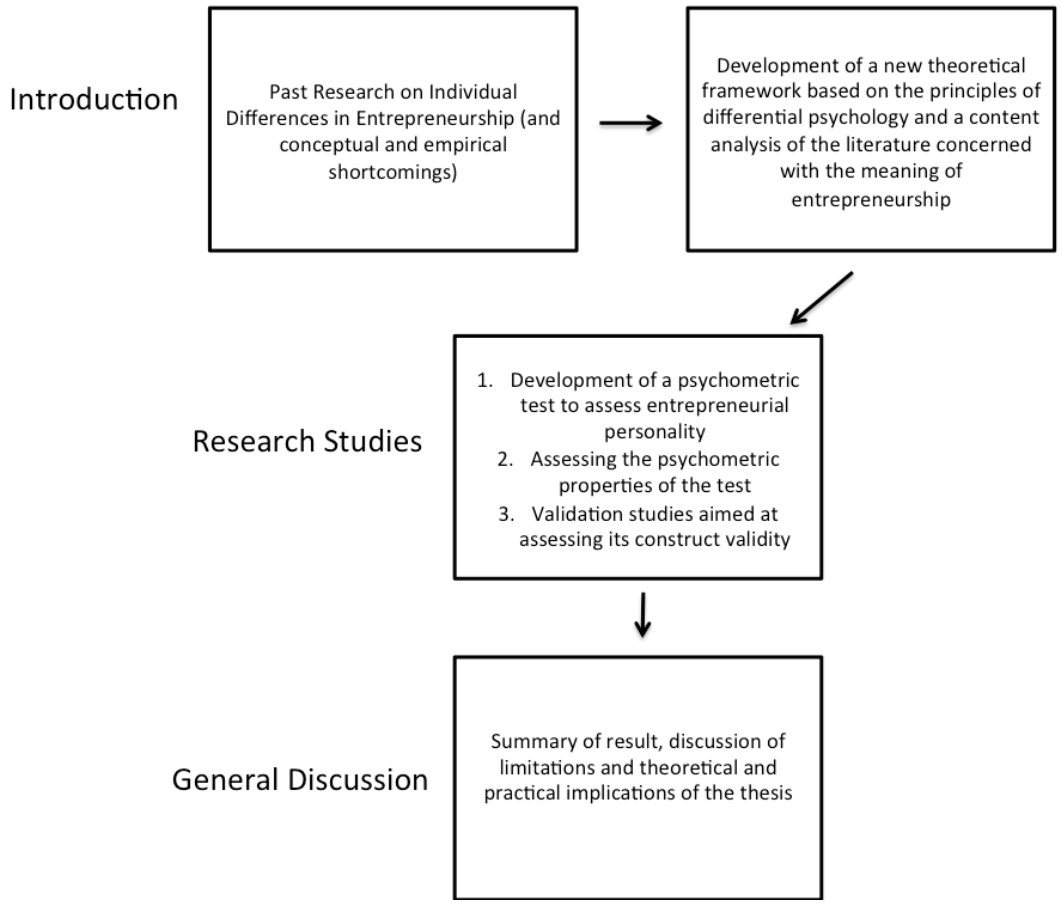

Figure 2. The flow of the current thesis

The next sections of Chapter 1 will review and critically evaluate the present (and past) operational definitions of entrepreneurship, and explain the limitations it poses on research. Following from that, an alternative operational definition of entrepreneurship, along with a theoretical framework for the trait (or individual differences) approach will be proposed.

1.2. Key Issues in Entrepreneurship Research

Operational Definitions of Entrepreneurship

Despite a sizeable literature on the topic, the definition of entrepreneurship and entrepreneur remains notoriously problematic (Busenitz et al., 2003; Leitch, Hill, & Harrison, 2010). Two decades ago Gartner (1988) identified more than 30 definitions of the term entrepreneur, few of which seemed to be consistent. In his seminal article, the author noted that the one issue that entrepreneurship scholars do agree on is that the definitions of entrepreneur and entrepreneurship remain elusive. Despite mounting research since Gartner's (1988) publication, the definitional dilemma remains unresolved (Baron & Henry, 2010; Burg & Romme, 2014; Nicolaou, Shane, Hunkin, Cherkas, & Spector, 2008). As Davidsson (2003, p. 3) notes, "…no one can claim to have the one, true answer to the question of what the phenomenon of 'entrepreneurship' truly is." Similarly, Rauch, Wiklund, Lumkin, and Frese (2009) state, "Many reviews and assessments of the entrepreneurship research field have concluded that the development of a cumulative body of knowledge has been limited and slow because there is lack of agreement on many key issues regarding what constitutes entrepreneurship" (p. 761). Thus, Shane and Nicolaou (2009, p. 3) argued, "…it will require the field to grapple with its lack of consensus on the definition of entrepreneurship."

Whilst a number of activities have been recognised as being central to entrepreneurship (see below), there has been a widespread tendency in psychological (and the wider entrepreneurship) research to operationalise entrepreneurship as business creation (Hisrich, et al., 2007), and entrepreneur as a business founder (Baron & Henry, 2010; Rauch & Frese, 2007; Stewart & Roth, 2001). Thus, a common operational definition of entrepreneur within the trait approach, is a major owner and manager of a

business venture not employed elsewhere (Brockhaus, 1980). As Baron and Henry (2010) note: "From the perspective of mainstream I/O psychology, it could be noted that entrepreneurs are simply a particular (albeit distinct) occupational group (p. 241)". Consequently, research focusing on the individual level of analysis has predominantly examined individual differences (in personality, motivation etc.) between business founders (entrepreneurs) and other populations (e.g. Zhao & Siebert, 2006)[3], and between more and less successful founders (Rauch & Frese, 2007).

Despite its pervasive use, however, the operational definition of entrepreneur simply as a business founder (i.e. an occupational category) has been contested on numerous grounds (c.f. Kuratko, 2007; McKenzie et al., 2007). Indeed, a critical evaluation of this definition indicates significant theoretical and empirical challenges for researching individual differences in entrepreneurship.

Trait Approach: Empirical Problem

Several authors (e.g. Baron & Henry, 2010; Baron, Markman, & Hirsa, 2001; Eddleston & Powell, 2008; Shane, 2008) have noted that conceptualising entrepreneurs as business founders denotes that entrepreneurs are a highly heterogeneous group. That is, by this definition, a sample of entrepreneurs could include, on the one hand, highly successful and innovative business founders with revenues in the (£) millions (or billions) (e.g. Jeff Bezos), and on the other, founders who have owned and managed a small business (e.g. a grocery store) for the majority of their lives, and earn a below average income. Furthermore, unlike other occupational groups, entrepreneurs may be found in any industry, region, or socioeconomic status (Frese et al., 2007). Consequently, Gartner

[3] The latter category consisting mainly of managers, but also of employees, students, nonfounders (e.g., heirs), or of a representative sample of the population.

(1988) noted, this definition of entrepreneur defies the notion of an 'average' or 'typical' entrepreneur, and therefore, the possibility of common (personality) predictors. That is, investigating group differences between entrepreneurs and non-entrepreneurs based on this definition is empirically challenging because of the within group variance that exists in the category of entrepreneurs (Baron & Henry, 2010).

Second, the definition of entrepreneur as business founder undermines the notion that entrepreneurs are a major source behind economic growth. Research on the relationship between business creation and economic growth is mixed at best; some studies even find a negative relationship between the two variables (Bogenhold & Staber, 1991; Shane, 2008). In fact, evidence suggests that the *typical* entrepreneur (a) works more hours and earns less than people in regular employment, (b) is not very innovative (i.e. tends to sell the same products to the same customers as their previous employer), and (c) ceases to operate within 5 years (going back to regular employment; cf. Shane, 2008). Thus, operationalised simply as business founders, the common view that entrepreneurs are the drivers of innovation and economic growth is not supported by research evidence. This data, in turn, undermines the trait approach, showing that researchers are investigating the personality profile of individuals who are, on average, unsuccessful. The approach would also depart from the common idea that the entrepreneurs are a 'special breed' (Stanworth & Kaufman, 1996), because of distinctive personality attributes and abilities (e.g. Kizner, 1997; Drucker, 1987; Schumpeter, 1934).

A final problem concerns the viability of actually establishing a common psychological profile of entrepreneurs. Data indicates that a large proportion of the population will be entrepreneurs at one point in their life (e.g. this figure is 40% in the

US, and generally higher in developing countries; OECD, 2012). Given that a majority of entrepreneurs cease to operate within 5 years, significant shifts in membership between the two groups are rather common: many non-entrepreneurs will at one point be considered entrepreneurs and most entrepreneurs will after 5 years be considered non-entrepreneurs. With such variation in occupational status, it is difficult to see how profile differences between these two occupational groups can be established. Indeed, with such variation, it is even difficult to see how one could reliably identify the population of study. As Chell (2008; p. 87) notes, "many studies…have floundered due to the difficulty of identifying target populations".

The fact that sampling is a ubiquitous issue in entrepreneurship research is widely recognised (Baron & Henry, 2010). This observation is unsurprising considering the variability of the entrepreneur status. Yet, it invariably poses a major limitation for meta-analytic studies in the field; as Rauch and Frese (2007, p 374) note:

> "…[one] limitation is the fact that many studies included in the meta-analysis are biased towards successful enterprises. Studies that compared entrepreneurs with other populations usually consisted of samples of entrepreneurs that survived until the time of data collection and, thus, compared ''successful'' entrepreneurs with other populations".

Similarly, Baron and Henry (2010) note that "most research in the field of entrepreneurship focuses on successful entrepreneurs" (p. 265). Consequently, meta-analytic studies that find significant personality differences between entrepreneurs and

non-entrepreneurs are methodologically hampered by the individual studies, which often contain sampling errors (Sarndal, Swenson, & Wretman, 1992).

Trait Approach: Theoretical Problem

Whilst these empirical challenges remain, a number of authors have contended that the key challenges of the trait approach reside on a conceptual level (e.g. Burg, et al. 2014; Kuratko, 2007; McKenzie et al, 2007). The following section outlines the conceptual confines of the trait approach. This is done in two steps: first, the basic assumptions of the trait approach are summarised; second, a critical evaluation of these assumptions is provided, followed by an outline of the problems they pose on research methodologies and designs (Burg & Romme, 2014).

There are, broadly speaking, three basic assumptions underlying the trait approach:

1) entrepreneurs play a major role in contributing to desirable and relevant outcomes such as innovation, economic growth, and job creation (e.g. Kirzner, 1997; Kuratko, 2003; Reynolds et al., 2004)
2) entrepreneurs engage in certain behaviours or activities (i.e. entrepreneurship) that contribute to these desirable outcomes, that others don't, or engage in them more so than others (Baron & Henry, 2010).
3) these behaviours and activities are (partly) determined by personality and ability traits (Rauch & Frese, 2007).

The first of the assumptions is perhaps the most obvious as it, inevitably, justifies

research efforts concerned with differentiating entrepreneurs from other populations (Baron & Henry, 2010). Nevertheless, in a strict sense, this assumption broadly disregards individual differences. That is, the notion that entrepreneurs play a major role in contributing to outcomes such as innovation, economic growth, and job creation (e.g. Kirzner, 1997; Kuratko, 2003; Reynolds et al., 2004), by definition deduces that there is homogeneity in the performance and behaviour of entrepreneurs. This approach is inconsistent with research in related fields of individual differences (e.g. industrial and organisational psychology). The basic assumption in this (adjacent) research is that performance and activity varies between individuals – also *within* occupational categories (Ones & Viswesvaran, 2011). That is, not all salespeople are good salesmen, and not all managers are good managers (Hogan & Hogan, 2001).

Furthermore, researchers in related fields rarely use links between traits and occupational choices to infer performance (Armstrong et al., 2011). For instance, Extraversion scores may be related to preferences for 'sales' occupations (Armstrong et al., 2011); however, this would not indicate whether Extraversion is predictive of *performance* within sales occupations, nor the type of performance it may be related to (e.g. sales figures, customer satisfaction, supervisor ratings, salary, absenteeism etc.). In theory, this trait may be positively related to some outcomes, negatively to others, or unrelated to all (Barrick & Mount, 1991). The relationship between Extraversion and various performance outcomes (within the occupation), therefore, would need to be established empirically.

Comparably, entrepreneurship researchers examining whether a trait is related to relevant outcomes (e.g. innovation, job creation, or economic growth), would need to

assess this relationship directly and empirically. Inevitably, there will be a distribution in the performance and behaviour of entrepreneurs; some entrepreneurs may contribute to innovation, others to job creation, and yet others to nothing (Shane, 2008). Accordingly, the relationship between traits and these performance outcomes cannot be inferred simply by looking at the personality profile of entrepreneurs.

Insufficient attention, therefore, is paid in research to the relationship between traits and relevant activity and outcomes. Of course, there is a good amount of literature examining psychological differences between more and less successful entrepreneurs (e.g. Rauch & Frese, 2007). However, this line of research may not directly, or sufficiently, address the aforementioned matters. For instance, the core metrics of entrepreneurial success used in research are revenues, profits, number of employees, or years in operation (Rauch et al., 2009); these may or may not be valid indicators of more widely assumed outcomes of entrepreneurship, such as innovation, opportunity exploitation, risk taking, or value creation (Kirzner, 1997). Second, a more successful entrepreneur in relative terms (i.e. to other entrepreneurs) may not be 'successful' in absolute terms (i.e. relative to employees within established organisations). That is, given that the average income of entrepreneurs, as a group, is lower than regular employment groups (Shane, 2008), a 'successful entrepreneur' may still have an average, or below average, income relative to people in regular employment. Accordingly, research examining differences between more and less successful entrepreneurs may not provide a reliable picture of the traits relevant for, say, innovation and economic progress.

The second assumption of the trait approach is a 'necessary condition' following from the first assumption (whether explicit or implicit). That is, if entrepreneurs

contribute to innovation and economic growth (Kirzner, 1997), they *must* do so because they engage in certain behaviours (i.e. simply 'being' an entrepreneur cannot contribute to economic activity). The most notable limitation of the trait approach is arguably in the methodology it employs to research this (second) assumption. This is because the behaviours/activities in question (i.e. entrepreneurship) are operationalised as the creation of an organization (and/or the act of becoming self-employed). This is problematic because the behaviours that are required for the creation of an organisation are unlikely to be meaningful indicators of wider performance outcomes (e.g. innovation, economic growth etc.). Clearly, the actual act of opening a company could take no more than a few minutes to perform (i.e. filling out a few forms online)[4]. In addition, more or less of the particular act (i.e. creating numerous businesses during one day, or getting everyone to create a business) is not likely to be related to any innovative or economic output.

Of course, entrepreneurs may engage in numerous behaviours both prior and subsequent to the act of creating an organisation. Behaviours prior to starting may include gathering of resources, conceiving of ideas and choices of industry, making investments, gathering of social and human capital, etc. (Baron, 2007). Behaviours subsequent to starting a business may include marketing decisions, investment decisions, networking activity, innovation activity, strategic decisions, operational decisions, managerial behaviours, etc. (Chell, 2008). Furthermore, variation in such behavioural activity is likely to be related to variation in relevant outcomes such as innovation, job creation, and economic growth. Likewise, variation in such behavioral activity (almost by definition) is likely to be a function of personality and ability traits.

[4] In many cases, businesses are created informally, meaning that, in essence, creation of an organisation does not even have to include filling in forms.

Indeed, *conceptually* entrepreneurship researchers rarely consider the actual act of creating a business as entrepreneurship; often entrepreneurship is said to be a process (Baum et al., 2007), constituting a variety of behaviours both before and after that act (although see Gartner, 1989, for an alternative view). Yet, whilst this is a common conceptual standpoint, it is not the operational one. The trait approach, by design, focuses on the very act of creating a company, and in turn treats it as an indicator (or metric) of relevant outcomes such as innovation and value creation (Chell, 2008). Few studies actually examine the psychological predictors of critical entrepreneurial behaviours and activities undertaken before and after the creation of an organisation (Baum et al., 2007). Indeed, attempts are lacking even to classify the exact behaviours during this process that should be considered entrepreneurial (versus non-entrepreneurial; Baron & Henry, 2010). Consequently, the trait approach fails to accurately define and assess relevant outcome variables, and in turn, their relationship to relevant personality traits. This inevitably limits the ability of research to address the third assumption of the trait approach.

The critical evaluation presented demonstrates that a lack of definitional clarity significantly limits research designs and methodologies in entrepreneurship. In particular, the operational definition of entrepreneurship employed in research, provides a narrow and restricted understanding of the relationships between traits, critical entrepreneurial activities, and bottom-line outcomes. Significant gaps, thus still remain in two core areas:

a) *Defining and assessing the critical behaviours and activities that constitute entrepreneurship*. Logically, entrepreneurship needs to comprise of critical behaviours and activities beyond the act of creating a business (for it to be relevant). Furthermore, these behaviours and activities may be differently related to bottom line

outcomes (e.g. certain behaviours may be related to profits, others to innovation, and still others unrelated to any). Entrepreneurship research currently fails to operationally define these behaviours, and thereby to assess which behaviours are related to which outcomes.

b) *Individual differences in the tendency and ability to engage in critical entrepreneurial behaviours.* There will inevitably be variation between people in the frequency and ability to engage in critical entrepreneurial behaviours and activities. Given the lack of specification of critical behaviours, however, research fails to directly examine such individual differences. Most studies, in essence, focus on the relationship between personality traits and the very narrow act of creating a business (Zhao & Siebert, 2005). Research that examines individual differences between more and less successful entrepreneurs, similarly fails at this task.

1.3. A New Framework For Entrepreneurship Research

If the aim of the trait approach to entrepreneurship is to identify the psychological characteristics of individuals behind important outcomes such as innovation and economic progress (Rauch & Frese, 2007), researchers needs to focus beyond entrepreneurs, and the act of creating a business (McKenzie et al., 2007). Naturally, for an individual to contribute to significant economic and social activity, they need to do more than open a company. The basic task of research, consequently, is to operationally define the critical behaviours that constitute entrepreneurship (and are likely to contribute to relevant outcomes). This would, in turn, allow researchers to assess individual differences in people's tendency and ability to engage in these entrepreneurial behaviours.

Although there is a large body of conceptual literature on what constitutes entrepreneurship, or entrepreneurial activity (see below), substantial gaps remain in research in terms of applying this information into a practicable framework (Burg & Romme, 2014). Consequently, an operational definition that can be used to examine individual differences in entrepreneurial activity is largely absent from research. Yet to allow a more direct examination of these differences, such a definition is not only desirable, but necessary. Accordingly, the first aim of the current thesis was to address this gap in the literature. To this end, a two-step process is taken:

1. Step 1 aimed to obtain an understanding of what is meant by entrepreneurship, or entrepreneurial activity, *beyond business creation*; that is, what behaviours, or activities, constitute entrepreneurship. To this end, a content analysis of the relevant literature on the definitions of entrepreneurship was conducted.
2. Step 2 aimed to position the components of entrepreneurial activity (extracted from the content analysis) into an individual differences framework.

This review is outlined below.

1.4. Conceptualising Entrepreneurship: A Literature Review

There is no shortage of studies concerned with analysing and understanding the essence of entrepreneurship. This literature review, thus, is not as much an attempt to provide a novel conceptual definition of the construct, as it is to provide an operational one (i.e. because a large number of conceptual definitions of entrepreneurship – cited in the content analysis – have been presented in the literature). The aim is to integrate previous content analyses into a practical framework for individual differences research. In order to achieve this, therefore, the literature was searched for articles concerned with the

definition (or meaning) of entrepreneurship and entrepreneurial activity, which included at least one reference to the concept, beyond 'creation of an organisation'.

Methodology

First, large-scale database searches were conducted for identification of relevant articles, as well as books; returned hits were carefully screened and selected according to a set of research criteria outlined below. Secondly, variables that defined, described and indicated the concept of entrepreneurship were identified in discussions with three subject matter experts[5]. Publications dating from 1960 to 2014[6] were consulted for definitions of entrepreneurship. Databases Wiley Online, Science Direct, Springer, Taylor & Francis, Emerald Insights, and EBSCO were searched to capture a broad range of journals (including the mainstream journals Entrepreneurship Theory & Practice, Journal of Business Venturing, Journal of Small Business Management, American Journal of Small Business included in the social sciences citation index) using respective Boolean search terms (in AB Abstract). The employed formula was:

'Entrepreneurship definition' OR (entrepreneurship defined OR entrepreneurship content-analysis OR entrepreneurship literature review)

The obtained hits included journal articles, dissertations, reports, and books whose references were also screened to ensure the completeness of the review. Approximately 1,000 hits were returned throughout all searches. Sixty percent of Abstracts of the

[5] The subject matter experts were Professor Tomas Chamorro-Premuzic, Professor Adrian Furnham, and Dr Robert Hogan. The subject matter experts were all researchers within the individual differences domain, with a focus on work psychology and entrepreneurship. Although it could have been useful to include scholars from other disciplines, such as economics and management, it was deemed that the judges (a) had a wide research experience and in these adjacent fields, and (b) were better suited to evaluate the theoretical framework of the current thesis, which is specifically based on differential psychology principles.

[6] These dates were chosen based on the fact that research on the trait approach is assumed to have started in the 1960's (Hisrich, et al. 2007). Nevertheless, definitions of entrepreneurship span to the seventeenth century (these are generally referenced in more recent journal articles).

returned hits were read and evaluated according to their relevance to the current research purpose (with the rest of the articles being omitted based on their titles alone). Full-text copies were obtained of all reports and articles that had been identified as potentially relevant to the review[7], with approximately two hundred and fifty full-length articles being read or examined for their content (i.e. investigating whether they met the criteria).

In conducting the literature review, the methodology used by Morris et al. (1994) was adopted, whereby definitions were content analysed for key terms. Several attempts to review the literature have been made in the past (see below); to avoid redundancies between the current work and previous reviews, therefore, the focus was primarily on these literature review and content analysis articles. Thus, the general criteria for article inclusion in the literature review were that the target study was a) investigating the definition of entrepreneurship, b) a comprehensive and systematic review and/or a content analysis of the literature, c) and/or an attempt to synthesise past definitions into broader themes, and d) including at least one reference to the concept beyond business creation.

Based on the literature review, fifty-one articles were identified as being concerned with the definition of entrepreneurship. Out of these, 9 fitted all the criteria outlined above. These were Ahmad and Seymore (2008), Dees (2001), Gartner (1985; 1990), Long (1983), McKenzie et al. (2007), Morris et al. (1994), Abu-Saifan (2012), and Wee (1994). Remaining articles were excluded based on a mixture of reasons, ranging from dealing with a very specific concept or focusing on a number of broad ones, to only

[7] Target articles, books and manuals were downloaded directly from the databases using two different university library accesses including Goldsmiths University of London and Senate House Library of the University of London. Hardcopies were obtained through the library resources where online resources were not available. Where these were not available copies of books were bought through Amazon.

reviewing a select number of authors to make a point about a specific domain of entrepreneurship. For instance, Watson and Pointhieu (1995) conduct a content analysis but only focus on 'successful entrepreneurs', whereas Stevenson (2013) focuses on the broad concept of the 'typology of entrepreneurs'. Spencer, Kirchhoff, and White (2008) on the other hand review the definitions of prominent authors (e.g. Schumpeter and Kirzner) make a point about entrepreneurial wealth distribution.

The remaining reviews, which did meet all criteria, were categorised into 2 themes: 1) content analysis of key terms/words, 2) reviews of selected authors' definitions. Appendix 1 shows the complete list of a) author(s) of the review article, b) identified definitions, c) the themes extracted of the definitions, d) the original author of the definition, and e) key terms/themes identified from the current content analysis. Naturally, many of the reviews referenced the same original authors' definitions; to avoid repetition, therefore, definitions that had previously been stated by other reviewers, were not shown in Appendix 1.

Table 1. *The Key Terms Identified As Reflecting Entrepreneurship In A Content Analysis Of 27 Definitions*

	# of mentions

1. Innovation/New/Unique/Novel/New Combination of Resources	**20**
2. Recognizing Opportunity/Discover Opportunity	**10**
3. Exploit Opportunity/Pursuit of Opportunity/Utilise Opportunity	**10**
4. Risk Taking/Assume Risks/Uncertainty	**9**
5. Creating Value/Adding Value/Wealth	**8**
7. Creating Business/Venture Creation/Self-employment	**6**
8. Management	**4**
9. Arbitrageur	**3**

As can be seen, a combined total of 27 definitions, 25 themes, and 70 key terms were identified and extracted from the 9 review articles of the literature. Table 1 shows a summary of the total number of mentions key words have received in definitions, grouped in 9 themes. These results are consistent with both Morris et al. (1994) and Gartner (1990) content analyses, indicating that more contemporary reviews (post 1994) delineate agreement with previous evaluations of the term.

Synthesising previous perspectives: Definition of critical entrepreneurial behaviours

The results of this literature review may be summed up in four main points: first, the content analysis demonstrates that there is a consensus among authors and scholars that entrepreneurship constitutes a broader construct than the act of creating an organisation. Indeed, key themes that consistently appear in the literature include innovation, recognition and exploitation of opportunity, risk, and creation of value. Second, whilst this review does not posit to have unlocked the 'true' meaning of entrepreneurship, in line with previous research (Morris et al. 1994; Gartner 1985), it

does suggest that commonalities in these definitions exist. Third, although there may not be complete consensus as regards to the appropriateness these dimensions, it is reasonable to argue that there will be a majority consensus around them (given that most common and prominent definitions will have been captured by the various review articles). Finally, given that this analysis provides a conceptual definition of entrepreneurship (or entrepreneurial activity), it should be possible to use it to deduce also an operational one. For the purpose of the current research, therefore, the following dimensions identified in this literature review are offered as constituting critical entrepreneurial behaviours and activities:

1. Innovation
2. Opportunity identification
3. Opportunity Exploitation
4. Creation of value

These four dimensions were specified on the basis that they represent the most common definitions of entrepreneurial behaviours (i.e. those appearing more than 5 times; Morris, 1994) beyond business creation, as identified in the content analysis[8,9]. In the subsequent sections each prominent theme will be reviewed.

[8] *Note*: although risk-taking appeared 9 times in the content analysis, the author elected not to include this dimension on the basis that it is not an activity or behaviour. Rather risk is a probability (or likelihood); commonly viewed as the probability of an action (not) achieving the expected results (Miner & Raju, 2004). Risk-taking, in turn, means acting despite the probability of failing (Stewart & Roth, 2007). Accordingly, although risk will be involved in any entrepreneurial activity (e.g. exploiting an opportunity will have a likelihood of failing), it will also be present more generally in any other activity (e.g. playing football, writing an essay, eating food). Furthermore, the degree of risk may not differentiate entrepreneurial from non-entrepreneurial activity (e.g. robbing a bank without being caught, and creating a successful business). Neither may it differentiate between more and less entrepreneurial activities (e.g. creating a social network website as a student may incur less risk than opening up another corner-shop to support ones family). Accordingly, it would be difficult to argue that an activity is more or less entrepreneurial because there it is more or less 'risky'.

[9] Reasons for not including business creation as a critical behaviour are discussed throughout.

Critical entrepreneurial behaviours and activities

Innovation

The content analysis clearly distinguishes innovation as a key theme/activity of entrepreneurship. Schumpeter (1934), who has been referred to as the father of modern entrepreneurial thought (Low, 1983), pioneered the concept, as related to entrepreneurship. Bruyat and Julien (2000) suggest that through innovation, Schumpeter laid the foundations for one of the most dominant notions in entrepreneurship to date. Although Schumpeter (1934) used the term innovation in a broad sense, to refer to anything that was carried out through new combinations, he suggested that the concept has 5 manifestations: 1) the introduction of a new (or improved) good; 2) the introduction of a new method of production; 3) the opening of a new market; 4) the exploitation of a new source of supply; and 5) the re-engineering/organisation of business management processes.

Schumpeter, in this sense, emphasised innovation as a business output (Low, 1983). However, he also referred to individual differences, noting that special aptitudes were required for the carrying out of new combinations (Schumpeter, 1934)[10]. In line, more recent definitions have incorporated personal characteristics, and in particular, the concept of creativity, under the construct of innovation. For instance, Brazeal and Herbert (1999) mention that creativity is an integral part of the innovation process, as the implementation of creative ideas is innovation (Amabile, 1996). Similarly, Lumpkin, Dess and McGee (1999) argue that entrepreneurship can be seen as the tendency to generate new ideas, engage in novel, creative processes (i.e. the individual behaviours),

[10] Although Schumpeter did not elaborate on the skills or processes these aptitudes may comprise.

resulting in new products, services, and technology (i.e. the output). Thus, innovation is viewed both as an output and as a personal disposition (Kuratko, 2007).

Opportunity Identification

The content analysis indicated that the notion of opportunity recognition is another core component of entrepreneurship (Kuratko, 2003). Indeed, Baron and Henry (2010; p. 250) suggest, "In the field of entrepreneurship, two of the most important [terms] are opportunity and opportunity recognition". In line, the widely accepted definition of entrepreneurship by Shane and Venkataraman (2000) treats the notion of opportunity recognition as central to entrepreneurship. In particular, the authors note, "The field of entrepreneurship involves the study of sources of opportunities; the processes of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them" (p. 218).

Opportunities have been defined as those 'situations' in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater price than their cost of production (Casson, 1982). The term opportunity recognition, in turn, has been referred to as a cognitive process (or processes) through which individuals conclude that they have identified an opportunity, or a new means-ends relationship (Baron & Henry, 2010l; Shane & Venkataraman, 2000). Accordingly, although opportunities may exist in an objective sense (i.e. regardless of whether someone recognizes them; Shane, 2003), the process (or activity/behaviour) of opportunity recognition is fundamentally personal.

Along with this idea is the view is that opportunities cannot be known to all parties at all times (Hayek, 1945); that is, opportunities are often recognized when there

is ‘asymmetry’ in the access to information. Accordingly, having more and better access to information is likely to have a strong impact on whether an opportunity is recognised (Aldrich & Kim, 2007; Ozgen & Baron, 2007; Shane 2000). At the same time, individuals will differ in their readiness to identify opportunities when they appear (Sarasvathy, Simon, & Lave, 1998). That is, some people will be better at storing and organising information in memory, and consequently, be more attentive to opportunities (Shane, 2003; Sternberg, 2004). Equally, individual differences in heuristic thinking, optimism, and cognitive alertness, may influence this process (Kuratko & Hodgetts, 2004). In addition, actively searching for opportunities, rather than passively waiting for them, has been implicated in whether opportunities are identified (Grant & Ashford, 2008; Parker, Williams, & Turner, 2006).

Opportunity Exploitation

The third, and related, theme identified in the content analysis is opportunity exploitation. Authors seem to agree that although the discovery of an opportunity is a key precondition for entrepreneurial activity, it is not sufficient. Indeed, in order for the opportunity to be manifested in behaviour it is crucial that a person pursues and utilises it (Shane & Venkataraman, 2000). Naturally, not all identified opportunities are brought to fruition, and research suggests that (as with opportunity recognition) the propensity to exploit an opportunity is a joint function of (1) the opportunity itself, and (2) personal characteristics of the individual (Venkataraman, 1997). Entrepreneurial opportunities can vary on several dimensions, such as social demand or need, profit margin, and density of competition (Dunne, Roberts, & Samuelson, 1988; Schmookler, 1966), which influence the *expected value* of the opportunity (Shane & Venkataraman, 2000).

However, not all individuals will exploit opportunities with the same expected value. Rather, the decision to pursue an opportunity may be influenced by, among other things, individual differences in willingness to bare risk (Palich & Bagby, 1995), optimism (Cooper, Woo, & Dunkelberg, 1988), self-efficacy and internal locus of control (Chen, Greene, & Crick, 1998), proactivity (Rauch & Frese, 2007), and prior experience (Carroll & Mosakowski, 1987). Note that the attributes that increase the probability of opportunity exploitation may not increase the probability of success.

Adding Value/Value Creation

A final major dimension of entrepreneurship, identified in the literature review, was the creation of value. There seems to be a consensual agreement amongst researchers that the creation of value is crucial to entrepreneurship (Bruyat & Julien, 2000). Dees (2001) defined the creation of value as situations where buyers are willing to pay more for a product (or service, or material) than its original cost of production; in that respect, value is often identified by the demand for the product. Accordingly, venture creation does not necessarily entail value creation; indeed, value created can be economic, social or cultural (Ahmad and Seymour, 2008). According to Ronstadt (1984), for instance, entrepreneurship is the dynamic process of creating incremental wealth. Furthermore, Ireland, Hitt and Sirmon (2003) propose that value creation is necessary to entrepreneurship; they argue that if an opportunity has not created any additional value to the original value of the resources, then the opportunity has not been exploited.

Although often viewed in an economic sense – as an output – there is agreement in the literature that the creation of value is directly influenced by individual differences in motives and behaviors. For instance, Hisrich, Peters, and Shepherd (2008) suggest that

the underlying motivation behind combining resources to create something is the end aim to create value, or increase value. Similarly, Ahmad and Seymour (2008) argue that entrepreneurial activity is ultimately about *pursuing* the generation of value. Indeed, a widely adopted definition of entrepreneur remains "a founder, owner, and manager of a business whose *principal purposes are profit and growth*" (e.g. Carland, Hoy, Boulton, & Carland, 1984; Rauch & Frese, 2000; Stewart & Roth, 2001; Zhao & Siebert, 2006). Thus, the desire and proactivity to create value is seen as fundamental to the process of wealth creation in the literature (Dees, 2001).

A New Framework For The Trait Approach of Entrepreneurship

The operational definition of entrepreneurial activity provided above has a number of implications for research. One observation from the above review is that entrepreneurship, or entrepreneurial activity, can be distinguished in terms of external outcomes (or outputs) and personal (or internal) processes and behaviours[11]. For instance, the internal process and personal behaviour may be the recognition pursuing of an opportunity, whereas the output may be the creation of a new product or venture, change of a process within the organisation, increase in productivity, or profit[12].

More importantly, this operational definition prompts two key points: the first is that business formation is neither sufficient nor necessary to be considered an entrepreneurial act. Indeed, if the act does not involve any innovative and opportunistic behaviour, and does not create any value, calling it entrepreneurial would not be in line

[11] This is in line with Morris et al. (1994) view of entrepreneurship.

[12] Of course, whether internal processes and personal behaviours lead to the outcome may be dependent on a number of factors including personal (e.g. ability), situational (e.g. geographic location), and coincidental (e.g. luck). This is a key distinction between the personal behaviours, and outcomes that result from these behaviours.

with most authors' concept of entrepreneurship (Ireland, et al., 2003). A second implication is that few, if any, entrepreneurial behaviours are likely to be exclusive to business founders. Theoretically, anyone, regardless of his or her occupation, is able to innovate, recognise and exploit an opportunity, and to create value – not only business founders (McKenzie, et al., 2007). Certainly, managers in established organisations are likely to (in their job) engage in most, if not all, of these critical behaviours. Likewise, unemployed persons or students can also engage in these behaviours.

Thirdly, people will differ in their tendency and ability to engage in these behaviours. That is, some people will recognise a greater number of, as well as better (more lucrative), opportunities than others. Consequently, they may also be better able to create economic value, progress, and change[13]. These individual differences in entrepreneurial behaviours are also likely to exist across occupational groups (even if the behaviours between groups, on average, may differ). Whether entrepreneurs are more entrepreneurial, as a group (i.e. on average), than other populations is then a statistical question[14].

Fourthly, thinking about individuals as more or less entrepreneurial based on their behavioural tendencies and abilities, is more consistent with individual differences

[13] Note that there is a distinction here between behavioural tendencies and abilities, and actual outcomes. The former is related to personal or internal behaviours and processes (e.g. recognising an opportunity and attempting to exploit it), whereas the latter is related to the actual outcome or output (e.g. introduction of a new product). Because the relationship between these can greatly be affected by external factors (e.g. the same person with the same aptitude may succeed with the introduction of a product in the US but not in Uganda), one may not necessarily be able to use the outcome to indicate personal aptitudes. For instance, one may not be able to infer whether a car sales person is a high performer, purely based on their sales figures because a good car sales person in rural areas may sell far less than a bad sales person in urban areas. In this sense, one can primarily infer their aptitude by looking at their behaviours and attitudes (which is what the domain of assessment and selection is concerned with; Chamorro-Premuzic & Furnham, 2010).

[14] Strictly speaking, research has not examined whether entrepreneurs are actually more entrepreneurial than other populations, or which populations they may be more entrepreneurial than.

research. Within I/O psychology, for instance, whether a person is agreeable or not is evaluated by the type and frequency of behaviours they engage in (Chamorro-Premuzic, 2011; Fleeson & Gallagher, 2009), not by whether they are in a customer service role or not[15]. Likewise, whether or someone is creative or not may be judged by the frequency and quality of their creative behaviours (or acts), or scores on a divergent thinking test, not by whether they are an artist or not[16]. In line with this approach, the current framework suggests that whether a person is more or less entrepreneurial, should be based on his or her behavioural tendencies and abilities, not on whether they are a business founder or not. That is, the entrepreneurial personality should resemble other individual differences constructs in that individuals will be more or less entrepreneurial just like they are more or less agreeable, or creative.

Naturally, conceptualising the entrepreneurial personality in this way, means that this construct is theoretically placed alongside other personality or ability constructs. Empirically investigating this construct, therefore, would require adopting methodologies and designs that are in line with those used in wider individual differences research (Chamorro-Premuzic, 2011). Whereas presently research on individual differences in entrepreneurship investigates differences in personality profiles between entrepreneurs and non-entrepreneurs (Zhao & Siebert, 2005), and more and less successful ones (Rauch & Frese, 2007), the current framework proposes a new set of research aims. In particular, issues that would need to be addressed by research include:

[15] Although the average agreeableness in this occupation may be higher compared to other occupations, there is likely to be a large number of customer service representatives that are not very agreeable (as many people will have experienced).

[16] It is probably not difficult to think of musicians and designers who are not very creative; conversely it is easy to think of non-artists who are. Furthermore, self-employment is arguably a rather more general occupation – given that one can be an entrepreneur in the customer service industry or in the arts industry.

1. Assessment of individual differences in entrepreneurial personality (or tendencies and abilities)
2. Examining the relationship between the entrepreneurial personality and other individual differences traits (i.e. where the construct belongs in the personality factor space)
3. Investigating the relationship between the entrepreneurial personality and entrepreneurial outputs, and performance in general (i.e. what do more entrepreneurial people achieve)?
4. Examining the causes of individual differences in the entrepreneurial personality (i.e. why are some people more entrepreneurial than others)?

Chapter 2 of this thesis addresses the first 3 questions. In order to investigate individual differences between more or less entrepreneurial individuals, a psychometric method is used (Kline, 2000). Accordingly, the first empirical aim of the current research is to develop a 'measure of entrepreneurial tendency and ability' (META) that covers the constructs domain, and to examine the psychometric properties of this inventory. A second aim is to investigate META's construct validity with reference to established personality and ability constructs, as well as relevant criteria and outcomes. The hypothesis inherent to the current framework is that more entrepreneurial individuals are those who stimulate innovation, value creation, and economic progress.

1.5. Overview of studies

In total, ten studies were conducted in this research[17]. The structure the studies comprised the following three components:

1. The development of questionnaire items for the META, and exploratory analysis of the psychometric properties of this inventory
2. The analysis of the concurrent validity of META in relation to established psychological constructs within the individual differences domains of *Personality* (including bright-side, dark-side, and compound personality traits), *Ability*, *Creativity*, and *Interests*[18], and
3. The analysis of the relationship of META to outcome/performance measures within different domains of entrepreneurship, job performance, creative achievement, and engagement. The structure of Chapter 2 is pictorially depicted in Figure 3.

[17] Parts of the thesis had undergone peer review at the time of submission.
[18] These domains were included in the analysis to provide a comprehensive cover of the full spectrum of individual differences domains (Chamorro-Premuzic, 2011), when examining the construct validity of META.

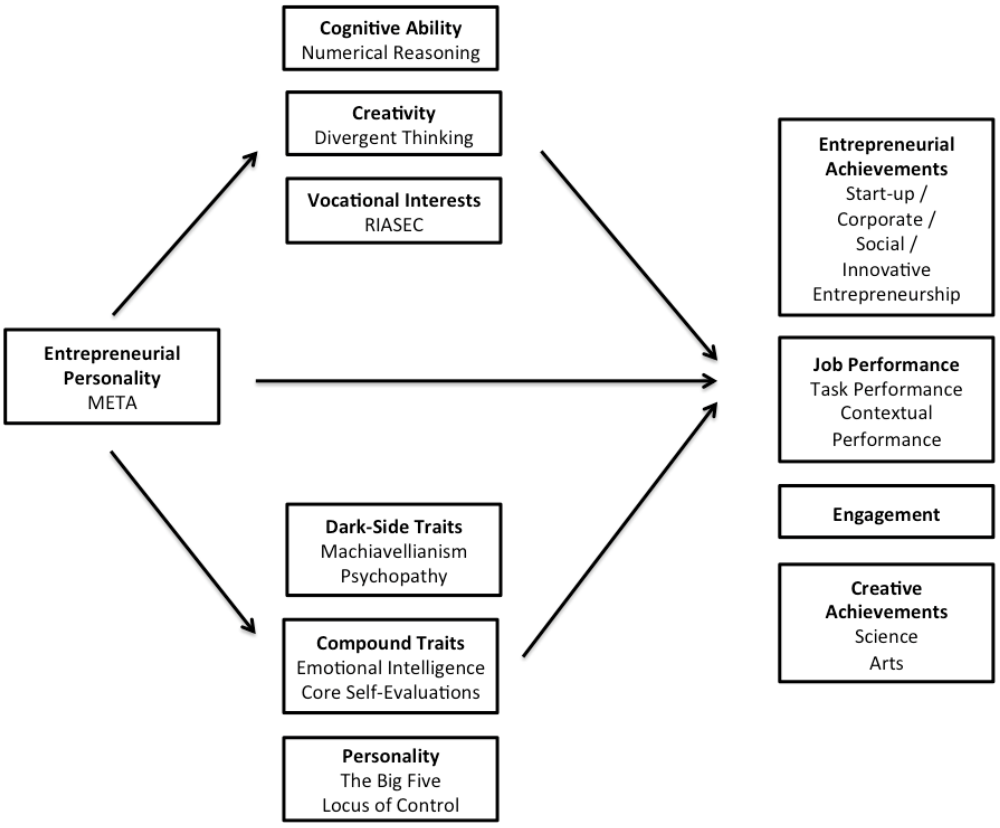

Figure 3. Depction of the construct validation process of META

A brief summary of the ten studies and the process of the thesis are provided below.

Studies 1 & 2 dealt with the development and exploratory validation of a new psychometric inventory aimed to assess individual differences in the four components of entrepreneurial personality: Innovation, Opportunity Recognition, Opportunity Exploitation, and Creation of Value. For simplicity, and to reflect their personal (i.e. rather than output) nature, these 4 dimensions are henceforth referred to as: Creativity, Opportunism, Proactivity, and Vision, respectively. This initial process involved (a) the generation of questionnaire items, (b) the examination of the factor structure of the items via exploratory data reduction, and (c) examination of the internal consistency of the extracted components. The next exploratory component involved the analysis of the concurrent and incremental validity of the four factors of META in relationship to salient

individual differences personality and ability traits via Structural Equation Modeling (SEM, Byrne, 2006). The traits examined in this preliminary analysis included the Big Five personality traits, General Mental Ability, Divergent Thinking, Machiavellianism, and Psychopathy. To investigate META's incremental validity beyond other trait measures in predicting relevant outcomes, income level of participants was used as the criterion variable[19].

Study 3 to 7 investigated the concurrent validity of META in relation to established psychological constructs and its incremental validity in predicting entrepreneurial outcomes. In particular, Study 3 examined the relationship of META to 'bright-side', or normal, personality traits, namely the Big Five. Both discriminant and incremental validity of META in predicting entrepreneurial output and achievements, in relation to the Big Five personality traits were examined. Further efforts were also made to increase the psychometric properties of the inventory. Finally, to assess the variety of domains of entrepreneurial activity (i.e. output) and achievements beyond business creation, a biographical inventory of entrepreneurial activity and achievements was developed.

Study 4 examined the relationships between META and 'compound personality traits' (i.e. combinations of multiple dimensions of personality; Ones, Viswesvaran, & Dilchert, 2005b), in the form of Emotional Intelligence and Core Self-Evaluations. It also investigated whether META predicts entrepreneurial activity and achievements beyond these compound traits.

Study 5 investigated whether META is linked to the 'dark-side' traits primary and

[19] The theoretical rationale for examining the concurrent and incremental validity of META in relation to the specified constructs is outlined in relevant sections and throughout the thesis.

secondary psychopathy. Again, META's incremental validity in predicting entrepreneurial achievements beyond these traits was investigated.

Study 6 investigated associations between META and the motivational domain of vocational interests. Here one of the most validated vocational interests inventory – RIASEC – (Holland, 1997) was used; the incremental validity of META in the prediction of entrepreneurial activity, beyond this measure, was again investigated.

Study 7 investigated the relationship between META and the domain of cognitive ability, that is, general mental ability (GMA). The incremental validity of META in predicting entrepreneurial achievements beyond GMA was also examined.

Study 8, 9 and 10 set out to investigate META's relationship to performance outcomes outside the domain of entrepreneurship. For instance, Study 8 examined the relationship of META in relation to creative achievements within the arts and sciences. In addition to META, the personality trait of perfectionism and the motivational construct of employee engagement were included in this study.

Study 9 examined the relationship of META to established job performance measures of task and contextual performance. In this study the effect of organisational, and work design factors, such as organisational structure and work autonomy on entrepreneurial tendencies and Locus of Control were also investigated. Accordingly, the aim of the study was to examine the work design factors that may facilitate and/or inhibit the performance of entrepreneurial employees.

The final study (Study 10), investigated the relationship between META and intentions to quit ones job. The intention was to examine whether entrepreneurial employees are more likely to quit the organisation they are working for than their less

entrepreneurial counterparts. To this end, associations between META, employee engagement, start-up plans, and intentions to quit one's job, were investigated.

To summarise, the ten studies presented in this reserach aimed to establish the validity of the (new) construct of the entrepreneurial personality by (a) investigating its relationship to established psychological construct within the full spectrum of the individual differences domain (Kline, 2000), and (b) examining the validity of this new construct in predicting important performance outcomes related to entrepreneurhsip, job performance, creative achievements, turnover, and engagement, beyond other trait measures. The empirical studies of the current thesis are presented in the next chapter (Chapter 2).

Chapter 2: Examining the psychometric properties of META

2.1. Study 1: Development of a measure of entrepreneurial tendencies and abilities

Abstract

The aim of the current study is to develop a psychometric measure of entrepreneurial tendencies and (self-perceived) abilities (META), and examine its psychometric properties. The purpose of the inventory is to distinguish between more and less entrepreneurial individuals. Approximately 120 items were generated to capture the four components of entrepreneurship, 55 of which were administered to participants and statistically analysed. The empirical results of the study show that the META S-30 has adequate psychometric properties in terms of internal consistency, although the hypothesised four-factor structure was only partially supported. The implications for future studies are discussed.

The primary thesis outlined in Chapter 1 indicated that the construct of entrepreneurial personality should be conceived, not as the personality profile of entrepreneurs (as traditionally researched), but rather as a person's tendency and ability to

engage in entrepreneurial behaviours. The content analysis conducted in the chapter indicated that entrepreneurial behaviours could reliably be merged under a taxonomy comprising four broad (behavioural) domains, namely Creativity, Opportunism, Proactivity, and Vision. Based on the theory of individual differences (Pervin & Cervone, 2010), therefore, two underlying assumptions emerged from the combined theoretical and empirical analyses. The first underlying assumption was that, on a fundamental level, entrepreneurial behaviours can be performed by any person – not just entrepreneurs. Thus measurement of entrepreneurial tendencies and abilities can in theory span far beyond the groups traditionally assessed in entrepreneurship research (i.e. entrepreneurs). The second emerging assumption is that, as with any other individual difference domain, people will differ in their tendency and ability to engage in entrepreneurial behaviours. That is, some people will be more likely to and better able to engage in these behaviours. In other words, there should be differences in the 'degree' to which one is entrepreneurial: individuals who more often and are better able to engage in entrepreneurial behaviours should be considered more entrepreneurial than those individuals who engage in these behaviours less often and less competently. It was contended, therefore, that a person's entrepreneurial personality, that is, whether they should be considered more or less entrepreneurial, should be based on an examination of their tendencies and ability to engage in these four domains – rather than on whether they have started a business or not.

Based on this rational, the first aim of the current chapter was to develop a method for assessing differences in people's tendencies and abilities to engage in entrepreneurial behaviours. To this end, the current research employs a psychometric approach. At present there do not exist any inventories to assess individual differences in

the entrepreneurial personality[20]. Accordingly, the aim of this study is to develop a 'measure of entrepreneurial tendency and ability' (META) that covers the four dimensions of the construct's domain, namely, Creativity, Opportunism, Proactivity, and Vision. Whilst there may be other methods available to assess this construct, such as the use of interview methods, assessment centers, CV's, or biographical measures, research has indicated that psychometric tests are generally reliable, valid, and convenient instruments for assessing personality traits (Kline, 2000; Schmidt & Hunter, 1998). The current thesis thus followed this line of research.

What follows is a standard scale development process that consists of three stages conducted over two studies. Study 1, stage 1, involved the development of questionnaire items, intended to assess the relevant dimensions of the construct identified in the content analysis. Study 1, stage 2, involved validation of the factor structure of the META via exploratory data reduction. Separate samples were used which allowed testing of the second-order factors' reliability (internal consistency). This psychometric technique is designed to shed light on new constructs, or measures of extant constructs (Kline, 2000).

Method

Participants

One hundred and twelve individuals (57 males and 55 females), predominantly students, from large UK Universities participated in the study. The mean age for the sample was 26.5 years (SD = 9.3 years).

Procedure

[20] *Note:* the author uses the terms entrepreneurial personality, entrepreneurial tendencies and abilities, and entrepreneurial potential interchangeably throughout the thesis.

Approximately 120 items were generated to capture the four components of entrepreneurship (Creativity, Opportunism, Proactivity, and Vision) identified from the literature review and content analysis. These items were screened and edited by three expert judges based on content relevance. Items were eliminated based on similarity/redundancy (i.e. too similar to other items), difficulty (i.e. complex, difficult to understand, or vague), and relevance (i.e. face validity; Wilson & MacLean, 2011). This process narrowed the number of items to 55. The questionnaire was administered in-class to approximately half of the participant sample. The other half of the sample completed the questionnaire through an online questionnaire tool. The questionnaire format enabled participants to rate themselves according to a 5-point Likert scale ranging from completely disagree (1) to completely agree (5). The use of Likert scales have been criticised in the literature on several grounds, including being less empirically correct, more prone to social desirable responding, and response biases (e.g. Cheung, 2006). Nevertheless, this response format is widely used in survey questionnaires (Chamorro-Premuzic, 2011), and has been suggested to be the most useful in behavioural research (Hinkin, 1998) and most suitable for use in factor analysis (Kerlinger, 1986). Coefficient alpha reliability with Likert scales has been shown to increase up to the use of five points, but then level off (Lissitz & Green, 1975). Ethical approval for the research was obtained through Goldsmiths, University of London.

Results

A Principal Component Analysis (PCA) was performed on the 55 items for the 112 participants to estimate number of factors. Factorability was confirmed by the Kaiser-Meyer-Olkin value of .85 (exceeding recommended minimum of 0.6; Kaiser,

1970, 1974) and anti-image correlation matrix (correlations exceed .3). Bartlett's Test of Sphericity (Bartlett, 1950) was statistically significant, supporting the factorability of the correlation matrix.

Thirteen components with Eigenvalues greater than 1 were identified. However, examination of the Scree plot suggested the presence of 1 principle component (see Appendix 2). The analysis revealed that the extracted component accounted for 35.3% of the variance. The component was labelled "META-total". A histogram of the component score showed that this component was normally distributed. The internal consistency (alpha α) for the total scale was .92.

An alternative Confirmatory Factor Analysis was performed to test the 4 *a priori* factorial structure of META, with the hypothesised facets *Creativity, Opportunism, Proactivity,* and *Vision*. Oblique (Direct Oblimin) rotation was requested to facilitate interpretation. In total, the 4 components accounted for 51.8% of the variance. Several complex variables were found in the solution, and with a cutoff of .45 for inclusion of variable in interpretation of a factor, several variables did not load on any factor. In addition, some items did not load on their corresponding (hypothesised) factor.

In an attempt to increase parsimony, validity, and reliability, analysis of item content, absolute loading, factor loadings, and internal reliability of scales, led to the omission of 25 items. The PCA was re-run on the remaining 30 items. Examination of the Scree plot again suggested the presence of 1 principal component. However, interpretation of the change in slope also indicated 3 further components. To interpret the optimal solution therefore, PCAs specifying 1 and 4 components were conducted.

The first PCA analysis with a unifactorial solution provided one normally distributed component, which accounted for 31.0% of the variance. The internal consistency for this total scale was .91. A second 4 factor solution with oblique rotation was performed. Extracted components were moderately correlated; therefore, an oblique rotation was retained. In total, the 4 extracted components accounted for 55.3% of the variance, with Component 1 contributing 31.0%, Component 2 contributing 10.4%, Component 3 contributing 7.3%, and Component 4 contributing 6.6%.

Each of the 7 items for 3 of the components, Opportunism, Proactivity, and Vision loaded as expected on their respective component, with adequate to good loadings, ranging from .53 to .85 for Opportunism, .55 to .79 for Proactivity, and .48 to .78 for Vision. However, the presence of cross-loadings suggested that the lower order facets do overlap moderately (see Appendix 2 for the factor loadings of items). Furthermore, out of the 8 items of component Creativity, 5 cross-loaded more strongly on Opportunism. Nevertheless, all components had moderate to high internal consistency (Opportunism = .89, Proactivity = .84, Vision = .80, I = .77) and were normally distributed. Based on the psychometric properties, parsimony and theoretical exactitude, the revised 30-item inventory was, therefore, deemed more appropriate for further investigation and use. This revised measure was labelled *META S-30.*

Discussion

The aim of study 1 was to explore the factorial structure and internal consistency of the META and examine the statistical suitability of individual items. From the results of this

study, it appears that a 30-item measure provides the optimal solution in terms of parsimony, variance explained, internal consistency, and theoretical exactitude of item loadings. Nevertheless, the results indicate that the second-order factors (facets) of the META S-30 may constitute a redundant layer in the structure. The PCA revealed a single-factor structure with the 4 variables as indicators of one broad latent variable (full-scale META-total). Thus, it is possible that from an empirical perspective, a 1 factor structure may be considered the superior solution.

On the other hand, the facets explain more of the variance in the data and the scales show good internal consistency. It is therefore important to determine the discriminant validity of these scales. In particular, it would be important to examine whether the facet scales explain incremental variance beyond the total facet score. Moreover, even if a one-factor solution is optimal, it is possible that the facets may be useful from a practical perspective if they are differentially related to outcomes (i.e. for domain specific decisions). Of course, it is critical to establish what these factors are assessing, and that they are doing so in a valid way. Further research is therefore warranted to determine the relative validity and utility of a unifactorial versus a multifactorial structure of META S-30.

One limitation to the current study was the use of a student sample. On the other hand, although students may, naturally, have been limited in terms of their entrepreneurial *achievements*, they are in theory not much less likely to display entrepreneurial personality traits than other populations. Nevertheless, some differences may be expected, just as one may expect differences with levels of Extraversion or

Conscientiousness with increasing age (Pervin & Cervone, 2010). Accordingly, future research should examine non-student samples to confirm the results of the current study.

2.2. Study 2: Examining the concurrent and incremental validity of META in relation to established personality and ability traits

Abstract

The aim of this study was to examine the trait correlates of META S-30, that is, its concurrent and discriminant validity in relation to established and theoretically relevant personality and ability traits. Accordingly, several relevant constructs were included in the analysis, namely: the Big Five personality traits, General Mental Ability, Divergent Thinking, Machiavellianism, and Psychopathy. To investigate META's incremental validity beyond trait measures, income level was used as 'external' criterion.

Given that the construct of entrepreneurial personality has been theoretically placed in the domain of personality and (self-perceived) ability, it is important to investigate how the construct fits in these domains (Kline, 2000). It is also necessary to show that this inventory predicts actual applied outcomes, beyond other psychometric

tests. As Furnham (2008) noted: 'to justify the use of any particular instrument, particularly used in conjunction with other better-established measures, it is advisable and desirable to demonstrate incremental validity, over other trait measures' (p. 43). It is also crucial to show that the measure actually predicts what it intended to predict. Accordingly, several theoretically relevant and well-established constructs were included in the analysis to assess the concurrent validity of META in relation to these constructs.

First, a measure of the most widely used classification system for personality traits, the five-factor model, or Big Five, was included to test META's relationship to broad personality traits. The Big Five identifies five broad domains of personality: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness/Intellect (Costa & McCrae, 1992a; Digman, 1990; Goldberg, 1993; John & Srivastava, 1999). The Big Five has proved extremely useful in providing a common language for researchers and organising personality research. It is therefore important to investigate META with reference to a Big Five trait taxonomy.

Theoretically, several of the Big Five factors can be related to META scores. For instance, two facets of Conscientiousness, 'achievement-striving' and 'competence', are conceptually related to the Vision and Proactivity facets of META. Openness is also relevant to META scale Creativity, as several of its (i.e. Openness') facets are conceptually related to innovation and creativity. Extraversion may similarly be related to META as it comprises facets such as 'excitement seeking' and 'activity', which are conceptually linked to Proactivity. It is more difficult to hypothesise on the links between neuroticism and META, and agreeableness and META, however, it could be argued that anxiety (Neuroticism facet) and compliance (Agreeableness facet) may be negatively

related to Opportunism. These links however, are more speculative in nature and strong relationships between these scales are not expected.

It could be argued that recognising opportunities and innovating (i.e. Opportunism and Creativity) require more than personality; that is, they may be a function also of cognitive ability and divergent thinking (e.g. Baron & Henry, 2010; Busenitz & Arthurs, 2007; Shane & Venkataraman, 2000). Accordingly, it is important to examine the concurrent validity of META also in relation to objective, rather than self-reported ability and creativity constructs. Consequently, a divergent thinking test and an intelligence test were included in the analysis. It should be noted, however, that because META encompasses *self-perceived* abilities and is measured through self-report, it is primarily a personality construct and thus may not relate to 'actual', or objective ability constructs (Chamorro-Premuzic, Ahmetoglu, & Furnham, 2008).

Finally, two measures of 'dark-side' personality constructs, namely, 'Machiavellianism' (Christie & Geis, 1970) and primary/secondary psychopathy (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995) were added in the analysis on an exploratory basis. Machiavellianism describes a person's tendency to be unemotional and detached from conventional morality, with deceitful and manipulative tendencies (Christie & Geis, 1970). Psychopathy may be described as having a deceitful interpersonal style, deficient affective experiences, and an impulsive and irresponsible behavioural style (Babiak & Hare, 2007)[21]. It has been hypothesised that dark-side traits, such as lack of empathy, manipulation, and callousness, which are trademarks of psychopathy and Machiavellianism, may be desirable and even necessary for entrepreneurial success (Kets

[21] See Study 5 for an in depth outline of the hypothesised relationship between dark-side traits and META.

de Vries, 1985). However, there is little empirical evidence to support this suggestion. Accordingly, the current study was the first to investigate the relationship between entrepreneurial tendencies and dark-side traits. Several demographic variables were also included in order to have a comprehensive understanding of the non-trait correlates of META.

Conceptually, income level may not necessarily be related to exploitation of opportunities or creativity (e.g. it could simply be related to job performance or hard work). Nevertheless, it may be appropriate to include this measure as a criterion to test a persons tendency and ability to create value (even if more comprehensive measures of entrepreneurial activity are no doubt needed). Thus, the aim was to see whether META S-30 predicts participant income, even after taking into account other well-established personality, ability, and creativity measures.

In line with above arguments several hypotheses are proposed:

H1: Conscientiousness will be positively related to META total and the facets Proactivity and Vision.

H2: Openness will be positively related to total META total and the facet Creativity.

H3: Extraversion will be positively related to total META total and the facet Proactivity

H4: Intelligence will be positively related to total META total and the facets Opportunism and Creativity.

H5: Divergent thinking will be positively related to total META total and the facets Opportunism and Creativity.

H6: META will show incremental validity in predicting income level beyond other trait measures.

Method

Participants;

One hundred and forty eight individuals (61 males and 87 females), taking part in a TV show in the UK, participated in the study. Participants were all from the UK, with a mean age for the sample of 27.8 years (SD = 5.1 years). They were assessed as part of the selection process for the TV show and completed a number of questionnaires during the process. The questionnaire was completed before (the selected) participants were asked to participate in further interviews. This was opportunity sampling.

Measures

The Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003): This is a brief measure of the five factors of personality. The inventory has been reported to have adequate levels of convergent and discriminant validity, as well as test-retest reliability (Gosling, Rentfrow, & Swann, 2003). The inventory begins with the stem ‘‘I see myself as:’’ followed by ten pairs of two trait descriptors, which participants rate on a 7-point Likert- type scale (ranging from ‘‘strongly agree’’ to ‘‘strongly disagree’’).

Numerical Reasoning Test 20-items (NRT-20, Chamorro-Premuzic, 2008): This test measures mathematical and logical reasoning via 20 items that do not require any previous training in mathematics; thus it is a test of fluid intelligence (gf). There are 20-items and participants have 15 minutes to complete the test. Items include series completion (numbers and matrices), basic arithmetic problems (computational speed), and other deductive reasoning tasks. Recent data for 6,023 UK adults and 325 students indicated uncorrected correlations of .52 and .68 with the Baddeley Reasoning Test (Baddeley, 1986) and Wonderlic Personnel Test (Wonderlic, 1992).

Divergent Thinking (*Chamorro-Premuzic & Reichenbacher, 2008):* Divergent thinking was operationalized and assessed in terms of verbal fluency and creative problem solving. In this study we used divergent thinking only, though the two scales (i.e. fluency and creative problem solving) have been shown to correlate (Chamorro-Premuzic, 2007). Verbal fluency is a central domain of divergent thinking and was measured with an adaptation of the *Alternate Uses Test* (Christensen, Guilford, Merrifield & Wilson, 1960), which required participants to name "as many possible uses" for a brick, paperclip, pen, pillow, tin and shoe box. They were given 1 minute per object. Three objects were used for each condition (calm and stressful), and the order of objects was counterbalanced. Responses were coded for (1) fluency or the total number of uses per item (regardless of quality or appropriateness); (2) elaboration or the level of detail provided for each use, and (3) originality or the number of responses provided by fewer than 1% (5 points), 10% (2 points), or 15% (0 points) of participants in the sample. Responses were rated blindly by three independent raters on a 1 – 10 (average inter-rater reliability was .75)

Mach-IV (Christie and Geis, 1970). Machiavellianism was assessed with the Mach-IV, which is a widely used scale for this construct (Ali & Chamorro-Premuzic, 2010). This test consists of 20 items covering the use of deceit in interpersonal relationships, a cynical attitude to human nature and a lack of concern for conventional morality. Participants indicate their response on a seven-point scale ranging from ''strongly disagree'' (1) to ''fully agree'' (7), with higher scores indicating higher levels of Machiavellianism. The reliability and validity of Mach-IV are well-documented (e.g. Christie & Geis, 1970).

Levenson Self-Report Psychopathy Scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995). The LSRP is a 26-item self-report measure that focuses not only on the central

personality traits related to psychopathy but also includes a social deviance component. The LSRP provides individual scores based on the two-factor structure of psychopathy. The primary psychopathy scale consists of a 16 items, ranging from ‘‘strongly disagree’’ (1) to ‘‘strongly agree’’ (7). The secondary psychopathy scale consists of a 10 items, ranging from ‘‘strongly disagree’’ (1) to ‘‘strongly agree’’ (7). The LSRP scales are both reliable and valid (e.g. Levenson, Kiehl, & Fitzpatrick, 1995).

Income: Participants reported their income on a five-point scale ranging from below ‘£15000 per annum’ to above ‘£50000 per annum’.

Education: Participants reported their education on a five-point scale ranging from “GCSE” (1) to “PhD” (5).

Procedure

Participants completed all the measures as part of a selection process for a reality TV show. Each participant completed the measure separately and supervised. Thus, this was a high-stake context; however, participants did not know the selection criteria. Ethical approval for the research was obtained through Goldsmiths, University of London.

Results

Data screening was conducted to investigate missing variables, and test the assumption that the data conformed to normality, linearity, absence of multi-collinearity and singularity, that the data could be considered homoscedastic, that the errors would be considered independent of one another, as measured by the Durbin-Watson statistic (Field, 2005) and no outliers were present (Tabachnick & Fidell, 2005). Normality was assessed by studying histograms as well as the scores for skewness and kurtosis which needed to be below 2 and 7 respectively (Tabachnick & Fidell, 2005). There were no

missing cases on any of the personality measures, as the questionnaire was designed to prevent proceeding in case of missing responses. All variables in the model were found to be normally distributed. Univariate outliers were first identified by assessing stem and leaf diagrams and box plots. They were also assessed by standardising the variables and identifying z-scores that exceeded 3.29 (Tabachnick & Fidell, 2005). No variables showed outliers above 3.29 and no multivariate outliers were identified using the method of Mahalanobis Distance. Bivariate correlations were computed in in order to check for multi-collinearity. None of the correlations exceeded 0.8 and, therefore, it could be assumed that variables were not multi-collinear with one another (Field, 2005). VIF values for all variables were below 10 and Tolerances values were above 0.10, again suggesting the absence of multi-collinearity (Myers, 1990). No singularity was found as no variables were found to be redundant with each other (Tabachnick & Fidell, 2005). Homoscedasticity and linearity were checked by assessing bivariate scatter plots as well as plots showing predicted versus actual values. All variables appeared to be linear when the latter plot was inspected and this was also seen looking at the Pearson's r in the correlation table. In the bivariate scatter plots, values seemed to cluster around a central point with roughly equal widths to either side, so homoscedasticity of variance was assumed (Tabachnick & Fidell, 2005).

Internal consistency reliabilities (Cronbach's alpha) were calculated for both the META-total factor and each of the META facet dimensions. The coefficients suggested that, with the exception of Creativity ($\alpha = .66$), which had somewhat lower reliability than the recommended cut-off value (.70; Guilford, 1956), META-total ($\alpha = .89$),

Opportunism (α = .86), Proactivity (α = .75), Vision (α = .75) facets had adequate to high internal consistencies.

Bivariate correlations and descriptive statistics for the META-total and 4 facet scales, as well as the 14 variables included in the concurrent validation analysis, are shown in Table 2. As can be seen, most variables correlated significantly with at least one of the META scales. In addition it seems some variables correlated with the subscales of the META S-30 but not with the total META score, indicating the discriminant validity of the facet scores. However, the inter-correlations between facet scores were generally high, indicating a general underlying factor may explain a substantial variance across the scales.

Concurrent and Discriminant Validity

To investigate the concurrent and discriminant validity of the META scales, structural equation modeling (SEM; Byrne, 2006) analysis using AMOS 5.0 (Arbuckle, 2003) was conducted. Four models were tested. Model 1, was a saturated model and paths from all variables that had significant correlations with META, were allowed to influence a latent total META-total factor[22]. The latent META-total factor was indicated by its four subscales Opportunism, Proactivity, Vision, and Creativity. The second model, Model 2, tested links between the individual META facets (i.e. omitting the latent META-total factor) and

[22] The variable "income" was not included in the first two models, which were concerned with the identification of the 'belonging' of META in personality factor space. Income was used in Models 3 and 4 as the criterion.

Table 2. *Descriptive statistics and bivariate correlations, between the META S-30, personality, ability, creativity, and demographic variables.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	M	SD
1. MT	_																		106.6	13.8
2. OP	.82**																		22.2	4.6
3. P	.72**	.40**																	24.8	4.3
4. V	.80**	.63**	.38**																26.3	4.3
5. C	.79**	.53**	.45**	.52**															29.8	4.1
6. O	.32**	.22**	.17*	.24**	.39**														12.7	1.5
7. C	.19*	.16	.13	.24**	.06	-.03													11.0	2.4
8. E	.34**	.21*	.30**	.20*	.34**	.24**	.03												12.0	1.8
9. A	.030	-.11	.12	.01	.09	.11	.13	.10											10.4	2.1
10. N	.19*	.15	.24**	.06	.18*	.09	.14	.17*	.23**										10.4	2.6
11. IQ	-.05	-.10	-.12	-.04	.09	.01	-.07	.04	.04	.10									8.6	3.1
12. DT	-.03	-.10	.03	-.09	.07	.01	-.10	.20*	-.03	-.09	.17*								29.4	8.4
13. Mac	-.12	-.09	-.11	-.07	-.11	-.02	-.19*	-.15	-.33**	-.24**	.12	.05							88.2	12.3
14. PP	.09	.19*	.08	.00	-.01	-.03	-.12	-.03	-.36**	-.16	-.08	.03	.42**						30.0	6.1
15. SP	-.24**	-.13	-.28**	-.18*	-.16	.01	-.20*	-.14	-.21*	-.40**	-.12	.08	.28**	.19*					19.5	4.5
16. Age	-.10	-.06	-.07	-.12	-.10	-.04	.18*	-.01	.15	.08	.05	-.02	-.23**	-.23**	-.12				27.8	5.1
17. Sex	.15	.23**	-.08	.14	.17*	.07	-.12	-.26**	-.21*	.11	.19*	-.26**	.16	.12	-.10	-.01			1.4	.49
18. Edu	.12	.00	.03	.11	.19*	.04	.07	.06	.04	-.09	.18*	.21*	-.04	-.03	-.26**	.02	-.01		2.4	.95
19. Inc	.16*	.20*	-.01	.15	.13	-.03	.14	-.04	-.07	.13	.19*	-.07	-.05	-.02	-.20*	.35**	.20*	.07	2.9	1.5

Note: MT = META-total, OP = Opportunism, P = Proactivity, V = Vision, C= Creativity, O = Openness, C = Conscientiousness, E = Extraversion, A = Agreeableness, N = Neuroticism, DT = Divergent Thinking, Mac = Machiavellianism, PP = Primary Psychopathy, SP = Secondary Psychopathy, Edu = Education, Inc = Income. Mean scores on Creativity are higher as a result of more items in this scale.

hypothesised predictor variables. Finally, two 'predictive' models were also tested, where paths from the predictor variables that were found to significantly correlate with income were loaded on this criterion variable. Model 3 examined the validity of the META total score in the prediction of income, whereas Model 4 investigated the validity of the individual facets of META, beyond other trait constructs.

Though the choice of ordering is rarely straightforward in SEM (Davis, 1985), the variables included in the predictive models were divided into three subsets in terms of their likely causal ordering. Age and sex were treated as exogenous variables, personality (including META) and ability factors, as well as education, were modelled as both exogenous and endogenous (mediators), and income was treated as endogenous. In the first of these (Model 3), a latent META-total factor was used, and in the second (Model 4), individual facets were allowed to influence the dependent variable.

The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989; tests the hypothesis that an unconstrained model fits the covariance or correlation matrix as well as the given model; ideally, values should not be significant); the goodness of fit index (GFI; Tanaka & Huba, 1985; a measure of fitness where values close to 1 are acceptable) and its adjusted version (AGFI; adjust for the number of degrees of freedom); the root mean square residual (RMSEA; Browne & Cudeck, 1993; values of .08 or below indicate reasonable fit for the model); the comparative fit index (CFI; Bentler's, 1990; can be interpreted as the improvement in fit of the hypothesised model over a baseline model, relative to the fit of the baseline model); and the Akaike's Information Criterion (AIC; Akaike, 1973; gives the extension to which the parameter estimates from the original sample will cross-validate in future samples).

The saturated model (Model 1) showed adequate fit to the data: χ^2 = (30 *df*, *p* = .05) 30.51, GFI = .94, AGFI = .90, CFI = .96, RMSEA = .05, AIC = 85.1. However, several paths

in the model were found to have non-significant values. Non-significant parameters can be considered unimportant to the model, and in the interest of scientific parsimony, they should be deleted (Arbruckle, 1999). Thus, in further fitting efforts, on the basis of the AMOS modification indices, expected parameter change statistics, and standardised residuals, paths and variables were deleted one at a time, and the model was re-estimated each time. The modified model, graphically depicted in Figure 4, fitted the data well: χ^2 = (24 *df*, *p* = .09) 33.53, GFI = .95, AGFI = .90, CFI = .96, RMSEA = .05, AIC = 75.5. As can be seen, the only paths that loaded significantly on the latent META-total factor were those of Sex (females were higher on META-total), Extraversion, Conscientiousness, and Openness. Extraversion was the strongest personality correlate of META-total. AMOS-squared multiple correlations indicated that sex and personality factors accounted for 36% of the variance in META-total.

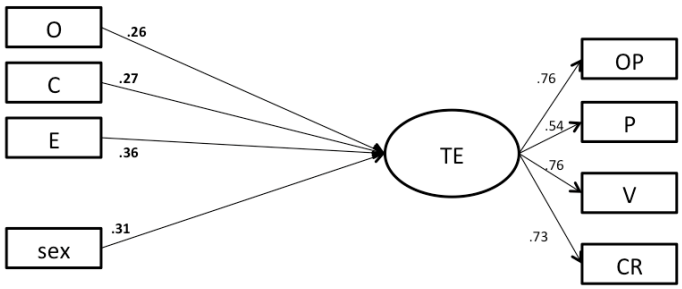

Figure 4. Modified model (Model1) for predictors of META S-30 total score. *Note*. All paths are standardised parameter estimates. Positive score on sex means females scored higher on TE. *Note*: OP = Opportunism, P= Proactivity, V = Vision, CR = Creativity

The second model, which tested links between the individual META facets and hypothesised predictor variables, did not fit the data well χ^2 = (107 *df*, *p* < .01) 197.46, GFI = .86, AGFI = .79, CFI = .77, RMSEA = .08, AIC = 289.5. Modifications were, therefore, made in order to improve fit. On the basis of the modification indices, 2 substantively meaningful paths (from sex to Opportunism and Conscientiousness to Opportunism) were

added to the model, and nonsignificant paths and variables were removed (see Figure 5). The modified model showed good fit to the data χ^2 = (43 *df*, *p* = .09) 55.69, GFI = .94, AGFI = .90, CFI = .96, RMSEA = .05, AIC = 125.69.

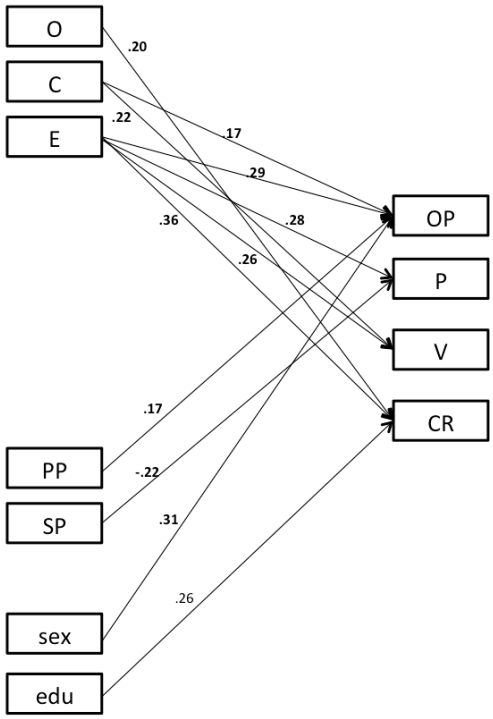

Figure 5. Modified model (Model 2) for predictors of META S-30 facet scores. *Note*. All paths are standardised parameter estimates. Positive score on sex means females scored higher on Opportunism; positive score on Primary Psychopathy means higher psychopathy levels were associated with higher Opportunism; negative score on Secondary Psychopathy means lower psychopathy levels were associated with Proactivity.

As can be seen in Figure 5, significant paths were from Education to Creativity, Sex to Opportunism (with females being higher than males on this facet), Extraversion to Opportunism, Proactivity, Vision, and Creativity, Conscientiousness to Opportunism and Vision, Openness to Creativity, Primary Psychopathy to Opportunism (those higher in Psychopathy were higher on Opportunism), and Secondary Psychopathy to Opportunism

(those higher in Psychopathy were lower on Opportunism). Overall, H1, H2, and H3 were partially supported, though no support was found for H4 and H5.

The third model, which tested a causal model in the prediction of 'income', and included the total META score, showed adequate fit to the data. However, two paths (sex and education) were found to be non-significant and subsequently deleted from the model. The modified causal model, shown in Figure 6, fitted the data well: χ^2 = (14 *df*, *p* = .21) 17.86, GFI = .97, AGFI = .93, CFI = .98, RMSEA = .04, AIC = 45.86. Looking at Figure 6, we can see that the only significant predictors of 'income' were age, intelligence, and META total score. It is noteworthy that, with the exception of age, the META is the strongest individual difference predictor of income. Overall, META, intelligence, and age accounted for 22% of the variance in income.

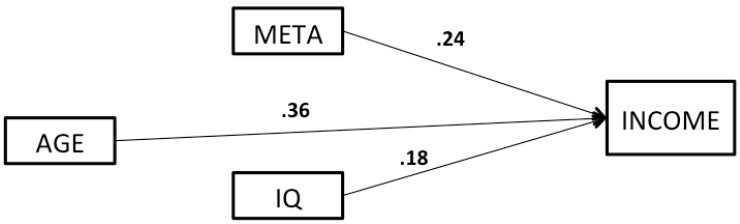

Figure 6. Modified model (Model 3) for individual difference predictors of 'Income'. *Note*. All paths are standardised parameter estimates.

The final model examined the individual contribution of META facets in the prediction of income (i.e. without a latent factor), tested in the same causal structure as in Model 3. Only the Opportunism facet of META was added to this final model given that it was the only significant scale correlate of income. In line with Model 3, sex and education were not related to income and were subsequently deleted from the Model 4. This modified model showed good fit to the data: χ^2 = (9 *df*, *p* = .27) 11.16, GFI = .98, AGFI = .93, CFI = .99, RMSEA = .04, AIC = 49.16. As can be seen in Figure 7, the Opportunism facet of

META was found to be a stronger predictor of income than intelligence. Overall, Opportunism, intelligence, and age accounted for 20% of the variance in income.

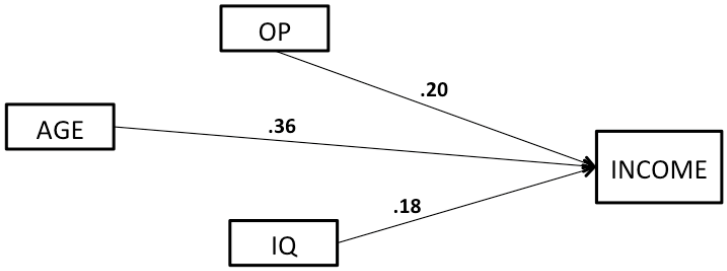

Figure 7. Modified model (Model 4) showing the relationship between age, intelligence, META S-30 subscales, and 'Income'. *Note*. All paths are standardised parameter estimates.

Discussion

The aim of study 2 was to examine the trait correlates of META. First, the META scales showed adequate to high alpha values, confirming the reliability of the measure. The exception was the Creativity subscale which had a somewhat lower than desirable internal consistency (alpha = .66). Indeed, several of the Creativity items were found to cross-load on the Opportunism subscale in Study 1. Looking at the correlations between these subscales one can see that there is substantial overlap (r = .82). One hypothesis is that similar creativity and ability related cognitive processes underlie both Creativity and Opportunism (Baron & Henry, 2010; Busenitz & Arthurs, 2007; Shane & Venkataraman, 2000). However, in the current study (contrary to H4 and H5), no significant relationship was found between either of these facets with divergent thinking or intelligence, rendering this explanation insufficient. The fact that Openness significantly correlated with both measures suggests that behavioural tendencies rather than cognitive processes underlie the Opportunism and Creativity concepts. However, the correlations may also be indicating insufficient discriminant validity of these two META scales, rather than the theoretical constructs. Further research will therefore be needed to evaluate this question.

As expected, both the total score and the facet scales of the META were significantly related to the Big Five personality traits. In line with the hypotheses, Conscientiousness (H1), Openness (H2) and Extraversion (H3) were significant predictors of total META scores. In terms of the facets, H1 was partially supported (the hypothesised directionality of correlations between Conscientiousness and Vision were confirmed, but were contrary to expectations for this variable and Opportunism), H2 was supported, and H3 was supported; however Extraversion was found to significantly relate also to the rest of the META sub-scales (which was not hypothesised). Furthermore, with the exception of two modest links between Primary psychopathy and Opportunism (positively) and Secondary psychopathy and Proactivity (negatively), no other personality or ability variable significantly related to META scales[23]. Overall, 13 different individual difference variables, including established personality, intelligence, creativity, and psychopathology constructs, as well as relevant demographic data, accounted for 36% of the variance in META-total. Thus, whilst META conceptually corresponds to a lower-order construct within the Big Five personality space, or a 'compound trait' (Ones & Viswesvaran, 2011), rather than a new personality dimension, it is expected to demonstrate discriminant and predictive validity.

Indeed, META (the Opportunism facet, in particular) was found to relate to participant income even after the Big Five personality factors, intelligence, age, and sex were included in the analysis (no other psychometric test was related to income). Notably, with the exception of age, META displayed the strongest relationship with income. While it remains for future studies to replicate these findings, also in relation to other criteria, these results show promise in regards to the potential usefulness of META for research and practice.

[23] Relationships between Primary and Secondary Psychopathy and META-total did not reach significance.

Discussion

Based on the theoretical framework suggested in Chapter 1, the aim of the two studies presented in this chapter was to design and validate a psychometric measure intended to distinguish between more and less entrepreneurial individuals. META was found to have adequate psychometric properties and showed a theoretically meaningful relationship with established personality traits. Importantly, META was found to relate to participant income, a theoretically meaningful criterion, over and above (incrementally) several established personality, ability, and creativity measures, as well as relevant demographic variables. This indicates the measure's potential validity in distinguishing between more and less entrepreneurial individuals. Of course, it would be unwise, at this early stage, to make claims about META's practical usefulness. The current research had several limitations and further research examining the reliability and validity of the META S-30 will no doubt be necessary.

Limitations and future research

One obvious limitation of the study was sample size. In general, it is desirable for studies aiming to provide evidence for the validity of a measure to use large and representative samples (Kline, 2000). While the recommended minimum for factor analysis was met (>100; Barrett & Klein, 1981; MacCallum, Widaman, Zhang & Hong, 1999) future research with larger sample sizes is warranted. Furthermore, as the participants in the study were to a certain extent self-selected and motivated to participate in a TV show, it would be useful for future research to replicate the findings with a more representative sample of the population. Nevertheless, theoretically the structure of personality dimensions should be consistent across populations (especially within the same country; Costa & McCrea, 1992a); thus, there is good reason to expect these results to be, at least partially, replicable.

Furthermore, whilst the internal consistency and validity of META were generally acceptable, there remain some issues with the psychometric properties of at least one of the

subscales, namely, Creativity. It would be necessary therefore to further investigate whether this scale can be improved in terms of factorial loadings and internal consistency. It could also simply be that the scale can theoretically not be separated from the Opportunism scale (Baron & Henry, 2010).

In addition to the personality measures used in this study, it would be also useful for future research to examine how the META relates to other well-established and theoretically meaningful personality measures. Particularly relevant might be constructs conceptually related to META, such as the Enterprising dimension of the Vocational Interests measure of John Holland (1997).

In the same vein, it would be desirable to locate the META in personality factor space with a factor-analytic, rather than correlational method, to demonstrate evidence of discriminant validity. However, as the current study used a short 10-item measure of the Big Five personality factors this was deemed unsuitable. Additional studies using more reliable and valid measures of the Big Five would be necessary in order to shed light this issue further.

Finally, an important area for future research is to establish clear criteria for prediction. Variables such as personal income may be examples of economic value creation. If META predicts these variables better than other personality and ability measures, it will be deemed practically useful. However, establishing the validity of META in the prediction of entrepreneurial activity is more complex. By definition entrepreneurial output, should be related to the creation of value and progress, via the exploitation of perceived opportunities and innovation. This means that, conceptually, one needs to attribute the value created to the exploitation of opportunities or innovation, rather than to, say, job performance, good

management, or the economy[24]. This may be more difficult to establish. It may need assessment of not only quantity, or value, but also quality, or type of output, which is inherently difficult to measure. Nevertheless, similar difficulties are found in several related fields. For instance, it has been notoriously difficult to measure creative activity and achievement (Chamorro-Premuzic, 2007). However, advances in research have led to increasingly better and more valid measures of creative achievements (e.g. Carson, Peterson, and Higgins, 2005).

[24] Note that this is perhaps more theoretically relevant than practically, as few would care about the means by which economic value was created if the measure incrementally predicts this criterion.

Chapter 3: Construct validity of META

3.1. Study 3: The relationship between META and the Big Five personality traits

Abstract

Although meta-analyses show that the Big Five personality traits predict entrepreneurship (Brandstätter, 2011), previous research has only examined the relationship of the Big Five with more traditional business related outcomes, such as business creation, revenues/profits, and employment growth. Accordingly, the current study extends previous research to examine the relationship between the Big Five and a wider range of entrepreneurial outcomes (e.g. social, corporate and creative entrepreneurship). Additionally, it examines the discriminant and incremental validity of META in relation to the Big Five. Results indicate both the Big Five and META significantly predict various forms of entrepreneurial success, though META does so more consistently. Analysis also establishes the discriminant validity of META in relation to the Big Five, corroborating the results found in Study 1. Implications are discussed in terms of the usefulness of META in predicting of entrepreneurial outcomes.

The ‘Big Five’ personality traits (Costa & McCrea, 1992a) have been found to be valid predictors of employee job performance, as demonstrated extensively by criterion-related validity studies (e.g., Chamorro- Premuzic & Furnham, 2010; Ones, Dilchert, Viswesvaran, & Judge, 2007). The personality-performance link is found across all occupational groups, managerial levels, and performance outcomes (Barrick & Mount, 1991, Barrick, Mount & Judge, 2001, Hurtz & Donovan, 2000). Whereas Conscientiousness and, to some degree, Emotional Stability, have been associated with higher job performance across most types of jobs, the relationship between other Big Five traits (e.g. Extraversion, Openness and Agreeableness) and job performance is more context-dependent (Barrick et al., 2001). For example, Extraversion predicts performance only in professions that involve social interaction, whereas Openness (Barrick & Mount, 1991) and Agreeableness (Salgado, 1997) only predict training proficiency but not subsequent job performance.

In contrast, there is less agreement about the importance of personality as a predictor of entrepreneurial success (Baron, Frese, & Baum, 2007). Although recent meta-analytic studies did highlight significant associations between personality and entrepreneurship (Brandstätter, 2011), these findings are limited to business performance, entrepreneurial intentions (i.e. intentions to start a business; Zhao et al., 2010) and occupational status (Zhao & Seibert, 2006). For instance, when entrepreneurship is defined in terms of occupational status (i.e., business ownership), data indicates that entrepreneurs tend to score significantly higher on Conscientiousness and Openness and lower on Neuroticism and Agreeableness than managers (Zhao & Seibert, 2006). Additionally, meta-analyses reveal that there is a particular personality profile associated with a person’s willingness or intention to

start a business (high Conscientiousness, Openness and Extraversion, and low Neuroticism; Zhao et al., 2010). In light of these findings, it could be suggested that the Big Five may also explain individual differences in entrepreneurial behaviours beyond business ownership or start up intention, such as opportunity recognition, opportunity exploitation, innovation, and value creation. Given the prevalent gaps in the literature relating to the definition of entrepreneurship (Hisrich et al., 2007), however, no studies have examined this hypothesis.

In addition, past research has found that narrow traits matched to the task of entrepreneurship have produced higher correlations with business creation and success compared to broad, unmatched traits such as the Big Five (Rauch & Frese's, 2007). Narrow and matched traits examined in the literature are need for achievement, self-confidence, innovativeness, stress tolerance, need for autonomy, and proactive personality. It has been suggested that the matched traits are more strongly related to entrepreneurial success because they rely on explicit descriptions that are task specific (Barrick & Mount, 2005; Rauch & Frese, 2007). Additionally, matched traits produce distinct variance that contributes to the prediction of entrepreneurial success (Rauch & Frese, 2007; Tett, Steele, & Beauregard, 2003). With this in mind, it is reasonable to expect that META – an inventory specifically matched to the task of entrepreneurship (at least conceptually) – will incrementally and more strongly predict entrepreneurial activity relative to the Big Five. Although Study 2 provided initial evidence for this assertion, it was limited to the criterion of 'income/salary' (which is an insufficient metric for entrepreneurial activity), as well as a short 10-item measure of the Big Five (which, as a standard, has less desirable psychometric properties; Goldberg, 1992).

The present study, therefore, extends previous research in a number of ways,

including: a) the adoption of a comprehensive operational definition and measurement of entrepreneurship as behaviours and activity relating to opportunity recognition, exploitation, innovation and value creation; b) investigation of the validity of the Big Five in predicting such entrepreneurial activity (beyond business creation and success), and c) examining the incremental validity of META above the Big Five in predicting entrepreneurial activity. Two further aims of this study was to d) improve the psychometric properties of the subscales of the META inventory, by generating additional items, and e) investigating the discriminant validity of META in relation to the Big Five through a factor analytic method. Kline (2000) describes that the most appropriate method to examine the discriminant validity of a personality scale, is to use factor analysis of the items of both measures. To this end, it was important to use a more reliable inventory of the Big Five, to investigate this assumption.

Accordingly the following hypothesis are produced:

H1: The Big Five personality traits will predict a wide range of entrepreneurial success outcomes other than business creation and success.

H2: META will positively predict a wide range of entrepreneurial success outcomes.

H3: META will show discriminant validity in relation to the Big Five personality traits.

H4: META will demonstrate incremental validity and produce stronger effect sizes relative to the Big Five in the prediction of entrepreneurial success outcomes.

Method

Participants

A total of 670 participants (322 males and 348 females) were recruited online. The mean age of this group was 33 years (80.3% aged between 19 and 43; 2.6% 18 or below; 17.1% 44 or above). Forty-eight per cent of participants were employed, 7.6% were unemployed, 31.5% were students, and 27.5% were self-employed (multiple responses such as self-employed and student were possible).

Measures

Big Five Personality Factor Markers (Goldberg, 1992)

The Big Five were measured using a 50-item scale (10 items per dimension) from the International Personality Item Pool: Extraversion ('I talk to a lot of different people at parties'), Agreeableness ('I am not really interested in others'), Conscientiousness ('I like order'), Emotional Stability ('I am easily disturbed'), and Intellect/Imagination (here referred to as Openness, 'I am full of ideas'). Answers are given on a five point Likert scale ranging from 'very inaccurate' to 'very accurate'. Scores are obtained for each dimension. All dimensions demonstrated good reliability (see Table 3). This longer measure of the Big Five was deemed more suitable for concurrent validity purposes given the 10-item measure would have insufficient items for such analysis.

Measure of Entrepreneurial Tendencies and Abilities

Given the lower than desired internal consistency and discriminant validity of some facet level scales of META, a total of 14 new items were generated and added to the measure (see Appendix 5). Example items included "I rarely use my creativity to solve everyday problems" (Creativity), "I am rarely afraid to exploit opportunities, even if there is a risk" (Proactivity), "I always keep a close eye on the future" (Vision), and "I rarely see lucrative opportunities, even if I'm very knowledgeable in the area" (Opportunism). This increased the total number of items to 44. Participants

rated themselves according to a 5-point Likert scale ranging from completely disagree (1) to completely agree (5).

Entrepreneurial Activity and Behaviour

In order to assess individual differences in entrepreneurial activity and behaviour (i.e. output), beyond creation of business, 16 items relating to past (biographical) and current achievements and activities were included in the survey. All items were rationally generated based on the most common themes in the literature, found in the content analysis (see Chapter 1), namely, entrepreneurial activities related to opportunities, innovation, and value creation, regardless of occupational status. These were related to corporate entrepreneurship (e.g., making improvements to the organisation's product or service lines, solving longstanding organisational problems, changed a procedure/method/system in the organisation that was being used etc.); social entrepreneurship (e.g., initiating activities aimed at bettering the community, creating a student organisation, taking initiative to enhance education etc.); and entrepreneurship through innovation/invention (e.g. building a prototype of a design; in line with the Creative Achievement Questionnaire; Carson, Peterson, & Higgins, 2005). The items referred to actual biographical achievements, outside and within organisations, rather than to attitudes or behavioural tendencies (as assessed by META). Responses were rated on a multiple choice and participants could select more than one option (c.f. Peterson, & Higgins, 2005 for the use of this method). A (Oblimin rotated) PCA was conducted to investigate the underlying structure of these items. Six components with Eigenvalues above 1 were extracted. An examination of the Scree plot revealed three independent factors. All items loaded on their hypothesised factor. The three factors named Corporate (4 items), Social (5 items), and Invention (7 items) entrepreneurship had adequate internal consistencies (see Table 3 for descriptive statistics and alpha levels). The item ''income'' was (as in Study 2) included in the analysis, given that it represents a common

operationalisation of entrepreneurial success in the literature (Zhao & Siebert, 2006).

Procedure

Participants were recruited through social media sites (such as LinkedIn, Facebook and Twitter), emails and posts in relevant forums. Their participation was voluntary and they could withdraw from the survey whenever they wanted. Participants provided biographical information first, followed by the Big Five and META questionnaires. Dynamic feedback on entrepreneurship scores (META) was given upon completion. Ethical approval for the research was obtained through Goldsmiths, University of London.

Results

Descriptive statistics and internal consistency reliabilities are presented in Table 3, and bivariate correlations in Table 4. Data screening showed that there were no scores out of range and no missing cases on any of the personality measures, as the online questionnaire did not allow participants proceeding in case of missing responses. The 50 Big Five and the 44 META items were investigated to establish whether they met the assumptions of multivariate analysis. The distribution of all variables was normal and there were no multivariate outliers in the dataset. Variables were not multi-collinear with one another and no singularity was found. All variables appeared to be linear and homoscedasticity of variance was assumed (Tabachnick & Fidell, 2005).

As expected, META correlated significantly with all entrepreneurial success outcomes as well as with each of the Big Five. The Big Five also correlated significantly with several of the entrepreneurial success outcomes, most notably Social and Corporate entrepreneurship. Moderate correlations were found amongst the four META facets and amongst most of the entrepreneurial success outcomes.

Examination of the psychometric properties of the 44 items of META showed that the addition of the 14 new items increased both the internal consistency of the facet level scales and improved the factor loadings of items. An Oblimin rotated Principal Component Analysis of the 44 items of META revealed a four-factor structure of META with Opportunism (11 items), Creativity (11 items), Proactivity (12 items), and Vision (10 items), with most items loading on their hypothesised factor. At the same time, the correlations between these factors (see Table 3) remained moderate, suggesting the possibility of an underlying latent factor.

	Mean	Median	SD	Skewness	Range	Cronbach's Alpha
Extraversion	3.23	3.30	.70	-.33	3.60	.84
Agreeableness	3.98	4.00	.57	-.71	3.50	.81
Conscientiousness	3.43	3.50	.61	-.21	3.80	.78
Emotional Stability	3.18	3.20	.76	-.08	4	.88
Openness	3.83	3.85	.48	-.52	2.90	.72
Proactivity	3.51	3.55	.70	-.37	4	.90
Opportunism	3.30	3.34	.65	.01	3.58	.88
Creativity	3.87	3.91	.66	-.59	3.64	.86
Vision	3.75	3.82	.52	-.95	3.27	.84
Invention E	.27	.22	.26	.60	1	.62
Social E	.28	.20	.29	.91	1	.66
Corporate E	.37	.25	.27	.17	1	.53
Income	5.20	5	3.11	1.00	14	—
Age	32.95	30	11.58	.82	72	—

Table 3: *Descriptive statistics*

To test the discriminant validity of META in relation to the Big Five personality traits, a single Oblimin rotated PCA was conducted on the items of both inventories. Analysis of the Scree plot in Figure revealed 8 components. Looking at item level loadings, none of the items of the META scales Opportunism, Proactivity, and Vision loaded on the Big Five components, and all META items loaded on their hypothesised component. Similarly none of the Big Five items loaded on any of the META components (see Appendix 4). The META scale Creativity, on the other hand, did not show discriminant validity, with most of its items and the Big Five factor Openness loading on the same component. Thus, it seems Creativity and Openness overlap to a degree that does not discriminate Creativity as a factor beyond that of Openness.

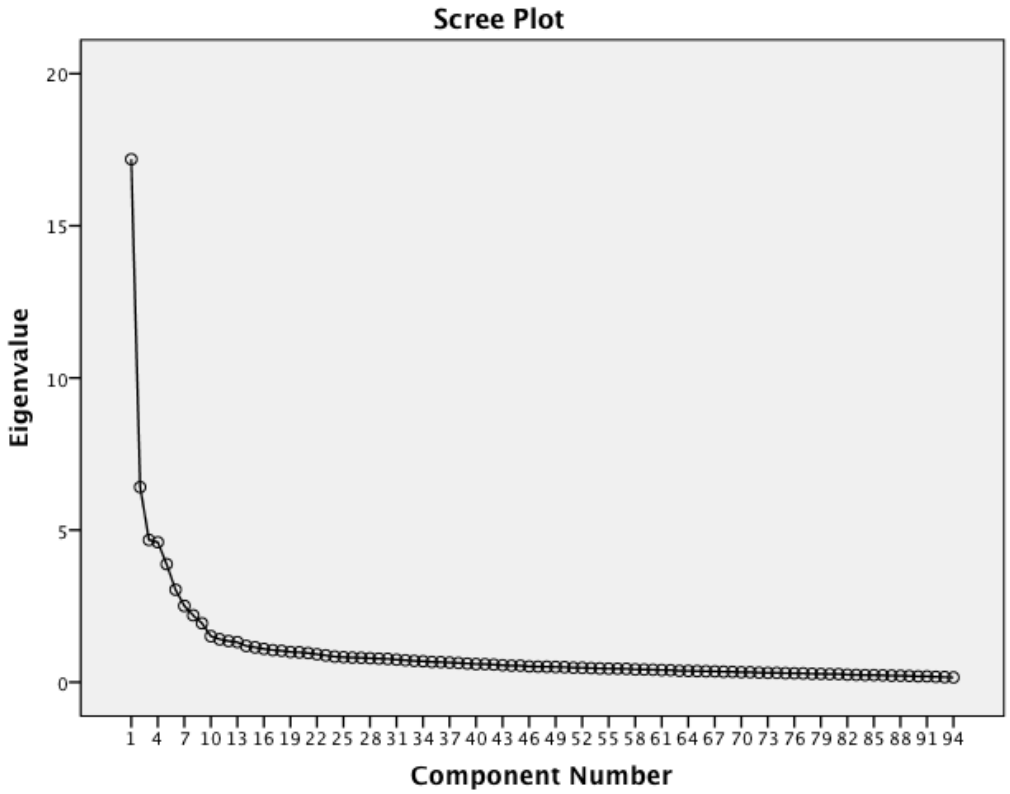

Figure 8. Screeplot showing the FA of META and Big Five personality traits

The component correlations matrix showed that none of the META components correlated with the Big Five components beyond the .2 level (with the exception of Openness and Creativity component, which loaded at .31 with Opportunism); the highest META – Big Five component correlation was .16. This substantiates the discriminant validity of META in relation to the Big Five personality traits.

Structural Equation Modelling

To assess the incremental validity of the different traits (of META and Big Five) in predicting entrepreneurial success, Structural Equation Modelling (SEM; Amos 5.0 software, Arbuckle, 2003) was carried out. Given the intercorrelations between the outcome measures of entrepreneurial achievements and between the META facets a parsimonious model was tested. In this model all four META facets were loaded onto a latent META total factor. Similarly, all entrepreneurial outcomes were loaded onto a latent Total Entrepreneurial Activity (TEA) factor. In this model, age, sex, and the Big Five were specified as exogenous variables, META as both exogenous and endogenous, and TEA and income as endogenous.

The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989), the goodness of fit index (GFI; Tanaka & Huba, 1985; values close to 1 indicate good fit); the comparative fit index (CFI; Bentler, 1990; values above .96 are acceptable); the root mean square residual (RMSEA; Browne & Cudeck, 1993; values below .06 indicate good fit); and the expected cross-validation index (ECVI; Browne & Cudeck, 1993; smaller values indicate better fit). The hypothesised model did not fit the data well (χ^2 (60) = 744.48; P = .000; GFI = .88; CFI = .75; RMSEA = .13; and ECVI = 1.34). Accordingly, steps were taken to identify misspecifications.

Modification indices, expected parameter change and standardised residuals were considered to evaluate whether paths should be deleted or added to the model. Only paths

Table 4: *Bivariate correlations between META, Big Five and entrepreneurial success.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Extraversion	—													
2. Agreeableness	.30**	—												
3. Conscientiousness	.02	.17**	—											
4. Emotional Stability	.29**	.17**	.18**	—										
5. Openness	.12**	.08*	.00	.08*	—									
6. Proactivity	.26**	.12**	.08**	.21**	.41**	—								
7. Opportunism	.34**	.16**	.16**	.26**	.20**	.57**	—							
8. Creativity	.27**	.16**	-.01	.27**	.66**	.65**	.43**	—						
9. Vision	.21**	.22**	.16**	.09*	.40**	.56**	.49**	.53**	—					
10. Corporate E	.20**	.10**	.04	.17**	.24**	.35**	.23**	.37**	.15**	—				
11. Social E	.20**	.10**	.04	.17**	.24**	.35**	.23**	.37**	.15**	.41**	—			
12. Invention E	.09	.03	.00	.08	.23**	.39**	.30**	.40**	.23**	.22**	.28**	—		
13. Income	.10**	-.01	.04	.11**	.07	.14**	.10*	.17**	-.03	.41**	.02	.22**	—	
14. Age	.01	.06	.05	.11**	.02	.07	-.03	.12	-.09*	.39**	-.05	.28**	.57**	—
15. Sex	.04	.21	.11	-.11	-.06	-.16	-.03	-.16	-.10*	-.02	-.01	-.13	-.04	.03

Note: * = $p < .05$; ** = $p < .01$

that made substantive sense in predicting outcomes were added to the model, and fit statistics were investigated after each addition. Paths from Emotional Stability, Openness, Conscientiousness and sex to TEA were non-significant and were deleted from the model. Paths were included from Extraversion and Agreeableness to Invention Entrepreneurship, from META to income, and from age to income, to Corporate Entrepreneurship, and to TEA. The final model as shown in Fig.1 fitted the data well (χ^2 (18) = 11.82; P = .87; GFI = .99; CFI = 1.00; RMSEA = 0; ECVI = .17).

In this model Extraversion and Agreeableness were the only Big Five dimensions that significantly predicted entrepreneurial achievements. Extraversion positively predicted TEA (path weight .27) and negatively predicted the Invention Entrepreneurship dimension of TEA (-.27). Agreeableness also negatively related to Invention Entrepreneurship (-.11), but failed to significantly predict TEA. None of the other Big Five dimensions significantly predicted entrepreneurial achievements when META and demographic variables were included in the model.

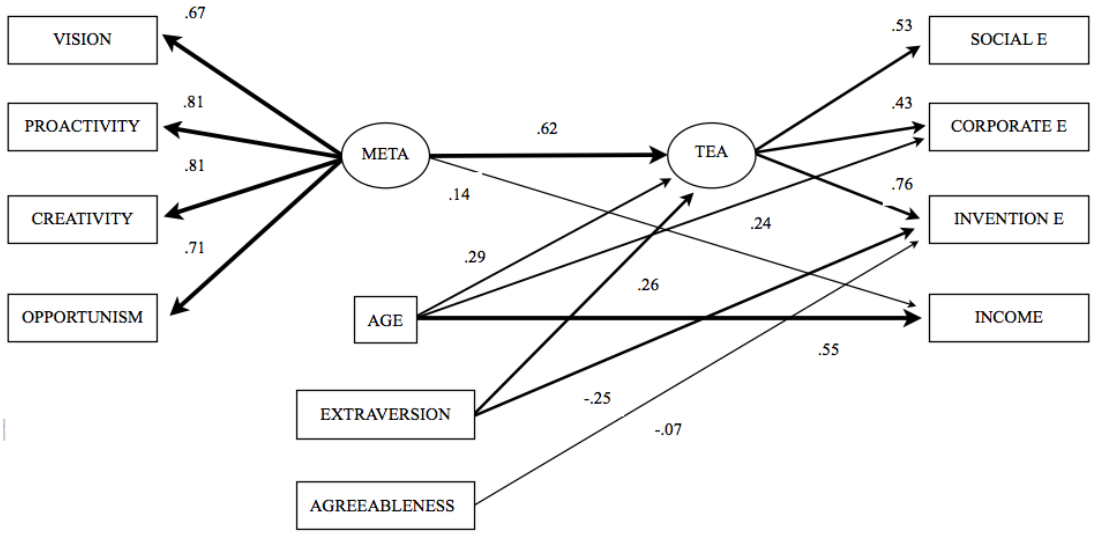

Figure 9. Structural Equation Model. Notes: TEA = Total Entrepreneurial Ability, E = Entrepreneurship. Thickness of lines represents strength of path weights.

The best predictor of entrepreneurial achievements was META, with a strong path weight on TEA (.62) and a weaker path weight on income (.14). Age was the second strongest predictor of entrepreneurial achievements, with moderate path weights with TEA (.25), and strong path weights with income (.55) and Corporate Entrepreneurship (.24). AMOS-squared multiple correlations showed that META, age and Extraversion together accounted for 66.8% of variance in TEA, and age and META for 34.5% of variance in income.

Discussion

The current study had 3 aims. The first was to demonstrate the discriminant validity of META in relation to the Big Five personality traits. The second was to investigate the personality predictors of a wide range of entrepreneurial activity and achievements (beyond business creation). Thirdly, it aimed to demonstrate the incremental validity of META in relation to the Big Five. All of the hypotheses outlined in this study were supported by the results.

First, results show that the addition of the 14 items to META improved the psychometric properties of the inventory, both in terms of internal consistency and factor loadings. Importantly, analysis of the data shows that META has good discriminant validity in relation to the Big Five (with the exception of the facets Creativity of META and Openness of Big Five). This finding is interesting given the broad and encompassing nature of the Big Five (Pervin & Cervone, 2010). In particular, it suggests that entrepreneurial tendencies and abilities may not be captured easily (or adequately) by broad measures of the Big Five; that is, the 'entrepreneurial personality', as assessed by META, seems to be a distinct construct.

Second, the current study is the first to operationalise entrepreneurship in a wider sense, beyond activity related to the creation of an organisation, capturing corporate, social, and creative entrepreneurial activity, and relate it to personality

traits. Although entrepreneurial activity may include a broader range of activity, and could be operationalized through other methods (e.g. archival records, performance ratings, examination of CV), the biographical inventory provides research with an alternative self-report measure to assess entrepreneurship.

Third, this is also the first study, to the author's knowledge, to show that personality traits predict entrepreneurial outcomes beyond activity related to business creation (e.g. intentions to start, self-employment status, and start-up success). Specifically, and consistent with the hypotheses (H1 and H2) and previous literature on the relationship between personality, job performance (Barrick & Mount, 1991; Barrick et al., 2001), and entrepreneurship (Brandstätter, 2011), both the Big Five and META predicted a range of entrepreneurial activities and achievements (i.e. social, corporate, and invention, and income). These findings provide further support for the notion that personality is an important variable in entrepreneurial achievements, (even beyond creating and running a business). Given that the usefulness of personality traits as predictors of entrepreneurship has been fiercely contested by some theorists (Chell, 2008; Shane, 2008), the findings yielded by the current investigation have both theoretical and practical implications for research.

In terms of the Big Five personality traits relevant for entrepreneurship, it is noteworthy that Extraversion and Agreeableness remained the only significant predictors of entrepreneurial success after META had been included in the model. Extraversion predicted overall entrepreneurial success while Agreeableness predicted Invention Entrepreneurship only. Our results showed that extraverted individuals are more likely to engage in a range of entrepreneurial activities such as creating new designs and selling them, finding new ways of helping society, and behaving entrepreneurially within organisations. It should be highlighted that previous meta-

analyses have found somewhat weaker links between Extraversion and entrepreneurship, when the latter is defined as start-up intention and performance (R = 0.14 and R = 0.08, respectively, Zhao et al., 2010) or as business ownership (business owners score non significantly higher on Extraversion than managers, Zhao & Seibert, 2006). Correspondingly, the results of the current study indicate that the importance of this personality trait (and others) may have been underestimated in the literature. When wider entrepreneurship outcomes, beyond business creation and management activity, are taken into account, this personality trait demonstrates a stronger impact. Given the social aspect of entrepreneurial activities, this relationship also makes theoretical sense. Indeed, several authors have suggested that the ability to interact effectively with other people, may often be essential for exploiting opportunities and innovations (Chell & Baines, 2000).

Interestingly, Extraversion was negatively correlated to Invention Entrepreneurship. Thus, more extraverted individuals are less likely to be involved in developing, building, or selling designs. A possible explanation is that a major part of creative achievements involves individual, often solitary, efforts and endeavours. Indeed, this same reasoning may explain the negative correlation between Agreeableness and Invention Entrepreneurship. In fact, previous literature does demonstrate that there is a negative relationship between Agreeableness and creative achievements (Chamorro-Premuzic & Furnham, 2005).

Secondly, this study corroborates results of previous meta-analyses (e.g. Rauch & Frese, 2007), suggesting that traits matched to the task of entrepreneurship (i.e. META) have incremental validity above and beyond that of broad personality traits (i.e. the Big Five) in predicting entrepreneurial achievements. Indeed, results indicate that although all the personality traits of the Big Five correlated with

entrepreneurial outcomes, most associations became non-significant after META was added to the structural equation model (supporting H4). Furthermore, the effect sizes of META in predicting entrepreneurial activity and success were stronger compared to those of the Big Five predictors. This is line with Rauch and Frese's (2007) meta-analysis showing that traits matched to the task of entrepreneurship are better predictors of entrepreneurial success than broad personality traits. The finding that perhaps best demonstrated this was the relationship between META, Openness, and entrepreneurial achievements. Openness was the strongest Big Five correlate of META facets. Yet, the relationship between Openness and entrepreneurial achievements were non-significant in the SEM, when META was taken into account. One interpretation of these results could be that whilst META is related to innovation and creativity in entrepreneurial activities and business (or business creativity), Openness is a broad trait that captures variance in other cognitive, behavioural and affective domains such as aesthetic and artistic tendencies, and having fantasies and a strong imagination (Chamorro-Premuzic, 2011). That is, whilst the former measure assesses a very specific type of creativity (i.e. within entrepreneurship) the latter inventory assesses people's creative tendencies more generally.

Implications

The results of the present study have several theoretical and practical implications. First, the current study provides a framework, and a biographical measure for researchers (and practitioners) to assess a wide range of entrepreneurial achievements. This measure can arguably be used by researchers and practitioners traditionally viewed as operating outside the field of entrepreneurship. For instance, the measure may be suitable for a researcher interested in assessing corporate entrepreneurship (Covin & Selvin, 1991), and indeed organisational innovation –

whether on the individual level, or at an aggregate. It may also provide an alternative way of assessing output of social entrepreneurship (Mair & Marti, 2006).

In the same vein, META is a psychometric tool that may well be used beyond the traditional realms of entrepreneurship research. For instance, employers interested in recruiting more entrepreneurial individuals with the vision, creative mind-set, and the talent to spot opportunities may potentially be in good position to do so through psychometric measures such as META (as well as the Big Five traits E and A). Naturally, there may be a good capacity to use META also for more traditional entrepreneurial research (and practice). For instance, it is reasonable to expect that more entrepreneurial individuals are also more successful in the creation and management of a start-up. This is, indeed, a common view of entrepreneurship researchers (e.g. Kirzner, 1997). However, whether this is the case or not is an empirical question. Thus it remains for future research to address it.

Limitations

This study has some limitations. First, although the META scales in general showed good psychometric properties, and demonstrated discriminant validity in relation to the Big Five, the Creativity scale of META was absorbed by the Openness factor (and vice versa), suggesting a significant overlap between these scales. Thus, further efforts to discriminate this scale from the Openness factor of the Big Five are desirable. On the other hand, looking at the correlations of the two scales in relation to relevant outcomes (Table 4), one can see that the META scale Creativity consistently displays higher effect size in comparison to the Openness factor of the Big Five. Thus, despite the overlap, it may be erroneous to conclude that these scales assess the same underlying construct. It seems that the Creativity scale of META captures important variance beyond Openness, for predicting entrepreneurial

achievements. Accordingly, the Creativity scale in its current form may be of use for research or practice.

Another consideration for the META is the intercorrelations of the facet level scales. Although the addition of the 14 new items decreased these correlations in comparison to those found in Study 1, these still remained in the moderate range. Indeed, the SEM analysis indicated an underlying latent factor for these scales. This finding may be interpreted in two ways: first, it may be that META scales need to be further refined in order to obtain orthogonal factors, which have less shared variance. Accordingly, further development efforts will be needed to discriminate these scales. On the other hand, the constructs measured by these scales are not only empirically related, but also theoretically so. That is, the entrepreneurial personality may indeed be a latent personality factor, with lower order scales (i.e. of Opportunism, Creativity, Proactivity and Vision). Given that this question partly requires subjective judgement, however, it may be difficult to address quantitatively.

A third limitation of the current research is the lack of objective measurement; given that all measurement relied on self-reported personality and performance and was cross-sectional in nature, relying on single informants, it inevitably introduces the risk of common method bias, which could inflate the relationship between META and perceptive performance measures. It would be advisable for future research, therefore, to include non-self-report measures of entrepreneurial achievements to assess the predictive validity of independent variables. Such measures could be performance appraisals and organisational, demographic, or historical records. On the other hand, a meta-analysis by Rauch, Wiklund, Lumkin, and Frese (2009) conducted in a similar domain, revealed no

significant differences between objective and self-reported measures of performance, suggesting that common method bias may not be an important issue.

It would also be desirable to examine other relevant constructs that vary amongst individuals - IQ and motivation in particular - to further establish Big Five and META's incremental validity in the prediction of entrepreneurial success. Lastly, longitudinal studies will be useful in establishing the causal nature of these relationship.

Conclusion

On a practical level, the results of the current study show that personality inventories can be useful tools to explain individual differences in entrepreneurial activity and achievements. Importantly, this applies not only to business founders but also employees (corporate entrepreneurship) and people working in areas unrelated to business such as social (social entrepreneurship) and creative circles (invention entrepreneurship). Indeed, these results further indicate that the impact of personality constructs may previously have been undermined in entrepreneurship research, by the outcome variable measured. This can certainly be of significance to researchers and practitioners working in the field of entrepreneurship and beyond.

3.2. Study 4. META and Compound Personality Traits: Understanding the Relationship between META, Trait Emotional Intelligence and Core Self-Evaluations

Abstract

Past studies highlight the importance of compound traits (Ones et al., 2005b) such as Emotional intelligence (EI) and Core Self-Evaluations (CSE), in the prediction of career success. Given the evidence that compound traits predict job performance and job satisfaction, it is reasonable to expect these traits to also predict other forms of career success. This study investigates the impact of EI and CSE on entrepreneurial behaviours and success. The interest, furthermore, is to examine the associations between these constructs and META, and observe how they relate to entrepreneurship. Of importance is to see whether META predicts entrepreneurial activity and success beyond the compound traits examined, as well demographic variables. Results showed moderate relationships between META and the compound traits. Furthermore, the CSE and EI traits were found to inconsistently and modestly relate to entrepreneurial outcomes, whereas META showed incremental variance in the prediction of entrepreneurship beyond compound traits, with moderate effect sizes. This suggests that individual differences in entrepreneurship result only in part from individual differences in trait EI and CSE, as compared to META. Implications for research on compound traits in entrepreneurship are discussed.

Compound personality traits, defined by combinations of multiple dimensions of personality (Ones et al., 2005b), have been found to be powerful predictors of various work related criteria, including overall job performance, task performance, and counterproductive work behaviours (c.f. Ones & Viswesvaran, 2011). Examples of compound traits include Integrity (Ones & Viswesvaran, 1998), managerial potential scales (Ones, Viswesvaran, Hough, & Dilchert, 2005) Trait Emotional Intelligence (Petrides & Furnham, 2001) and core self-evaluations scales (Bono & Judge, 2003). Whilst there is good reason to believe that compound traits are important also for entrepreneurial achievements (see below), only a handful of studies have examined this hypothesis; even fewer have done so with entrepreneurship as operationalised beyond business creation. To this end, the aim of the current study was to examine the relationship of two compound traits, namely EI and CSE, in the prediction of entrepreneurial activity and success. Given that META can be considered a compound trait, it was of particular interest to examine the validity of META in the prediction of entrepreneurial outcomes relative to these compound traits. Extending the findings from Study 3, an attempt was made to further improve the psychometric properties of META, as well as the entrepreneurial outcomes inventory. The next sections provide an outline of the traits examined in the current study, followed by the hypotheses of the research.

Trait Emotional Intelligence

Trait Emotional Intelligence (EI) (Petrides & Furnham, 2001) has increasingly been argued to be a highly useful concept in career success (O'Boyle Jr., Humphrey, Pollack, Hawver, & Story, 2010). Indeed, some authors have even suggested that EI, in this respect, may be more important than IQ (e.g. Goleman, 1995). Whilst empirical evidence does not support the latter argument (e.g. Van Rooy & Viswesvaran, 2004), there is certainly evidence to show that EI predicts career-related performance outcomes. For instance, emerging evidence suggests that trait EI is a proxy for emotion-related self-perceptions that are directly

relevant to organisational variables such as job satisfaction and performance. Two recent meta-analyses (O'Boyle Jr. et al., 2010; Van Rooy & Viswesvaran, 2004) showed that EI predicts a range of performance outcomes, even after controlling for IQ and the Big Five factors of personality.

Although the above mentioned studies have focused mainly on job satisfaction and performance, there is reason to expect that EI also predicts other forms of career success and outcomes. Indeed, more recently, several authors have argued that EI can be an important factor in the prediction of entrepreneurial outcomes (e.g. Chell, 2008; Zampetakis, Beldekos, & Moustakis, 2008). Theoretically, there is good reason to believe EI to be a useful concept for entrepreneurship. In simple terms, trait EI may be interpreted as a person's self-perceived ability to understand and manage his or her own and other people's emotions (Chamorro-Premuzic, 2007). Given the social nature of entrepreneurial activities, EI has been hypothesised to be an extremely important factor for predicting entrepreneurial success. Indeed, several authors have suggested that the ability to interact effectively with other people, which is associated with higher trait EI, may often be *necessary* for individuals attempting to exploit opportunities and innovations (Chell & Baines, 2000).

Despite the increasing academic and business interest in EI as a key index for career success (O'Boyle Jr. et al., 2010), however, surprisingly little research has explored the relationship between trait EI and individual differences in entrepreneurship; even fewer studies have looked at this relationship taking into account a broader conceptualisation of entrepreneurship, beyond business start-ups (Zampetakis et al., 2008). A rare exception is a recent study conducted by Zampetakis et al. (2008), which examined the role of EI in entrepreneurial behaviour *within* organisations. The researchers found a significant relationship between EI and entrepreneurial behaviour, highlighting that EI may be a useful concept for the prediction of entrepreneurial outcomes.

However, Zampetakis et al. only examined *corporate* entrepreneurship and focused exclusively on managers' entrepreneurial behaviour towards subordinates, which is only one of many aspects of entrepreneurship (Kuratko, 2007). As mentioned above, entrepreneurship as a broader concept can occur within as well as outside organisations, including in non-business related activity (Kuratko, 2007). Finally, Zampetakis et al. (2008) did not include other personality variables in their study. Given that trait EI is related to a wide range of self-constructs (Chamorro-Premuzic & Furnham, 2010), it would be important to demonstrate its incremental validity over other individual differences. Accordingly, the first aim of the current study was to extend Zampetakis et al.'s research by a) including a more comprehensive measure of entrepreneurial activity, and b) by including two relevant personality measures, namely, Core Self-Evaluations (CSE; Judge, Erez, Bono, & Thoreson, 2003) and META.

Core Self-Evaluations

CSE is a broad personality trait reflecting the most general and fundamental beliefs individuals hold about themselves (Judge & Bono, 2001). In addition to Neuroticism, and Self-esteem, CSE includes the characteristics of Self-Efficacy and Locus of Control (Judge et al., 2003). The influence of CSE on career related outcomes and performance has been well documented in the past (Judge, 2009) and there is good reason to believe that this trait will be a good predictor also of entrepreneurial outcomes.

First, meta-analytic studies show three of the scales of CSE to be related to entrepreneurial activities and success. For instance, Zhao and Seibert (2006) found that entrepreneurs score lower on Neuroticism than managers, and Zhao et al. (2010) report negative effects of Neuroticism both on intention to establish a private business and on performance of the business. Furthermore, Rauch and Frese (2007) found effect sizes of .38

and .25 for generalized self-efficacy, and .19, .13 for locus of control in the prediction of business creation and business success respectively.

Second, research suggests that the CSE compound trait explains much of the overlap among the individual trait measures, while also predicting many work-related outcomes better than the individual traits (Judge, 2009). Specifically, individuals with high levels of CSE perform better on their jobs, are more successful in their careers, and better capitalise on advantages and opportunities (Judge, 2009). Indeed, Shane (2003) suggests that CSE is likely to influence the discovery of opportunities as well as the individual's decision and ability to pursue and exploit these opportunities. Nevertheless, little research has directly examined this assertion. Consequently, CSE remains an important individual difference variable that has not been empirically related to entrepreneurship. Thus, an additional aim of the current study is to fill this gap in the literature. It is also worth noting that previous research has found a strong link between EI and CSE (e.g. .78, Kluemper, 2008); even stronger than that traditionally found between EI and the Big Five (Chamorro-Premuzic & Furnham, 2010). It is therefore important for research to further establish the exact relationship between CSE and EI and how these variables interact to predict relevant outcomes – in this case, entrepreneurship.

A final aim of the current study was to examine the relationship between META and the compound traits used in this study. Of particular interest was the incremental validity of META in the prediction of entrepreneurial outcomes and success. There is little in the literature that speaks directly to how these variables may relate; given the arguments put forward previously, however, it is possible to hypothesise that META should be positively related to both socio-emotional tendencies (i.e. EI) and confidence related tendencies (i.e. CSE). Taken together, the present study attempted to assess the relative validity of compound traits (including META) in the prediction of entrepreneurial activity and success.

Based on the arguments presented above, therefore, the hypotheses (H) of the study were as follows:

H1: EI will positively predict entrepreneurial activity and achievement

H2: CSE will positively predict entrepreneurial activity and achievement

H3: META will positively predict entrepreneurial activity and achievement

H4: META will show incremental validity in the prediction of entrepreneurial activity and achievement even after accounting for scores on EI and CSE, as well as other demographic variables.

Method

Participants

In all, 528 (288 males) participants, most from the UK, completed this study. Their ages ranged from 16-84 years (M = 31.1, SD = 13.0); 77% were aged over 18 or under 44, with 3.8% aged 18 or below, and 19.2% being 44 or above. With regard to participants' occupational status 4.4% indicated that they were unemployed; 47.7% were students, 33% employed, and 25.9% were self-employed (note that participants were allowed to select more than one option, so they could, for instance, indicate that they were students as well as self-employed).

Measures

Trait Emotional Intelligence questionnaire - Short Form (TEIQue-SF; Petrides and Furnham, 2006). The TEIQUE-Short form is a self-report scale that consists of 30 items designed to measure a *global* trait EI. Example items include "Expressing my emotions with words is not a problem for me" and "I usually find it difficult to regulate my emotions". Respondents are instructed to use a 7-point Likert scale that ranges from "completely disagree" (1) to "completely agree" (7).

Core Self-evaluation Scale (CSES; Judge, Erez, Bono, & Thoreson, 2003). This is a 12-item inventory that measures a single factor, i.e. CSE. Items involve statements about typical thoughts/feelings ("Overall, I am satisfied with myself") and behaviours ("I complete tasks successfully"), which are answered on a five-point Likert scale, ranging from "strongly disagree" to "strongly agree".

Entrepreneurial outcomes. In order to assess individual differences in entrepreneurial success, items from Study 3, relating to past (biographical) and current entrepreneurial achievements and activities were used. Two additional items were added to the scale which increased the total number of items to 18. The first of these related to the more common operational definition of entrepreneurship, namely, "Number of businesses started"; the other assessed entrepreneurial behaviours related to alternative incomes "In the past, have you earned money outside your regular income" – the rationale being that more opportunistic individuals will have a greater number of sources for income; participants were asked to specify how they generated this income (e.g. by selling things, providing services, organizing events etc.). A Principal Component Analysis (PCA) revealed 6 factors with Eigenvalues above 1, and examination of the Scree plot confirmed this component structure, with the dominant factor accounting for 22% of the variance. Thus, the factor structure of the biographical measure of entrepreneurial activities and achievements matched that of Study 3, with the exception of Social Entrepreneurship, which was divided into social (e.g. homeless welfare initiative etc.), and student-related (e.g. initiated/organized school-wide events) entrepreneurial activity.

Measure of Entrepreneurial Tendencies and Abilities (META). Study 3 showed improved psychometric properties of META scales, in particular relating to internal consistency and discriminant validity in relation to the Big Five. The Creativity scale of META was the exception, showing lower than desired discriminant validity (indicated by cross-loadings onto

the Openness factor of the Big Five scale). Furthermore, META scales generally showed moderate to high intercorrelations. Thus, further efforts were made to increase the psychometric properties of the META 44-item inventory by generating 17 additional items; this increased the total number of items to 61. A Varimax rotated Principal Component Analysis of the 61 items of META revealed a four-factor structure, with most items loading on their hypothesised factor. All META scales demonstrated good internal consistency (see Table 5). PCA revealed 4 oblique factors corresponding to Opportunism, Creativity, Proactivity, and Vision.

Procedure

Participants completed the survey on-line, through a website that was advertised through various social-media websites (Facebook, LinkedIn, and Twitter) as well as e-mails. The website invited participants to provide their responses to the three personality inventories as well as report on biographical information related to entrepreneurial activities and achievements. Participants were told that they would be provided with feedback on their personality. First, participants completed a section on demographics. Then, they completed a section on biographical data. After this, they completed the personality inventories. After completing the survey, participants were thanked for taking part in this study and given feedback on their personality profiles (META scores). Only data from participants who completed the entire study was saved to a database, which was then transferred on to SPSS. Ethical approval for the research was obtained through Heythrop College, University of London.

Results

Descriptive statistics and inter-correlations for all measures are presented in Table 5. There were no missing cases on any of the personality measures and no outliers. The distribution of all variables, with the exception of Business Creation, was normal. The decision was, thus, made to transform the variable Business Creation. After transformation skewness was

reduced so that normality could be assumed. Variables were not multi-collinear with one another, no singularity was found, and there were no multivariate outliers in the dataset. All variables appeared to be linear and homoscedasticity of variance was assumed (Tabachnick & Fidell, 2005).

As shown, all personality scales had good internal consistency (Cronbach's alpha). As expected, trait EI correlated with all entrepreneurial outcomes and was also substantially correlated with CSE. There were also significant correlations between trait EI and the dimensions of META. Moderate correlations were, in addition, observed between the META facets, suggesting that the addition of the 17 items did not alter the discriminant validity of the scales. Finally, there were moderate correlations between most of the outcome measures (with the exception of income). Given these results the *incremental* validity of compound traits versus META in the prediction of entrepreneurship outcomes was tested.

Structural Equation Modelling

To test for the relative validity of the predictor variables, structural equation modelling (SEM) was carried out using AMOS 5.0 (Arbuckle, 2003). Two competing models were tested. Given the intercorrelations between the META facets and the intercorrelations between the outcome measures, first a parsimonious latent model was tested, where a total META score as well as a latent Total Entrepreneurial Activity (TEA) factor (where all outcomes were loaded on a latent factor) were specified. Secondly, a facet level model was tested, where both the META facets and the outcome variables were treated independently, as correlated factors.

In both models, the variables included were divided into three subgroups, whereby age and gender were exogenous or covariates, personality variables (i.e. EI, CSE, and META) were mediators, and the various entrepreneurial outcomes were endogenous. With the exception of the latent TEA factor, variables were entered as observed covariates in the

model. The directionality of the model is conceptual rather than causal and can be justified on the basis that personality constructs are less affected by situational variables than are entrepreneurial activities, and that age and sex in turn are less affected by environmental factors than are personality constructs.

The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989), the goodness of fit index (GFI; Tanaka & Huba, 1985; values close to 1 indicate good fit), the comparative fit index (CFI; Bentler's, 1990; values above .96 are acceptable); the root mean square residual (RMSEA; Browne & Cudeck, 1993; values below .06 indicate good fit); and the expected cross-validation index (ECVI; Browne & Cudeck, 1989; smaller values indicate better fit). In the latent model, saturated paths from the covariates to the mediators and the DV (i.e. TEA factor), and from the mediators to the DV were added. This model, which included 11 paths between exogenous and endogenous variables, did not fit the data well: χ^2 = (37 *df*, $p < .01$) 189.48, GFI = .94, CFI = .91, RMSEA = .09, ECVI = .52. Accordingly, the next step was to investigate the sources of misfit in the model. Modifications were based on the AMOS modification indices, expected parameter change statistics, and standardised residuals, and parameters were added only if they made substantive sense. On an inspection of parameter estimates, 3 observed variables, Income, Student Entrepreneurship, and Alternative Entrepreneurship, were found to be poor indicators of their latent TEA factor. These paths were subsequently freed. Based on the modification indices and expected parameter change, 7 direct paths were added to the model; these were from META to Income, Student Entrepreneurship, and Alternative Entrepreneurship, from Age to Income,

Table 5. *Descriptive statistics, Alpha coefficients, and bivariate correlations between EI, CSE, META, and entrepreneurial activities and achievements.*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	M	SD	α
1. EI	_																142.1	14.9	.89
2. CSE	.74**																42.8	7.2	.83
3. Opportunism	.34**	.41**															35.7	7.3	.85
4. Creativity	.53**	.43**	.61**														44.0	7.1	.81
5. Proactivity	.45**	.51**	.58**	.50**													57.7	9.0	.79
6. Vision	.40**	.41**	.58**	.55**	.56**												75.3	12.7	.91
7. META_total	.52**	.53**	.82**	.77**	.80**	.87**											212.7	29.7	.94
8. Income	.12**	.13**	.10*	.11**	.07	.06	.10*										4.1	4.4	
9. #Businesses	.15**	.14**	.33**	.27**	.25**	.13**	.28**	.27**									1.6	0.7	
10. Alternative_E	.16**	.12**	.34**	.27**	.28**	.11*	.40**	.08	.40**								1.1	0.9	
11. Student_E	.16**	.12**	.28**	.25**	.24**	.18**	.20**	.05	.20**	.28**							1.4	1.4	
12. Corporate_E	.22**	.13**	.31**	.25**	.37**	.20**	.35**	.25**	.35**	.26**	.29**						1.1	0.9	
13. Invention_E	.12*	.13**	.35**	.32**	.36**	.28**	.40**	.11*	.40*	.27**	.28**	.38**					0.4	0.5	
14. Social_E	.21**	.18*	.30**	.24**	.37**	.19**	.31**	.17**	.31**	.27**	.32**	.33**	.36**				0.2	0.3	
16. Total_E	.26**	.20**	.47**	.40**	.49**	.30**	.50**	.17**	.50**	.60**	.63**	.68**	.74**	.68**			6.3	3.5	

Note: EI = Emotional Intelligence, CSE = Core Self-Evaluations, E = Entrepreneurship. Income was scored 1-15 where 1 = £0, 2 = £1-5000, 3 = £5000-20000, with a £10000 increase until 12 = £100000 – 150000, 13 = £150000 – 200000, 14 = £200000 – 300000, 15 = over 300000. # Businesses was scored 1-5 where 1= 0, 2 = 1-2, 3 = 3-5, 4 = 6-9, 5 = 10+

Student Entrepreneurship, and Invention Entrepreneurship, and from trait EI to Invention Entrepreneurship. These paths were added one at a time, and all other path coefficients and fit statistics were examined after each addition to determine its effect on these values. In addition, several paths were found to have non-significant values and were subsequently removed from the model one parameter at a time, starting with the lowest t-value. The modified model, shown in Figure 10, fitted the data well: χ^2 = (34 *df*, $p < .01$) 42.19, GFI = .99, CFI = .99, RMSEA = .02, ECVI = .25.

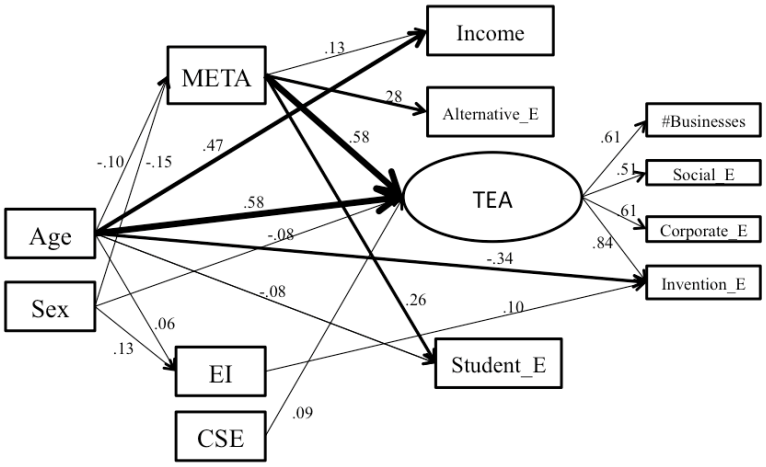

Figure 10. The modified model. The thicknesses of the lines are directly proportionate to the strength of the weights.

As shown in Figure 10, while EI displayed significant correlations with all entrepreneurship outcomes, when other relevant personality and demographic variables were included in the SEM model, only one significant path, between EI and Invention Entrepreneurship, remained. Similarly, while CSE was significantly correlated to all entrepreneurial outcomes, the only significant path remaining once other variables were taken into account was between CSE and the latent TEA factor – and this relationship was weak. The strongest personality predictor of entrepreneurial outcomes was META. Specifically, the total META score significantly predicted all entrepreneurial outcomes and the weights of the paths ranged from modest (.13 with Income) to moderate (.58 with latent TEA factor). Age significantly predicted all entrepreneurship outcomes with the exception of

Alternative Entrepreneurship. Sex was related to the latent TEA factor, with females engaging in less entrepreneurial activities than males, although this relationship was weak.

Looking at AMOS-squared multiple correlations it was found that, in combination, the relevant predictors accounted for 23% of the variance in Income, 58% in the latent TEA factor, 8% in Alternative Entrepreneurship, and.8% in Student Entrepreneurship.

Next the facet level model was tested, to investigate the comparative goodness of fit. Although the fit statistics of this second model were comparable to the latent model: χ^2 = (44 *df*, $p <$ .01) 56.20, GFI = .99, CFI = .99, RMSEA = .02, ECVI = .40, the ECVI value indicates that a more parsimonious solution is reached with the latent model. Thus, Model 1 was deemed to have better fit to the data.

Discussion

The aim of the current study was to investigate the predictive validity of META beyond compound personality traits, namely EI and CSE. The results of the study supported most hypotheses. In terms of the psychometric properties of META, it was observed that whilst the addition of the 17 items increased the validity of the inventory in predicting entrepreneurial outcomes, moderate intercorrelations between the individual scales remained. Thus, META appears to be composed of a hierarchical structure with 4 facet level scales and an underlying latent factor. On the hand, whilst employing a higher order factor provides the most desirable solution, from an empirical standpoint, moderate correlations between scales, and differential relationships of scales with outcomes, indicate that individual facets may, nevertheless, be useful for practical purposes (e.g. for selection into a particular role, or development of a particular facet).

In terms of validity of compound traits, as expected (H1), EI correlated significantly with all entrepreneurship outcomes examined, though only one association remained significant after the variance of other personality and demographic variables was accounted for. This finding is important in two ways. First, it demonstrates that EI has validity in the prediction of some entrepreneurial activities, beyond that of other relevant personality and demographic variables, even

if the effects are weak. Specifically, the results suggest that more emotionally intelligent individuals are more likely to engage in innovative entrepreneurial activities - a finding which is in line with previous research suggesting that individuals high in EI tend to have higher affectivity, informing creative dispositions and thus facilitating innovation (Amabile, Barsade, Mueller, & Staw, 2005). Second, the results stress the importance of examining incremental validity in addition to concurrent validly in EI research. Indeed, while Zampetakis et al. (2008) study found EI to predict entrepreneurial behaviour within organisations, the research did not account for other personality variables in their analysis.

In addition to the EI-entrepreneurship link, CSE was found to be a significant predictor of the latent TEA factor, confirming H2. Although this relationship was weak, it indicates that CSE may well be a concept worthy of increased attention in future entrepreneurship research. Indeed, previous research has shown that the components of CSE, namely Neuroticism, Locus of Control, and Self-efficacy, are important predictors of entrepreneurship, defined as business creation and success (Zhao et al., 2010; Rauch & Frese, 2007). The current study extends this research to show that the compound personality trait CSE, may be important also in explaining individual differences in entrepreneurial activity and success, beyond that of business creation. An interesting avenue for future research would be to investigate the relative validity of the individual traits versus the compound CSE measure in predicting entrepreneurial outcomes. Given that CSE has been found to predict work related outcomes better than the individual traits (Judge, 2009), and is a more parsimonious scale measure, it may certainly prove useful for researchers (and practitioners) to examine this hypothesis.

In line with the findings in Study 3 and H4, META was found to moderately relate to entrepreneurial activity and success, and did so even when other personality and demographic variables were taken into account. A noteworthy finding was the moderate correlations of META with both EI and CSE. This indicates that more entrepreneurial individuals (i.e. high scorers on META) tend to have higher emotional intelligence and higher confidence and self-regard than low

scorers. That is, they are better able to regulate their own and others emotions and are more confident in their abilities. It is reasonable to expect such personality traits to be advantageous in entrepreneurial endeavors, including innovating, pursuing opportunities and creating value. Yet, the fact that EI and CSE only weakly predicted entrepreneurial outcomes once META scores were accounted for, suggests that domain specific entrepreneurial traits are more central in explaining variability in entrepreneurial activity and success than EI and CSE. In particular, whilst self-belief and ability to network, and regulate one's emotions, may be important (Chell & Baines, 2000), independently they are not sufficient for entrepreneurial success. On the other hand, the tendency and ability to recognise and seize opportunities, to think innovatively, and have the desire to create value, appeared to be the better distinguishing traits in more and less successful entrepreneurial endeavors, and more and less frequent ones.

Implications

The current research has two important implications. First, the results reiterate the utility of domain specific traits, matched to the task, versus broad personality inventories in entrepreneurship, to explain variability in relevant outcomes (Rauch & Frese, 2007). Most notably, the results of the current study show that whilst compound personality trait inventories such as EI and CSE can be useful for identifying individuals who are more likely and better able to engage in entrepreneurial activity, their impact may be limited when individuals' entrepreneurial personality (i.e. META) scores are taken into account. Given the widespread use of individual scales such as Locus of Control, generalised self-efficacy, and Neuroticism (which are captured by CSE) in entrepreneurship research, the finding that these traits account for little variance in predicting entrepreneurial outcomes, beyond domain specific traits (as assessed by META), may have important implications for research activity. Although using inventories to assess EI and CSE may be of use, their addition may have limited value, where increased innovation and entrepreneurial activity is the objective. These findings may be of significant interest to organisations and governments alike.

Limitations and future research

Of course, some limitations of this study need to be considered. First, it would be interesting for future research to assess the incremental validity of META beyond other compound personality traits, such as Integrity (Ones & Viswesvaran, 1998) and managerial potential (Ones et al., 2005). Integrity in particular, has been found to be one of the best predictors of job performance (Schmidt & Hunter, 1998), and is indeed another compound trait, which has received insufficient attention in entrepreneurship research. Furthermore, although compound traits, and in particular CSE, may account for relevant lower order traits (Judge, 2009), it would be desirable to assess the validity of META in relation to these and other lower order traits, such as Locus of Control, Self-efficacy, Risk Taking Propensity (Stewart & Roth, 2001) and Optimism (Hmieleski and Baron, 2008) in explaining entrepreneurial outcomes.

Conclusion

Entrepreneurship can occur both outside organisations and within them. It involves the recognition and exploitation of opportunities, innovation, and creation of value. Importantly, it is a function of individuals' behaviour and actions. This means that people will differ in their tendencies and abilities to engage in entrepreneurial activity. Several individual differences in personality and ability may influence this process. The current study looked at differences in EI, CSE and META and showed that these are important contributors to entrepreneurship.

3.3. Study 5: Greed is good? Assessing the relationship between entrepreneurial personality and subclinical psychopathy

Abstract

Despite the stereotype of entrepreneurs as corporate psychopaths (Babiak & Hare, 2007), little empirical research has been conducted on the overlap between individual differences in entrepreneurial tendencies and subclinical psychopathy. In line with this issue, the current study investigated whether primary and secondary psychopathy are linked to the entrepreneurial personality (as assessed by META), as well as entrepreneurial activities and achievements. Participants were 435 working adults. Structural equation models revealed that individual differences in META were positively related to primary psychopathy, but unrelated to secondary psychopathy. Secondary psychopathy did not predict entrepreneurial activity; primary psychopathy predicted some entrepreneurial outcomes, albeit modestly, providing partial support to the 'corporate psychopath' stereotype. Implications for entrepreneurship research and practice are discussed.

In recent years there has been substantial popular interest in so called "dark-side" personality characteristics, broadly defined as counterproductive, subclinical, and dysfunctional dispositions (Hogan & Hogan, 2001; Hogan & Kaiser, 2005; LeBreton, Binning, & Adorno, 2006; Moscoso & Salgado, 2004; Paulhus & Williams, 2002). The most widely discussed trait in this area is psychopathy, a personality disorder characterised by a lack of empathy, manipulation and callousness (Hare & Neumann, 2006). Psychopathy can be found in subclinical populations, ranging from clinically diagnosable symptoms (e.g., criminal behaviour) to everyday manifestations of anti-social behaviour in the normal population (Levenson, Kiehl & Fitzpatrick, 1995). Correspondingly, psychopathy has been found to have negative correlations with the Five Factor model trait of Agreeableness (r=-.39; Lee & Ashton, 2005).

Perhaps as a reaction to several high-profile cases of counter-productive work behaviour and corporate corruption, the idea that psychopathy levels are significantly higher than average among corporate managers and entrepreneurs has become commonplace (Babiak & Hare, 2007). Psychological traits have been studied in connection with entrepreneurship for many decades (Baron & Henry, 2010; McClelland, 1965), though it was only in recent years that researchers started focusing on 'dark-side' traits. CEOs and individuals achieving high levels of entrepreneurial success have been portrayed as driven and focused, but also as people who will show little regard to another's feelings or emotions (Jones & Paulhus, 2009) – thus they would prioritise getting ahead over getting along. Some authors have even hypothesised that dark-side traits (such as those characterised by psychopathic traits), such as lack of empathy, manipulation, and callousness, which are trademarks of psychopathy, may be desirable and even necessary for entrepreneurial success (Kets de Vries, 1985). On the other hand, Hogan and Hogan (2001) argued that although dark-side traits may promote an individual to the top and encourage *short-term* success, they may be detrimental for performance and well-being of others in the *long-term*.

Although there may be doubts about the direction of the relationship between psychopathy

and entrepreneurship (i.e., whether positive or negative correlations are found), there is a lack of empirical evidence on this issue. Beyond popular writings (Gapper, 2012), there seems to be no clear source of evidence to inform our understanding of the potential role of psychopathy in entrepreneurial activity and achievements. Yet, given that psychopathic behaviours may have substantial consequences on individuals engaging in entrepreneurial activity, it would be important to explore this link. Furthermore, although there is no direct research to investigate whether entrepreneurial personality traits are related to dark-side tendencies, some literature indicates that a significant link may exist (e.g. Eysenck, 1993; 1995; Burch, 2006; Zibarras, Port, & Woods, 2008). Accordingly, the current study aims to fill what appears to be an important gap in the literature by examining the role of psychopathy in individual differences in entrepreneurship.

Defining Subclinical Psychopathy

Although studies on psychopathy have generally been conducted in clinical psychology, the construct has increasingly been adapted in subclinical spheres, where it is viewed simply as a variation of normal personality traits (Paulhus & Williams, 2002). People with elevated psychopathic tendencies may be described as having a deceitful interpersonal style, deficient affective experiences, and an impulsive and irresponsible behavioural style. However, despite the negative connotation, these individuals are perfectly able to function normally and successfully in everyday life; in fact, they may often even achieve high social status. This is because manifestations of psychopathic traits may often be related to positive attributions, such as a person being perceived as intelligent, charming, ingenious, and entertaining. Indeed researchers note that psychopaths can become very proficient in acting emotions, and use this ability to their advantage (Hare, 1999).

Psychopathy comprises four personality facets: *interpersonal relationships* (manipulating others, narcissism and being very superficial), *shallow affect* (callousness, failure to accept responsibility and lack of empathy or guilt), *lifestyle* (impulsivity, stimulation seeking and parasitic dependence on others) and *antisocial tendencies* (criminal versatility, juvenile delinquency and increased likelihood to reoffend; Hare & Neumann, 2006). It is common to organise the four facets

into two constructs: ‘primary psychopathy’ and ‘secondary psychopathy’ (Levenson, et al., 1995). Primary psychopathy consists of the *interpersonal relationships* and *shallow affect* facets, whereas secondary psychopathy consumes the latter two. The existence of two constructs is due to the nature of the antisocial behaviour produced by each type of psychopathy: secondary psychopathy is associated with emotionally charged antisocial behaviour (likening itself to antisocial personality disorder; Hare, 1991), whereas primary psychopathy is characterised by emotional bluntness and callousness that is largely absent from secondary psychopathy (Karpman, 1948).

Entrepreneurship and Psychopathy

Many psychological traits have been examined in the entrepreneurship literature. Personal attributes have included personality traits (e.g. Rauch & Frese, 2007), motives (Baum & Locke, 2004), and cognitions (Busenitz, 1996; Kirzner, 1997). Yet, little research has focused on the role of psychopathic traits. There is, however, good reason to believe that such traits may be important predictors of career related outcomes, including entrepreneurship. For instance, Babiak and Hare (2007) suggest that many ‘successful’ psychopaths, that is, individuals who are able to manipulate, extort, and abuse others – without being found out (Mullins-Sweatt, Glover, Derefinko, Miller & Widiger, 2010), can be found in high-level corporate positions. In a recent study Babiak, Neumann & Hare (2010) investigated the psychological traits of a corporate sample in comparison to a general community sample and found that the former had significantly elevated psychopathy scores compared to the latter. They also found positive correlations between levels of psychopathy and *positive* peer ratings of individuals’ communication skills, strategic thinking, and ability to be creative/innovate (r=.33, r=.30 & r=.27 respectively). Given that entrepreneurial personality is characterised by Creativity and Vision, a link between these traits and psychopathy seems highly plausible. Nevertheless, Babiak and Hare’s study did not explicitly examine this link.

Other authors have formulated the potential link between dark side traits and entrepreneurial tendencies more purposely. McClelland (1961), for instance, attributed the dark-side of the entrepreneurial personality to high need for achievement, whilst Kets de Vries, (1985) suggested

that need for control, a sense of distrust, a desire for applause, and defense mechanisms such as splitting, that is, seeing the world as all good or all bad, may be beneficial for entrepreneurial activity and success.

The qualitative nature of such assertions undoubtedly limits their reliability and generalisability. Nevertheless, it is plausible to assume that the tendency to be callous, fearless, and seemingly charming (i.e. primary psychopathy) will be positively related to success in entrepreneurial endeavours (H1), because such behaviour may be competitively adaptive in exploiting opportunities and pursuing innovations. On the other hand, being aggressive and impulsive (i.e. secondary psychopathy) is likely to be detrimental to success (H2), because such behaviour may alienate work colleagues and impair access to resources needed to exploit opportunities and innovations (Hogan & Kaiser, 2005). The present study sought to provide empirical evidence for these hypotheses.

Given previous contentions of a relationship between psychopathy and entrepreneurial tendencies (e.g. Kets de Vries, 1985; McClelland, 1961), the current study attempted to investigate the link directly by employing META as a measure of entrepreneurial personality. Accordingly, this study was an extension of Study 2 (which assessed this relationship in relation to income), in assessing a variety of entrepreneurial outcomes, as well as using a revised version of META. It was hypothesised that these two constructs would be related, albeit distinct (H3). Finally, it was also relevant to investigate the incremental validity of META over psychopathy, as well as demographic variables, in the prediction of entrepreneurial outcomes. Given the results of previous studies, META was expected to be related to the outcomes of the study (H4); considering the distinct nature of psychopathy, in addition, it was hypothesised that this (i.e. psychopathy) construct would demonstrate incremental validity in predicting entrepreneurship (H5).

Method

Participants

In total, 435 (224 male) participants, mostly from the UK, took part in the study. Their ages ranged from 16–72 years (M = 30.3, SD = 12.0); 80.2% were aged over 18 or under 44. With regard to participants' occupational status: 6.4% indicated that they were unemployed; 38.8% were employed part-time, 49.5% were employed full-time, and 20.0% were self-employed (note that some participants had more than one of these occupational statuses, e.g., they were self-employed and employed by someone else part-time).

Measures

Levenson's Self-Report of Psychopathy (LSRP; Levenson, et al., 1995)

This self-report scale consists of 26 items: 16 items measure primary psychopathy (e.g. "Success is based on the survival of the fittest; I am not concerned about the losers") and 10 items measure secondary psychopathy (e.g. "When I get frustrated, I often "let off steam" by blowing my top"). Participants responded to each of the items by scoring themselves according to a 4-point Likert scale, ranging from "extremely disagree" (1) to "extremely agree" (4). Cronbach's alphas in the current study were .91 for the primary psychopathy scale and .73 for the secondary psychopathy scale. The LSRP has been shown to be both reliable and valid (McHoskey et al., 1998).

Measure of Entrepreneurial Tendencies and Abilities

The 61-item META was retained for the current study for further evaluation. Cronbach's alpha for the META scales in the present study were acceptable (see Table 6).

Entrepreneurial Activity and Success

In order to assess individual differences in entrepreneurial success, the biographical measure relating to past and current entrepreneurial achievements and activities, employed in Studies 2 and 3 was retained. In addition two further items were added to the scale relating to the more traditional operationalisation of entrepreneurial achievement in past research, namely, "Number of businesses still operating" and "Number of Employees (the business has)". Accordingly, the scale comprised a

total of 22 items developed to measure entrepreneurial achievements and activity related to (a) entrepreneurial behaviours to generate income outside ones main job (e.g. organising events, selling things), (b) corporate entrepreneurship, (c) social entrepreneurship, and (d) entrepreneurship through innovation/invention and (e) traditional entrepreneurship (which included the variables "Income" and "number of businesses started"). Responses were rated on a multiple choice and participants could select more than one option. A Principal Component Analysis (PCA) revealed five factors with Eigenvalues above 1. Inspection of the Scree plot revealed four independent factors, corresponding to the above-hypothesised factors. The four factors were labeled corporate entrepreneurship, social entrepreneurship, inventive entrepreneurship, and traditional entrepreneurship.

Procedure

Participants completed the survey on-line, through a website that was advertised through various social-media websites (Facebook, LinkedIn, and Twitter) as well as e-mails. The website, invited participants to provide their responses to the three personality inventories as well as report on biographical information related to entrepreneurial activities and achievements. Participants were told that they would be provided with feedback on their personality. They first answered biographical information related to entrepreneurial activities and achievements. Next, they completed the subclinical psychopathy inventory (LSRP) and the entrepreneurial personality measure (META). After completing the survey, participants were thanked for taking part in this study and given feedback on their personality profiles (META scores). Only data from participants who completed the entire study was saved to a database, which was then transferred on to SPSS. Ethical approval for the research was obtained through Goldsmiths, University of London.

Results

Bivariate correlations are presented in Table 6, together with descriptive statistics and internal consistency reliabilities. Cronbach's alpha coefficients for all measures and facets were satisfactory (alpha values above .70 are considered appropriate; George, & Mallery, 2003). There

were no missing cases on any of the personality measures and no outliers. The distribution of all variables was normal. Variables were not multi-collinear with one another, no singularity was found, and there were no multivariate outliers in the dataset. All variables appeared to be linear and homoscedasticity of variance was assumed (Tabachnick & Fidell, 2005).

As expected, primary psychopathy was positively correlated with all META facet scales, whereas secondary psychopathy only displayed significant (and negative) correlation with the Proactivity scale. There were also significant correlations between trait primary psychopathy and some entrepreneurship outcomes. Moderate correlations were, in addition, observed between the META facets, as well as META and entrepreneurial outcomes (in line with Studies 3 & 4). Finally, there were moderate correlations between most of the outcome measures. Given these results the *incremental* validity of psychopathy traits versus META in the prediction of entrepreneurship outcomes was tested.

Structural Equation Modeling (SEM)

In order to investigate the concurrent and discriminant validity of primary and secondary psychopathy, as well as META, SEM analysis using AMOS 5.0 (Arbuckle, 2003) was carried out. In light of the inter-correlations between the META facets and the inter-correlations between the outcome measures, a parsimonious model was tested where a latent META factor and a latent "Total Entrepreneurial Activity (TEA)" factor (onto which all outcomes loaded) were specified. The variables included in the model were divided into three subgroups, whereby age and gender were exogenous or covariates, META, primary psychopathy, and secondary psychopathy were mediators, and the various entrepreneurial outcomes were endogenous. The directionality of the model is conceptual rather than causal and can be justified on the basis that personality constructs ('bright' and dark-side) are less affected by situational variables than are entrepreneurial activities, and that age and sex in turn are less affected by environmental factors than are personality constructs.

Table 6. *Bivariate correlations, descriptive statistics, and reliabilities of subclinical psychopathy, META facets and entrepreneurial outcomes.*

	1	2	3	4	5	6	7	8	9	10	11	12	M	S.D.	α
1. P. Psychopathy	-												59.65	8.13	.91
2. S. Psychopathy	.39**	-											21.71	4.45	.73
3. Opportunism	.37**	.06	-										34.68	7.27	.72
4. Creativity	.14**	-.04	.56**	-									33.63	5.10	.75
5. Proactivity	.30**	-.10**	.57**	.40**	-								56.05	10.31	.87
6. Vision	.36**	-.04	.53**	.39**	.52**	-							74.19	11.54	.85
7. Corporate E.	-.05	-.09	.24**	.19**	.13**	.10**	-						3.10	1.89	-
8. Inventive E.	.15	-.04	.35**	.32**	.26**	.20**	.44**	-					1.81	1.36	-
9. Traditional E.	.21**	.06	.39**	.24**	.27**	.26**	.23**	.36**	-				0.02	0.16	-
10. Social E.	-.03	-.05	.27**	.26**	.21**	.21**	.10*	.04	.10*	-			1.05	1.26	-
11. Age	-.27**	-.22**	.01	-.00	.06	.16**	.37**	.20**	-15**	.01	-		30.27	11.98	-
12. Sex	.19*	.14**	.13**	.05	-.00	-.00	.16**	-.10*	.10*	-.05	.06	-	0.54	0.49	-

N = 435. *Note*: Correlation is significant at the (**) 0.01 level or (*) 0.05 level (2-tailed). P. = Primary, S. = Secondary, E = Entrepreneurial/Entrepreneurship, #Business = Number of Businesses created, M = mean, SD = standard deviation, α = Cronbach ´s alpha. Income was scored 1-15 where 1 = £0, 2 = £0-5000, 3 = £5-20000, with a £10000 increase until 12 = £100000 – 150000, 13 = £150000 – 200000, 14 = £200000 – 300000, 15 = over 300000. # Businesses was scored 1-5 where 1= 0, 2 = 1-2, 3 = 3-5, 4 = 6-9, 5 = 10+. Sex was coded as a dummy variable, with 1 for male and 0 for not male (i.e. female).

The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989; which tests the hypothesis that an unconstrained model fits the covariance or correlation matrix as well as the given model); the goodness of fit index (*GFI*; Tanaka & Huba, 1985; values close to 1 are acceptable); the comparative fit index (*CFI*; Bentler, 1990; values above .96 are acceptable); and the root mean square residual (*RMSEA*; Browne & Cudeck, 1993; values of .06 or below indicate reasonable fit for the model).

In the saturated model, paths from the covariates to the mediators and the DV, and from the mediators to the DV were added. This model, which included 11 paths between exogenous and endogenous variables, did not fit the data well: χ^2 (46 *df*) = 307.29, $p < .01$; *GFI* = .89; *CFI* = .79; *RMSEA* = .11 (.10 - .13). Accordingly, modifications were made based on the AMOS modification indices, expected parameter change statistics, and standardised residuals. Parameters were added only if they made substantive sense. One observed variable, Social Entrepreneurship, was found to be a poor indicator of the latent TEA factor. This path was subsequently freed. Based on the modification indices and expected parameter change, three direct paths were added to the model; these were from the latent META variable and Primary Psychopathy to Social Entrepreneurship (β = .43 and -.21 respectively), and age to Vision (β = -.15). In addition, a correlational path between META and primary psychopathy (r = .43) was specified. These paths were added one at a time, and all other path coefficients and fit statistics were examined after each addition to determine its effect on these values. In addition, several paths were found to have non-significant values and were subsequently removed from the model one parameter at a time, starting with the lowest t-value. The modified model, shown in Figure 11, fitted the data well: χ^2 = (46 df, p < .01) 93.33, *GFI* = .97, *CFI* = .96, *RMSEA* = .05.

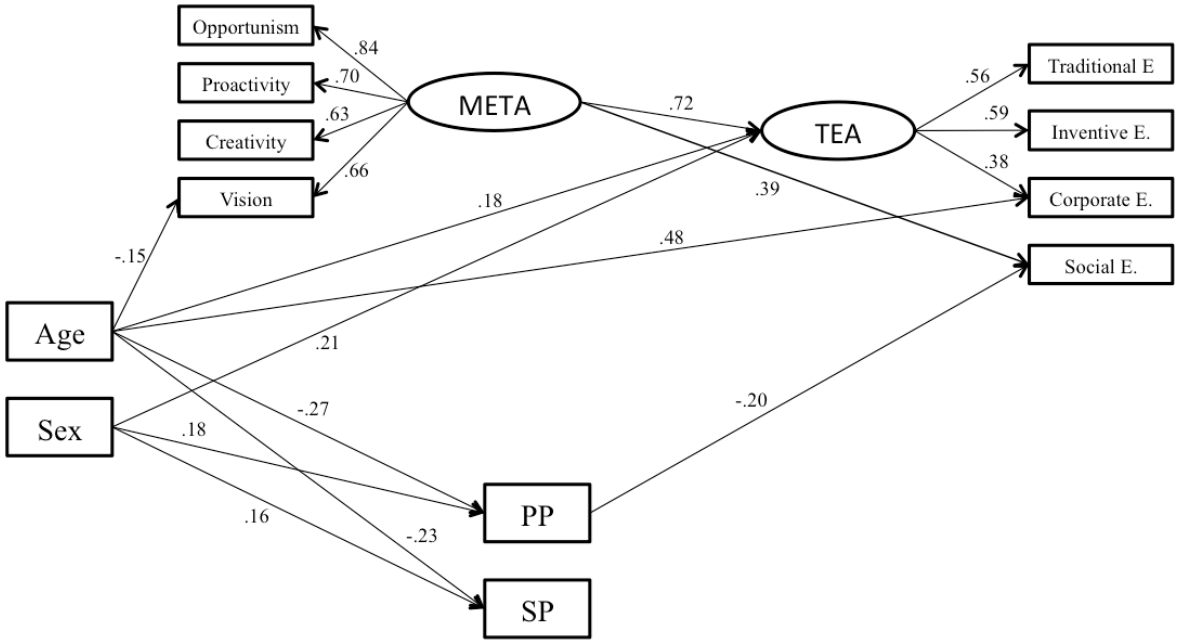

Figure 11. The modified model. *Note:* For simplicity, the correlational path from META to primary psychopathy is not shown in the figure. PP = primary psychopathy, SP = secondary psychopathy.

As shown in Figure 11, when META and demographic variables were included in the SEM model, only the path between psychopathy and social entrepreneurship was significant. The results further showed that META, as with previous studies, was a consistent and strong predictor of entrepreneurial activity, with significant paths from META to all entrepreneurship outcomes. Age was also a moderate, albeit less consistent, predictor of entrepreneurial activity. Finally, some small sex differences (in favor of men) were found in entrepreneurial outcomes. AMOS-squared multiple correlations revealed that the relevant predictors combined accounted for 59% of the variance in the latent entrepreneurship (TEA) factor and 16% of the variance in Social Entrepreneurship.

Discussion

The main purpose of this study was to explore the relationship between subclinical psychopathic tendencies, the entrepreneurial personality (assessed by META), and individual differences in entrepreneurial activity and success. The results partially

supported the hypotheses of our study. First, as expected (H3), a moderate correlation between entrepreneurial personality (i.e. META) and primary psychopathy was found. This finding is in line with the assumption that more entrepreneurial individuals are also more callous, fearless, and glib (e.g. Kets de Vries, 1985) – attributes that are arguably needed when exploiting opportunities and pursuing innovations. Whilst this confirms a common stereotype found in entrepreneurship, the current study is the first to demonstrate this link empirically. It is also interesting to note that META is not related to, and even negatively related to secondary psychopaty. This indicates that whilst more entrepreneurial individuals may be more insensitive in getting ahead, they are not careless or aggressive; this combination of traits is no doubt is necessary for success in entrepreneurial activities (and arguably any career related achievements).

Contrary to expectations, the current results showed that psychopathy was only modestly related (or in the case of secondary psychopathy, unrelated) to entrepreneurial activity and achievements. This undermines the notion that psychopathy, as a construct, may be very relevant for entrepreneurial success, therefore H1 and H2 are only partially supported. On the other hand, primary psychopathy does demonstrate incremental validity in the prediction of some entrepreneurial activities, beyond that of other relevant personality and demographic variables. Specifically, the results suggest that primary psychopathy was significantly, and negatively, related to social entrepreneurship, a finding that supports H5. Although a modest relationship, this finding may be important; it indicates that people who have elevated primary psychopathy scores are less likely to initiate activities aimed to improve the community, enhance education, or create student organizations. Given that psychopathy is characterized by callousness and a lack of loyalty (Babiak & Hare, 2007) this association makes substantive sense. These personality facets are likely to be detrimental to the enduring effort required for creating social value and change.

Although primary and secondary psychopathy correlated significantly with several entrepreneurship outcomes, only the association between primary psychopathy and social entrepreneurship remained significant after the variance of META and demographic factors was accounted for. Thus, the hypothesised positive associations between primary psychopathy and entrepreneurship, and negative association between secondary psychopathy and entrepreneurship, were not found.

Overall, these findings reveal some interesting insights. First, they stress the importance of considering other relevant personality variables and specifically, the need to examine incremental validity in addition to concurrent validly in individual differences research. Research on personality and entrepreneurship often fails to account for other individual difference variables when examining such associations (see Hisrich et al., 2007). On the other hand, the lack of expected associations indicate that psychopathic tendencies may not be relevant for some entrepreneurship outcomes. For instance, antisocial and callous behaviors may be counterproductive for success in social entrepreneurship, whereas the same behaviors may not be of any consequence in entrepreneurial activities that are more commercial in nature (e.g. finding ways of making money, starting a business, or exploiting opportunities).

In addition to the psychopathy-entrepreneurship association, the current study also showed that META, as expected, significantly related to entrepreneurship outcomes (H4). In particular, the effect sizes were consistent and considerably stronger than both psychopathy and demographic variables. Whist this association was expected, it adds significant value to the current understanding of the psychology of entrepreneurship, where there still remains substantial knowledge gaps (Hisrich et al., 2007).

Limitations and future research

The current study inevitably has some limitations. One is the characteristics of the sample. A majority of participants in the sample consisted of young professionals or part-time

employees, who had an average salary of £20,000-£30,000 (with the median being between £5,000-£20,000). Thus, it is likely that even those who were employed full-time were in junior positions in their companies. It is possible, however, that psychopathic tendencies are only consequential (be it a positive or negative) in higher-level positions. That is, job status, or occupational rank, may moderate the association between psychopathy and entrepreneurship (Hogan & Hogan, 2001). Future research should therefore aim to have evenly distributed samples in terms of occupational rank, including more managerial level participants and successful entrepreneurs.

It could also be useful for future research, to use alternative measures to assess psychopathy. For instance, Babiak et al.'s (2010) 'Psychopathy Checklist-Revised' (PCL-R) is an interview technique that is the standard assessment instrument in clinical populations; it would be interesting for future research to examine the differences and similarities between the interview and the self-report method. Finally, it may be interesting to examine the impact of other dark side traits, such as Machiavellianism and Narcissism to the entrepreneurial personality as well as achievements. Whilst there is an overlap between these traits and Psychopathy, they are generally treated as distinct (Paulhus & Williams, 2002).

Implications

The results of our study have several important implications. Empirical studies have shown that dark-side personality traits can be highly problematic in a professional context (e.g. Connelly et al., 2006). The current study suggests that this can also be the case within the domain of entrepreneurship. In particular, subclinical psychopathic tendencies may be negatively related to social entrepreneurship. Given the importance of social entrepreneurship, that involves innovative practices and the pursuit of opportunities aimed at creating social change and meeting social needs (Mair & Marti, 2006), the selection of people into such initiatives may be informed by examining their psychopathic dispositions.

Interestingly, our results show that the same negative effects may not be found in entrepreneurial activities that are more commercial in nature (at least at junior levels). Thus it could be that such tendencies are not as detrimental in business settings (Robie, Brown, & Bly, 2008).

Finally, in recruiting or selecting people with an entrepreneurial dispositions, practitioners may not necessarily need to worry about the potential negative implications of doing so. Whilst entrepreneurial individuals may be more callous and fearless, they will not be careless or aggressive. In addition, their elevated psychopathic tendencies may not impact their performance significantly.

3.4. Study 6: The relationship between entrepreneurial personality and vocational interests

Abstract

The current study examines the relationship between individual differences in entrepreneurship and vocational interests in a sample of 565 adults. Specifically, it investigates associations between the entrepreneurial personality (as assessed by META) and vocational interests (as assessed by Holland's RIASEC model) in the prediction of entrepreneurial achievements, both within and outside organisations. Results reveal predictable associations between Holland's taxonomy of vocational interests and entrepreneurial personality and outcomes. Incremental validity tests show that META predicts entrepreneurial activity even when Holland's vocational interests and demographic variables are taken into account. Furthermore, structural equation modeling indicates that META is the strongest and most consistent predictor of entrepreneurial activity. Practical and theoretical implications for vocational guidance and career assessment are considered.

The trait approach in entrepreneurship assumes that entrepreneurial activity and success is dependent on the actions and behaviors of individuals (Shane & Venkataraman, 2000). Theoretically, therefore, there should be a direct link between individual differences in cognitive and non-cognitive traits and entrepreneurial outcomes. Whilst a large amount of research has been conducted to examine the effect of personality traits in entrepreneurship (Brandstatter, 2011), very few efforts in the field have focused on individual differences in interests. Yet there is wide consensus in the domain of differential psychology about the fact that interests are a core component, or "pillar", of individual differences (Armstrong, Su, & Rounds, 2011; Chamorro-Premuzic, 2011).

In recent years there has been a revival of the study of interests with a particular focus on vocational interests. Vocational interests have been suggested as a strong predictor of career related outcomes, including entrepreneurship (Schmitt-Rodermund, 2004). However, there is insufficient empirical evidence to support this hypothesis, particularly when it comes to the assessment of criteria beyond self-employment. Thus, the present study attempts to fill what appears to be an important void in the entrepreneurship literature, by examining the validity of vocational interests in predicting a variety of entrepreneurial outcomes. Of particular importance is exploring the conceptual and empirical overlap between vocational interests and META. Finally, the analysis is also extended to scrutinize the comparative validity of interests in relation to META and demographic variables in the prediction of entrepreneurial activity and success. The following sections provide a succinct theoretical framework to understand the conceptual links between vocational interests and entrepreneurship.

Vocational interests

Vocational interests reflect preferences for particular behaviors and activities, the context in which these preferences occur and their associated outcomes (Rounds, 1995).

There is robust evidence indicating that genetic dispositions influence which environments people prefer and tend to inhabit (Chamorro-Premuzic, 2011). Such "niche picking" behaviors are crucial to understand career choices and their associations with individual differences. In line, theories of vocational interests suggest that individuals gravitate towards working environments (occupations and jobs) that are congruent with their personalities.

The most influential theory of individual differences in vocational interests is no doubt John Holland's theory (1959, 1997; see also Armstrong, et al., 2011). Holland's model focuses on the linkages between individuals and their environments. Within this framework, an individual's personality is articulated as preferences for work activities, and work environments are defined in terms of the activities performed by the people who work in them (Armstrong, Allison, & Rounds, 2008; Armstrong, Day, McVay, & Rounds, 2008).

According to Holland (1959, 1997), both individuals and environments can be categorized into one of six types: realistic (R), investigative (I), artistic (A), social (S), enterprising (E), and conventional (C) - represented by the RIASEC acronym. *Realistic* individuals show preference for activities that include hands-on problems and solutions. Examples of related occupations are construction carpenters, airline pilots, fire fighters, or truck drivers. *Investigative* people are scientific and task orientated. Examples of related occupations are astronomers, epidemiologists, teachers or doctors. *Artistic* types prefer occupations in which they have to use their imagination and creativity, dealing with forms, designs, and patterns. Examples of related occupations are floral designers, painters, illustrators, singers or English language college teachers. *Social* people are humanistic and team-oriented. Examples of related occupations are special education teachers, nurses, fitness trainers or tour guides. *Enterprising* personalities like persuading and leading people, mainly to attain organizational goals or economic gain. Examples of related occupations are purchasing managers, personnel recruiters, program directors, or first-line supervisors.

Conventional individuals are careful, conforming, attentive to detail, and willing to follow instructions. Examples of related occupations are cashiers, postal service clerks, accountants or auditors.

An interesting feature of Holland's taxonomy is the relationship among the six types, usually depicted as arrayed on a hexagon (Cole, Whitney, & Holland, 1971). The types more proximal to each other are conceptually and empirically more inter-related than those farther apart from each other. For instance, conventional and artistic types have very little in common, whereas, conventional and realistic are very similar. In other words, people with conventional interests also tend to like realistic occupations, while people with artistic interests are quite attracted to investigative jobs.

Vocational Interests and Entrepreneurship

Integrative models of individual differences point out that a person's future behavior will be influenced not only by personality and ability but also by interests, and the interplay between these three domains of individual differences over time (Chamorro-Premuzic, 2011). As Armstrong et al. (2011) note: "there is a reciprocal feedback loop between interests, personality and abilities, with personality and abilities contributing to interests by influencing how individuals function in environments, and interest-based self-selection of educational and work environments influencing which personality traits and abilities are developed and refined by new experiences" (p. 620).

Thus interests "pull" individuals towards certain activities and influence which behavioral tendencies and skills they develop. It is therefore likely that interest will be significant predictors of career related behaviors, including entrepreneurship. However, few studies have looked at this relationship, especially looking at entrepreneurship beyond business start-ups (e.g. Fraboni and Saltstone, 1990; Schmitt-Rodermund, 2004). Accordingly, the first aim of the current study is to address this gap in the literature by

investigating the validity of vocational interest as predictors of a wider range of entrepreneurial activities.

Given the evidence on the stability of vocational interests and their overlap with personality traits (Chamorro-Premuzic & Furnham, 2010), a second aim of this study is to investigate the relationship between META and vocational interests. Of particular interest is the link between the entrepreneurial personality (assessed by META) and the enterprising type (also called entrepreneurial type) of RIASEC, given that there is a conceptual overlap between the two constructs. A final purpose of the current research is to investigate the incremental validity of META over and above RIASEC dimensions, as well as demographic variables. Thus, in accordance with the arguments above we hypothesize that:

H1: Enterprising type will be significantly related to META

H2: RIASEC dimensions will significantly predict entrepreneurial activity and achievement

H3: META will significantly predict entrepreneurial activity and achievement

H4: META will significantly predict entrepreneurial activity and achievement beyond RIASEC dimensions

Method

Participants

Five hundred and sixty five individuals (407 females and 158 males) participated in this study. Eighty five percent of participants indicated that they were employed and eighteen percent indicated that they were self-employed (note that participants were allowed to select multiple options, i.e. employed and self-employed). A regression analysis (N = 545, only the subjects that had selected either of the occupations were used in this particular analysis) revealed that there was no effect of sex on type of occupation ($F_{1,543} = 1{,}89$; $p = 0{,}17$).

Measures

*O*NET Interest Profiler Short Form* (Rounds, Su, Lewis, & Rivkin, 2010). The Interest Profiler is an Occupational Information Network (O*NET) scale that measures Holland's types of vocational interest. In the computerized version of the measure, participants are instructed to rate on a 5-point Likert-type scale (ranging from "Strongly Dislike" to "Strongly Like") how much they would like to do the activity described in the statements presented. The short form consists of 60 items with 10 items per type: realistic (e.g. "Set up and operate machines to make products"), investigative (e.g. "Investigate the cause of a fire"), artistic (e.g. "Write scripts for movies or television shows"), social (e.g. "Take care of children at a day-care center"), enterprise (e.g. "Negotiate business contracts"), and conventional (e.g. "Keep shipping and receiving records").

Measure of Entrepreneurial Tendencies and Abilities. The 61-item META was retained for the current study for further evaluation. The reliabilities of the scales were acceptable (see Table 7).

Entrepreneurial outcomes. Twenty-two items relating to past (biographical) and current entrepreneurial achievements and activities were included in the survey in order to assess individual differences in entrepreneurial success. Items were generated to assess entrepreneurial activities to generate income outside main job (e.g. by selling things, providing services, or organizing events); corporate entrepreneurship (e.g. making improvements to the organisation's product or service lines); social entrepreneurship (e.g. engaging homeless welfare initiatives, creating a student organization); and entrepreneurship through innovation/invention. The items referred to actual outcomes, outside and within organizations, rather than to preferences or tendencies. A (Varimax rotated) Principal Component Analysis was conducted to investigate the underlying structure of these items. Six factors with Eigenvalues above 1 were extracted. An examination of the Scree plot revealed four independent factors. All items loaded on their hypothesised factor, with one

item (organizing events) not loading well (below .3) on any factor. This item was excluded from the analysis. The four factors were named: general (4 items; α =. 73), corporate (6 items; α = .68), invention (5 items; α = .65), and social entrepreneurship (5 items; α = .70). The item "Income" was included separately in the analysis, as it did not load on any of the components.

Procedure

Participants completed the survey online, through a website that was advertised via social-media sites, email, and psychology websites. First, participants answered some biographical information related to entrepreneurial activities and achievements. Next, they completed the vocational interest inventory (O*NET Interest Profiler) and the Entrepreneurial Measure (META). After completing the survey, participants received feedback on their RIASEC and META scores. Ethical approval for the research was obtained through University College London.

Results

Bivariate correlations are presented in Table 7, together with descriptive statistics and internal consistency reliabilities. There were no missing variables in the sample. The distribution of all variables was normal. Variables were not multi-collinear with one another, no singularity was found, and there were no multivariate outliers in the dataset. All variables appeared to be linear and homoscedasticity of variance was assumed (Tabachnick & Fidell, 2005).

Inter-correlations between types of the O*NET Interest Profiles (Table 7) revealed that the internal structure replicates the circular ordering of RIASEC. The types closest to each other present the highest correlations, whereas the correlations decrease in those with greater distance.

As excepted META scales presented the highest correlations with enterprising interests, although Creativity correlated moderately also with artistic interests (.33). Vocational interests presented small to moderate correlations with some of the entrepreneurial outcomes, whereas META scales had modest to moderate correlations with all those outcomes. Given these results the incremental validity of these constructs in the prediction of entrepreneurship was tested using structural equation modeling.

Structural Equation Modeling (SEM)

In order to investigate the concurrent and discriminant validity of the facets of META and RIASEC, SEM was carried out using AMOS 5.0 (Arbuckle, 2003). Given the intercorrelations between the META scales and the inter-correlations between the outcome measures (see Table 7), a parsimonious model was tested where a latent META factor and a latent "Total Entrepreneurial Activity (TEA)" factor (onto which all outcomes were loaded) were specified. In this model, the variables age and gender were exogenous, or covariates; personality and vocational interest (i.e. META scales and RIASEC dimensions) were mediators; and entrepreneurial outcomes were endogenous variables. The variables were entered as observed covariates, with the exception of the two latent factors. The directionality of the model is conceptual, considering that sex and age were the variables less affected by environmental factors, followed by personality and interest constructs, and finally entrepreneurial activities. The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989; which tests the hypothesis that an unconstrained model fits the covariance or correlation matrix as well as the given model); the goodness of fit index (*GFI*; Tanaka & Huba, 1985; values close to 1 are acceptable); the comparative fit index (*CFI*; Bentler, 1990; values above .96 are acceptable); the root mean square residual (*RMSEA*; Browne & Cudeck, 1993; values of .06 or below indicate reasonable fit for the model); and the expected cross-validation index (*ECVI*; Brown & Cudeck, 1989; smaller values indicate better fit).

Table 7. *Bivariate correlations, descriptive statistics, and reliabilities of O*NET Interest Profiler, META, and entrepreneurial outcomes*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	M	SD	#I	α
1. Realistic																		22.43	7.43	10	.88
2. Investigative	.55**																	28.97	8.70	10	.91
3. Artistic	.30**	.34**																32.70	7.79	10	.86
4. Social	.11**	.22**	.33**															32.85	6.95	10	.83
5. Enterprising	.23**	.17**	.23**	.33**														27.37	7.05	10	.82
6. Conventional	.43**	.28**	-.01	.06*	.34**													24.50	7.27	10	.87
7. Opportunism	.11*	.12**	.15**	.10*	.49**	.00												32.56	7.47	11	.89
8. Creativity	.07	.11*	.31**	.08	.23**	-.14**	.59**											42.59	7.57	12	.88
9. Proactivity	-.02	.05	.05	.10*	.32**	-.05	.60**	.45**										53.37	9.99	18	.87
10. Vision	-.03	.04	.08	.13**	.37**	.01	.55**	.41**	.53**									73.46	9.98	20	.85
11. Income	-.01	.09*	.06	-.05	.09*	.01	.20**	.12**	.19**	.10*								3.25	2.93	-	-
12. Corporate E.	.10**	.04	.07	.04	.24**	.05	.42**	.40**	.25**	.25**	.25**							1.55	1.62	6	.68
13. Invention E.	.11**	.05	.19**	-.01	.11**	-.03	.32**	.35**	.23**	.21**	.14**	.26**						.40	.87	5	.65
14. Social E.	.02	.04	.15**	.22**	.18**	-.02	.29**	.36**	.29**	.24**	.11*	.18**	.24**					1.02	1.31	5	.70
15. General E.	.06	-.01	.07	.03	.05	-.00	.13**	.13**	.07	.09*	.00	.00	.10*	.07				1.38	1.47	3	.73
16. Age	.05	.03	.12*	-.01	-.04	.05	.05	.09**	-.03	-.13**	-.02	.51**	.33**	.26**	.11**			31.81	10.74	-	-
17. Sex	.28**	.13**	.00	-.12**	.02	.03	.18**	.13**	.05	.04	.12**	.03	.12**	.07*	.06*	-.00				-	-

N = 565. Note: Correlation is significant at the (**) 0.01 level or (*) 0.05 level (2-tailed). E = Entrepreneurship, M = mean, SD = standard deviation, #I = number of items, Income was scored 1-15 where 1 = £0, 2 = £0-5000, 3 = £5001-20000, with a £10000 increase until 12 = £100000 – 150000, 13 = £150000 – 200000, 14 = £200000 – 300000, 15 = over 300000. Sex was coded as a dummy variable, with 1 for male and 0 for not male (i.e. female).

In the saturated model, paths from the covariates to the mediators and the DV, and from the mediators to the DV were added. This model, which included 11 paths between exogenous and endogenous variables, did not fit the data well: χ^2 (86 df) = 343.32, $p < .01$; *GFI* = .93; *CFI* = .88; *RMSEA* = .07 (.07 - .08); *ECVI* = .79.

Accordingly, modifications were made based on the AMOS modification indices, expected parameter change statistics, and standardised residuals. Parameters were added only if they made substantive sense. Two observed variables; social entrepreneurship and general entrepreneurship, were found to be poor indicators of their latent TEA factor. These paths were subsequently freed. Based on the modification indices and expected parameter change, four direct paths were added to the model; these were from the latent META variable to social (β = .35) and general (β = .14) entrepreneurship, from social interests to social entrepreneurship (β = .19), and from artistic interests to inventive entrepreneurship (β = .14). These paths were added one at a time, and all other path coefficients and fit statistics were examined after each addition to determine its effect on these values. In addition, several paths were found to have non- significant values and were subsequently removed from the model one parameter at a time, starting with the lowest t-value. The modified model, shown in Fig 1, fitted the data well: χ^2 (84 df) = 175.55, $p < .01$; *GFI* = .96; *CFI* = .96; *RMSEA* = .04 (.03 - .05); *ECVI* = .50.

As shown in Figure 12, vocational interests significantly predicted several entrepreneurship outcomes even when META and demographic variables were included in the model. Specifically, social interests loaded significantly on the latent entrepreneurship factor, as well as the observed social entrepreneurship factors, and artistic interests loaded significantly on invention entrepreneurship. The results further demonstrated that the latent META factor was the strongest predictor of entrepreneurship outcomes. AMOS-squared multiple correlations revealed that the relevant predictors combined accounted for 75% of the

variance of the latent entrepreneurship factor, 22% of income, 2% of general entrepreneurship, and 16% of social entrepreneurship.

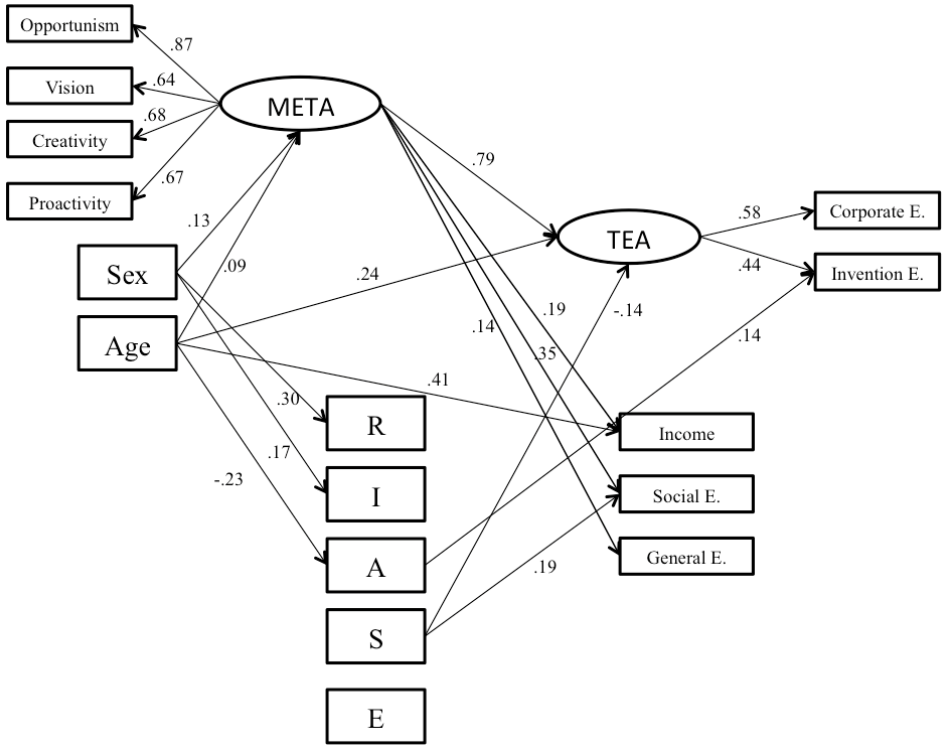

Figure 12. Results of a model for the prediction of entrepreneurial outcomes: N = 565. *Note*: All other coefficients were significant on the $p < .01$ level.

Discussion

The main purpose of this study was to explore the relationship between individual differences in entrepreneurship and vocational interests. As hypothesized (H1), the analysis revealed that the enterprising dimension of the RIASEC displayed the highest correlations with META scales. The artistic dimension presented the second highest correlation with META (i.e. Creativity). This suggests that entrepreneurial individuals tend to gravitate towards enterprising *and* creative activities. The lowest RIASEC correlates of META scales were the conventional and realistic types. Conversely, these two types were the highest RIASEC correlates of the enterprise dimension, clearly distinguishing between the construct of enterprising as conceptualized in RIASEC and the entrepreneurial personality as assessed by

META. Thus, entrepreneurial individuals are characterized primarily as enterprising and creative, and to some degree as social and investigative.

SEM showed, as predicted (H2), that several of the RIASEC dimensions were related to entrepreneurship. Specifically, social types are more likely to engage in social entrepreneurship, which includes activities aimed at improving student and community welfare, organizing events, and taking initiative to enhance education. Artistic types on the other hand had higher entrepreneurial inventive achievements, involving a higher likelihood to build a prototype of a design, and seeking investment in, receive orders, and/or selling an invention. Interestingly, social types had lower overall entrepreneurial achievements, as indicated by the negative correlation between this type and total entrepreneurial achievement, suggesting that these individuals are less likely to act entrepreneurially within organizations, and to engage in creative entrepreneurship activities (i.e. creating and pursuing new designs and inventions).

As hypothesized (H4), the predictive power of vocational interests remained even when other personality and demographic variables were included in the analyses – a finding that is likely to be important for the entrepreneurship literature. Thus, the results of our study stress the importance of considering the domain of interests in entrepreneurship research. As Armstrong et al. (2011) and others (e.g. Chamorro-Premuzic, 2011) have noted, more integrative models of individual differences, which include domains of personality, ability, motivations, *and* interests, are needed in order to understand any psychological or behavioral phenomena in full. This study is a testament to the importance of vocational interests in the prediction of a wide range of entrepreneurial activity, both outside and within organizations.

In addition to the RIASEC-entrepreneurship link, the current study also showed that META, as expected, significantly related to (all) entrepreneurship outcomes (H3). In particular, the relationship of META to entrepreneurial outcomes was significantly stronger

and more consistent than both RIASEC and demographic variables, with magnitudes of effect sizes exceeding .7 (compared with the highest RIASEC weight coefficient which was less than .2). Given that META was specifically developed to assess entrepreneurial potential its comparatively higher validity in predicting entrepreneurial activity makes sense. Nevertheless, the current results consolidate the incremental validity of META to predict entrepreneurship beyond other conceptually related trait measures (such as the enterprising dimension of RIASEC).

Implications

The current results have several implications for research and practice. First, the results of the current study indicate that in order to understand and facilitate the entrepreneurship process more integrative predictive models, which include both personality and vocational interests may be necessary (Revelle, Condon, & Wilt, 2011). It suggests that individual differences shape the process of entrepreneurship, both directly through the actions of entrepreneurial individuals, and indirectly by the vocational choices that these individuals make. In this respect, understanding and incorporating models of person-environment fit should be of great advantage for entrepreneurship research.

Second, from a theoretical perspective, it is interesting to observe the conceptual overlap between the entrepreneurial personality as assessed by META and the enterprising (or entrepreneurial) type as assessed by RIASEC. It seems that whilst META does relate to the enterprising type, the correlations are only in the modest to moderate range, suggesting that these measures do not assess one and the same underlying trait. This is further demonstrated when looking at the correlations of these constructs with other scales and outcomes. For instance, META also relates to Artistic and to certain extent Social types, both of which are unrelated to the enterprising dimension of RIASEC. Furthermore, META explains a large amount of the variance in entrepreneurial activity and success whereas the

enterprising type is unrelated to entrepreneurial outcomes when META is accounted for. These lines of results demonstrate that META is not simply an auxiliary construct for the Enterprising type of RIASEC, it also attests to an interesting position of META in personality and interests factor space.

From a practical perspective, RIASEC dimensions are excellent tools for providing vocational guidance for young (and old) individuals (Chamorro-Premuzic, 2011). This study suggests that guidance for high scorers on the social and artistic dimensions may also be important in terms of nurturing future entrepreneurial activity, particularly relating to social entrepreneurship and creative entrepreneurship. Similarly, the use of META may provide a complementary tool in this domain, particularly relevant for entrepreneurial individuals. For instance, a practitioner may use META to guide an individual not only in the direction of becoming self-employed, but also in finding relevant roles within an organisation or industry, that would allow them to exploit their strengths to pursue opportunities, innovate, and create value for others. Particularly, relevant industries may be those comprising business related activities, but also artistic activities, where high META scorers may obtain a 'fit' with the environment. Relevant personality and vocational interests profiling could further be used as a placement tool in private and public sector organizations, where individuals are promoted or relocated into roles where entrepreneurial commotion and thinking is beneficial, or necessary.

Limitations and future research

The current study has some limitations, such as the demographics of participants. Specifically, females were overrepresented in our sample. In contrast, research shows that females are underrepresented, particularly among self-employed individuals (Shane, 2008). Thus, future research should aim to have more evenly distributed sample in terms gender. Nevertheless, the current sample incorporated a sufficient number of participants from each

occupational status, as well as different professions. Thus, combined with the large sample size, the current study is still based on a more representative sample than many studies within the field.

3.5. Study 7: General Mental Ability in Entrepreneurship

Abstract

There is a great deal of research, which demonstrates that General Mental Ability (GMA) is a strong predictor of job performance and career success. However, the literature is largely occupied by studies that focus on more 'traditional' measures of job performance; very few studies have examined the impact of GMA on less conventional career outcomes such as entrepreneurship – especially beyond business creation and success. Accordingly, the current study investigates the relationship between GMA and a range of entrepreneurial activity and success. A second aim of the study is to investigate the link between the entrepreneurial personality (as assessed by META) and GMA and compare the incremental validity of META in relation to GMA and demographic variables in predicting entrepreneurship. Findings reveal that, unlike its impact on job performance, GMA is only modestly related to entrepreneurial activity and success; there is also a negligible relationship between GMA and META. Furthermore, results show that META is a stronger and more consistent predictor of entrepreneurial achievements. The findings shed some important light on the role of GMA in individual differences in entrepreneurship. Implications and avenues for future research are discussed.

Decades of research has demonstrated GMA to be a powerful and key predictor of career success (e.g. Hunter and Hunter, 1984; Schmidt and Hunter, 1998). GMA has been found to predict a number of occupational outcomes, including training and job performance, occupational status, sales performance, leadership, and salary, to name a few (Ones & Viswesvaran, 2011). These findings have been replicated in cross-cultural research (Furnham, 1994; Hogan, Curphy, & Hogan, 1994) as well as longitudinal studies (Austin & Hanisch, 1990). Indeed, the predictive power of GMA in occupational settings is now all but beyond debate (Murphy, 2002; Schmidt, 2002).

Despite this, however, some knowledge gaps do remain in the GMA literature in regards to its importance in less traditional – yet not uncommon – career settings. For instance, whilst the literature on the impact of GMA on job performance is unequivocal, research on the relationship between this construct and *entrepreneurship* is near to non-existent. Indeed, Hisrich, Langan-Fox and Grant, (2007), in their review of the entrepreneurship literature, noted that intelligence is a variable that has been "overlooked in the entrepreneurship literature" (p. 583) and that only a handful of studies have examined the impact of GMA on entrepreneurial activity and success. This is surprising given that there is good theoretical reason to believe GMA is a useful construct for entrepreneurship.

Entrepreneurship and GMA

Although there is a large body of research examining the antecedents of entrepreneurial achievements and success (Baron & Henry, 2010; Hisrich et al., 2007), a great deal of this research has focused on personality and motivational, rather than cognitive ability, factors. For instance, meta-analyses have shown that both broad and narrow personality traits predict a variety of entrepreneurial activity and success. Brandstätter (2011) recently summarized in a paper 5 meta-analytic studies showing that the Big Five personality dimensions have consistently been associated with both entrepreneurial intentions and business performance.

Similarly, narrow traits have been found to relate to entrepreneurship, including need for achievement, generalized self-efficacy, innovativeness, stress tolerance, locus of control, need for autonomy, and proactive personality (Rauch & Frese, 2007).

Despite the prominence of the trait approach, however, surprisingly few studies have examined the impact of GMA in entrepreneurship. Yet there is very good reason to believe that, in addition to personality and motivational factors, cognitive ability should play a strong role in the prediction of entrepreneurial success. First, the literature on job performance shows that GMA is generally a stronger and more consistent predictor of career success than personality. Second, it has been shown that cognitive ability influences performance by assisting in the acquisition of knowledge and skills, and speeding up decision making (Ackerman & Humphreys, 1990; Hunter, 1986) – all crucial for performance in entrepreneurial tasks (Shane & Venkataraman, 2000). Third, GMA predicts several performance outcomes that are related to entrepreneurial activity, such as sales ability and managerial capability. Accordingly, several authors have argued that intellectual capacity (e.g. the ability to identify new opportunities and to reconfigure the firm's resource base) is not only beneficial but also needed for successful entrepreneurship (Busenitz and Arthurs, 2007; Sternberg, 2004).

Whilst there is a relative absence of research to examine the impact of GMA on entrepreneurial success, some exceptions exist. For instance, Ray and Singh (1980) in a longitudinal study found that the GMA of business owners predicted growth rate. Similarly, Van Praag and Cramer (2001) showed that GMA predicted business success (as measured by business size and number of employees) even after accounting for parental background, education, and risk attitude. Finally, Frese et al. (2007) showed that GMA had a moderate positive impact on business size (but not growth). The results of this research provide some evidence to support the notion that GMA is a useful concept in entrepreneurship research.

Nevertheless, there were several limitations to the studies noted above. First, the research shows inconsistent results, with one study showing significant and positive and another non-significant relationship between GMA and firm growth. Second, the samples used in these studies are from distinct cultures, and generally differ from the majority of samples used in the literature (Rauch & Frese, 2007). Finally, all three studies focused only on business growth in operationalising entrepreneurial success, which is only one of many aspects of entrepreneurship (Kuratko, 2007). Clearly then, there is an important need for more research to establish the impact of GMA on entrepreneurial activity and success, particularly in relation to a wider range of entrepreneurial outcomes.

Accordingly, the aim of the current study was to extend previous research and address what seems to be an important void in the entrepreneurship literature, by examining the validity of GMA in predicting a variety of entrepreneurial outcomes. To do so, the current study a) includes a more comprehensive measure of entrepreneurial activity and success, b) uses a large representative sample to examine these associations, and finally, c) attempts to assess the validity of GMA in comparison to the entrepreneurial personality as assessed by META. To this end, the current study is an extension of Study 1, which employed a shorter version of META and did not assess entrepreneurial activity and success beyond the single variable of income. Given that both variables predicted income equally, it is of interest to further examine the relative validity of META and GMA in the prediction of a wider range of entrepreneurial achievements. As META assesses individual differences in the tendency and (self-perceived) ability to recognise and exploit opportunities, and innovate and create change, it is reasonable to expect a positive relationship between the two measures (Busenitz and Arthurs, 2007). Furthermore, although personality and ability are seen as distinct constructs, the literature does indicate that there are significant correlations between GMA and personality traits, particularly those related to Openness to experience (c.f. Von Stumm,

2011). Given that this Big Five trait that was previously shown to be the strongest correlate of META (see Study 3), the incremental validity tests employed in the current study are warranted.

Based on the arguments presented above, therefore, the hypotheses of the study were as follows:

Hypothesis 1 (H1): GMA and META will be positively correlated.

Hypothesis 2 (H2): GMA will positively predict entrepreneurial achievements.

Hypothesis 3 (H3): META will positively predict entrepreneurial achievements.

Hypothesis 4 (H4): META will show incremental validity over GMA in the prediction of entrepreneurial achievements.

Method

Participants

A total of 792 individuals (45.5% females), participated in this study. The mean age was 29.30 (SD = 11.58), ranging from 21 to 72 years. Participants were mostly from the USA (47.1%) and the UK (36.4%). The other participants came from a wide range of countries over Asia and Europe. With regards to occupational status, 47.3% were 'students', 33.0% were 'employed', 21.3% were 'self-employed', 6.3% were 'unemployed' and 3.4% of the population indicated 'Other'.

Measures

Numerical Reasoning Test 20-items (NRT-20, Chamorro-Premuzic, 2008). This is a 20 item multiple choice test that assess numerical (mathematical) and logical reasoning. The test does not require any previous training in Mathematics as it tests an individual's fluid intelligence. Test-takers are presented with a series of abstract matrices, deductive reasoning tasks and

basic arithmetic problems (computational speed) and have to complete the sequences by identifying the underlying implicit connection. They have 15 minutes to complete the entire test. Recent data for 6,023 UK adults and 325 students revealed uncorrected correlations of .52 and .68 with the Baddeley Reasoning Test (1986) and the Wonderlic Personnel Test (Wonderlic, 1992) respectively.

Measure of Entrepreneurial Tendencies and Abilities (META). The 61-item META was retained for the current study. Cronbach's alpha for the META scales in the present study were acceptable (see Table 6). The reliability of each of the four scales was in the acceptable range of above .7 (see Table 8).

Entrepreneurial outcomes. This is a measure of 18 items[25], which is aimed to assess entrepreneurial achievements and activity both within and outside organizations. The scale is based on the most common entrepreneurship themes in the literature such as corporate entrepreneurship (improving organisational processes or products; e.g. "Have you in your past or current employment solved longstanding organisational problems?"), innovation (patenting innovations, selling innovations; e.g. "Have you in the past build a prototype of your own designs?"), and business success (see below). Responses were rated on multiple-choice questions, where in some cases test takers could select multiple answers. A Principle Component Analysis revealed 2 components with eigenvalues above 1, namely Corporate Entrepreneurship (8 items) and Inventive Entrepreneurship (7 items). Three items, namely 'Income', 'Number of Business created' and 'Number of Business operating' did not load well on any component and were added as observed variables measuring more traditional outcomes of entrepreneurship. Thus the current results partially supported the component structure of the entrepreneurial outcomes inventory found in previous studies.

Procedure

[25] This survey was designed prior to Study 6, and therefore applied questions that were those found in Study 4.

Participants completed the survey online, which was sent through emails and advertised on various social network sites, such as Facebook, LinkedIn and a Psychology Forum (Web link of the study - http://www.psych-research.com/s/iq/). The study engaged potential participants by advertising that they could discover their learning potential and entrepreneurial tendency upon completion of the assessments, which would last approximately 20 minutes. Participants were invited to complete a multiple choice inductive reasoning test, followed by some demographics questions and then a self-report measure assessing personality aspects. Upon completion, participants were thanked for their participation and fully debriefed of the study. In addition, feedback on their learning potential and their entrepreneurial profiles was provided. Ethical approval for the research was obtained through Goldsmiths, University of London.

Results

Descriptive statistics, internal consistencies, and bivariate correlations for all measures are shown in Table 8. All scales that were used in the study demonstrated good internal consistencies (Cronbach's alpha values above 0.7 are considered appropriate; George & Mallery, 2003). There were no scores out of range and no missing cases on any of the personality measures. The distribution of all variables was normal and there were no multivariate outliers in the dataset.

There was a significant, albeit small, positive correlation between GMA and META dimensions Creativity and Vision. META facets also significantly and positively correlated with all entrepreneurial outcomes, namely Corporate Entrepreneurship, Inventive Entrepreneurship, 'Income', 'Number of Business created' and 'Number of Business operating'. Finally, GMA correlated significantly and positively with 'Number of Business created' and 'Number of Business operating'. Given these results, the relation between

META facets, GMA and the entrepreneurial achievements was further tested using structural equation modeling.

Table 8. *Descriptive Statistics, Cronbach's Alpha Coefficients and Bivariate Pearson Correlation Coefficients for All Measures Employed in the Study*

	1	2	3	4	5	6	7	8	9	10	11	M	SD	α
1. P												3.19	0.56	.85
2. C	.50**											2.39	.39	.83
3. V	.56**	.55**										4.19	.72	.91
4. O	.61**	.59**	.64**									3.29	.70	.87
5. GMA	.03	09**	.07*	.03								8.54	3.59	.74
6. CE	.36**	.40**	.26**	.45**	-.02							3.07	2.11	.78
7. SE	.25**	.23**	.21**	.27**	-.02	.38**						1.34	1.57	.70
6. Income	.09*	.17**	.12**	.13**	-.05	.28**	.12**					5.71	4.46	-
8. NBC	.31**	.23**	.17**	.34**	.30**	.53**	.20**	.21**				.37	.44	-
9. NBO	.25**	.12**	.09**	.23**	.35**	.43**	.17**	.15**	.79**			.52	.42	-
10. Age	.04	.15**	-.03	.08*	.01	.34**	.10**	.28**	.38**	.28**		29.30	11.58	-
11. Gender	-.10**	-.04	-.07	-.18**	.08*	-.02	.04	.04	.01	.01	.17**			-

Note: P = Proactivity, V = Vision, C = Creativity, O = Opportunism, GMA = General Mental Ability, IE = Corporate Entrepreneurship, SE = Social Entrepreneurship, NBC = Number of Businesses Created, NBO = Number of Businesses Operating, M = Mean, SD = Standard Deviation and α = Cronbach's alpha. **Correlation is significant at .01 level (2-tailed). * Correlation significant at .05 level (2-tailed).

Structural Equation Modeling

Structural equation modeling (SEM) was carried out using AMOS 5.0 (Arbuckle, 2003). The twelve observed variables included in the hypothesized model (GMA, META dimensions, entrepreneurial achievement outcomes, gender and age) were modeled as shown in Figure 13. To test a parsimonious model, META and entrepreneurial achievements were modeled as latent variables (given intercorrelations between META sub-dimensions and entrepreneurial achievement sub-dimensions). A saturated model was initially tested where (significant) paths between all exogenous and endogenous variables were specified. The model's

goodness of fit was assessed via the χ^2 statistic (Bollen, 1989; tests the hypothesis that an unconstrained model fits the covariance or correlation matrix as well as the given model; ideally values should not be significant); the goodness of fit index (*GFI*; Tanaka & Huba, 1985; a measure of fitness, where values close to 1 are acceptable); the comparative fit index (*CFI*; compares the fit of a target model to the fit of an independent model - a model in which the variables are assumed to be uncorrelated; values greater than .95 indicate a very good fit; Bentler, 1990); and the root mean square residual (*RMSEA*; Browne & Cudeck, 1993; values of .08 or below indicate reasonable fit for the model).

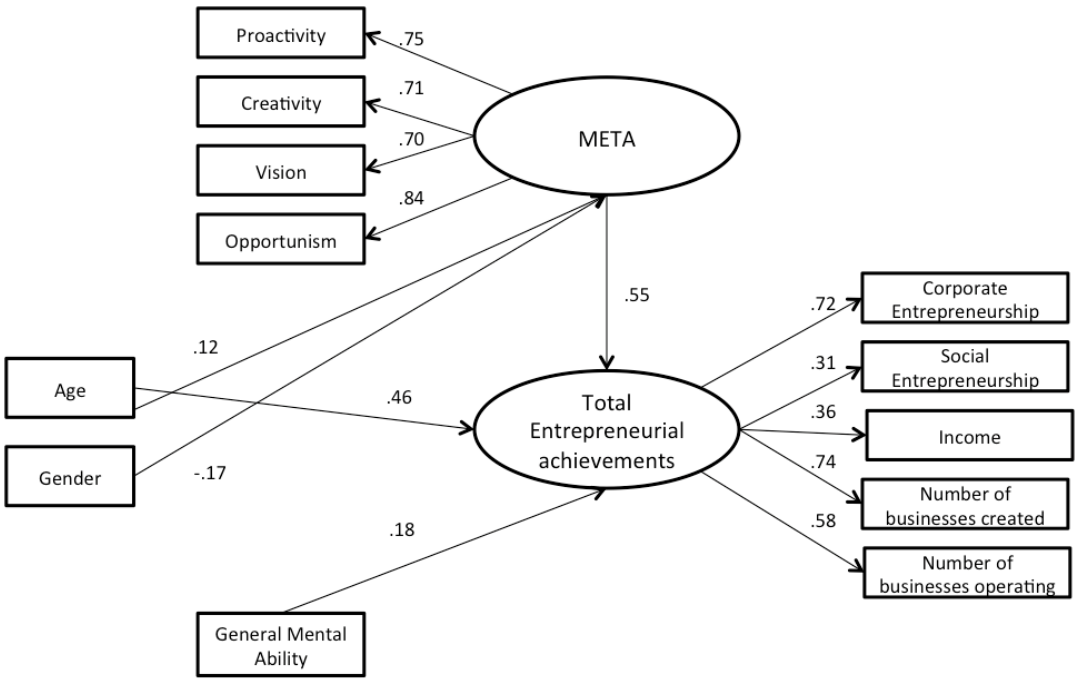

Figure 13. The modified model: META and GMA.

The hypothesized model, which included five paths between exogenous and endogenous variables, showed adequate fit to the data: χ^2 = (44 *df*, $p < .01$) 347.45, *GFI* = .93, *CFI* = .91, *RMSEA* = .09. The path between gender and GMA was non-significant, and was therefore omitted from the model. As shown in Figure 13, GMA significantly and positively predicted the latent factor "total entrepreneurial achievement", even when META and demographic variables were included in the model. On the other hand, META was a stronger

predictor of entrepreneurial achievements than GMA. Age also moderately predicted entrepreneurial achievements with older individuals being achieving more. There were slight gender differences on META, such that females rated themselves as less entrepreneurial (however, there was no effect of gender on entrepreneurial achievements). AMOS-squared multiple correlations indicated that the relevant predictors accounted for 60% of variance in entrepreneurial achievements, with GMA accounting for 9% of the variance, age accounting for 23% of the variance, and META accounting for 28%.

Discussion

The current study explored the relationship between GMA, entrepreneurial personality, and range of entrepreneurial achievements. Partly supporting H1, GMA was significantly and positively correlated with META; however, this was only the case for the two facets, namely, Creativity and Vision. These lines of results indicate that more intelligent individuals are also better at generating new ideas and think strategically about the future (Frese et al., 2007). This is consistent with the literature showing that GMA is related to personality dimensions related to intellectual investment – such as Openness to experience (von Stumm, 2011). Given the moderate correlation found between Creativity and Openness in previous studies (see Study 3), these results make theoretical sense. Nevertheless, the relationships between GMA and the META facets were negligible (below .1; and indeed non-significant in the SEM analysis), suggesting that they are unlikely to have any significant practical implications (Kline, 2000). These findings demonstrate that META is more appropriately placed in the personality, rather than ability, domain.

Second, GMA predicted entrepreneurial activity and success, and did so even after taking into account META and demographic variables (confirming H2). The results extend previous research, which has shown that GMA is a strong predictor of job performance and business success; our findings show that GMA also predicts performance in a wide range of

entrepreneurial outcomes beyond business success, including corporate entrepreneurship, innovation (inventive entrepreneurship), number of business created, and number of businesses still operating. These findings are important in several ways. From an empirical standpoint, there has been near to a total neglect of the concept of GMA in entrepreneurship research. This is despite the plentiful of theoretical discussions of the importance of cognitions in entrepreneurship (e.g. Baum, Frese, & Baron, 2007; Chell, 2008). Thus, the current research is only one of a handful studies to reiterate the necessity of taking into account GMA in any model of entrepreneurial activity and success. The fact that GMA predicts entrepreneurial achievements beyond a measure specifically designed to capture entrepreneurial potential/personality is a testament to its predictive power.

From a theoretical standpoint the results of this study are consistent with the notion that knowledge acquisition is key for entrepreneurial success (Shane & Venkataraman, 2000). In order for entrepreneurship to occur individuals must somehow innovate and create value (Dess, 1998), generally by discovering and exploiting new opportunities (McKenzie, 2007). Shane & Venkataraman (2000) argues that prior knowledge is key to the discovery of entrepreneurial opportunities. GMA helps people acquire knowledge faster, better, and more effectively (Chamorro-Premuzic & Furnham, 2010). It is likely, therefore, that having a higher GMA enables individuals to learn faster, and in turn, be better equipped to discover entrepreneurial opportunities. In addition, Frese et al. (2007) show that the influence of GMA on entrepreneurial success may occur because individuals with higher GMA are better at planning. That is, individuals with high processing capacity are able to develop plans quicker than those with low processing capacity (Frese et al., 2007). Thus, in some situations, quick thinking may help people to provide good and successful plans of action, and in turn be better able to exploit opportunities and deal with business obstacles. Of course, both of these hypotheses remain to be confirmed by future research, examining the exact mechanisms

through which GMA predicts entrepreneurial success.

An important finding in the current study was the effect size differences of GMA versus META (and demographic variables). Whilst GMA predicted entrepreneurship significantly, the impact (effect size) of this construct was relatively small compared to the impact of META (which was a moderate to strong predictor of entrepreneurial achievements). These results are in line with the findings of Study 2, showing that META displays a stronger relationship to entrepreneurship than GMA (H4). However, they contrast research on (traditional) job performance, where GMA is found to have a pervasive and generally stronger influence on performance than personality (Schmidt & Hunter, 1998). One could argue that the task of entrepreneurship is more fitting to divergent rather than convergent thinking (Sternberg, 2003), hence why META scales may be more strongly related to such achievements. On the other hand, Study 2 suggested that META and (objective) divergent thinking are uncorrelated. Another explanation is that typical performance, generally assessed by personality inventories, is more important than maximal performance, measured by cognitive ability inventories (Chamorro-Preumiz & Furham, 2010). Future research examining the mechanisms by which GMA and META influence entrepreneurial achievements may be able to address this question.

Practical Implications

The current study has several important implications. First, given the deficiency of studies on the effects of GMA on entrepreneurial achievements, there has been a general neglect of GMA in models of entrepreneurship. In line with the wide literature on the relationship between GMA and job performance, the current study demonstrates that GMA should also be included in models of entrepreneurial performance. Several authors have argued that intellectual capacity (e.g. the ability to identify new opportunities and to reconfigure the firm's resource base) is not only beneficial but also needed for successful entrepreneurship

(Busenitz and Arthurs, 2007; Sternberg, 2004). The current study is the first to provide empirical support for this suggestion in relation to a wide range of entrepreneurial outcomes.

In practical terms, there are several avenues which the results of the current study can inform. The first is practitioners in selection settings (e.g. organizational selection or financing of entrepreneurs). Selecting individuals who score high on GMA and META may be of significant interest to practitioners, who are concerned with increasing entrepreneurial activity. Given that GMA and META are relatively unrelated (or marginally related), they are likely to capture different aspects of performance. That is, GMA is likely to add incremental variance in the prediction of entrepreneurial achievements beyond META (and vice versa). Used in combination therefore, the ability of practitioners to predict who will be successful in entrepreneurial endeavors will be substantially enhanced (Schmidt & Hunter, 1998). In this sense, hiring individuals scoring high on GMA and META would be advantageous, both in terms of increasing performance (e.g. Ones & Viswesvaran, 2011) and entrepreneurial (or "intrapreneurial") activity. Similarly, governmental bodies that encourage venture creation may want to use measures of GMA and META to decide the most appropriate candidates for financial (and non- financial) assistance.

Limitations and Future Research

One limitation of the current study was to test the comparative validities of GMA and META in low-stake settings, that is, when participants have little or no motivation to fake their responses. Whilst the use of GMA tests in high-stake settings, such as employee selection, remains controversial (Murphy, 2002), it is not unreasonable to argue that objective tests which are more difficult to fake (and predict performance; Chamorro-Premuzic & Furnham, 2010) may be better able to predict entrepreneurial achievements in these settings. Indeed, it may be that the power of GMA to predict entrepreneurial success is relatively higher or equal to that of self-report inventories (such as META) in high-stake settings. This hypothesis

remains to be empirically tested, however.

Another limitation of the current study was the use of a numerical reasoning test to assess GMA. It may be desirable for future research to employ different measures of GMA that capture not only numerical, but also spatial and verbal intelligence (Carrol, 1992). Nevertheless, measures of fluid intelligence (as applied in the current study) have been shown to correlate substantially (von Stumm, 2011), suggesting that this may not have a major impact on the current findings.

3.6. Study 8: Predictors of Creative Achievement: Assessing the impact of entrepreneurial personality, perfectionism, and employee engagement

Abstract

Creativity is a key ingredient of organisational effectiveness, business innovation, and entrepreneurship. Yet there remain substantial gaps in the literature in terms of understanding the antecedents of creative achievement. The current study investigated the effect of entrepreneurial personality, perfectionism, and engagement as predictors of creative achievement. As predicted, Structural Equation Modelling demonstrated that entrepreneurial personality was significantly and positively related to all creative achievement outcomes. The hypothesised negative relationship between perfectionism and creative achievement was not supported. Furthermore, no significant associations were found between employee engagement and creative achievement. Implications are discussed in terms of the importance of entrepreneurial tendencies and abilities as a determinant of creative achievements.

Creativity is considered to be a key driver of competitiveness both within and outside organisations (Chamorro-Premuzic & Furnham, 2010). In line, identifying the antecedents of creative output is now a priority for many sectors of the economy (Perretti & Negro, 2007). The psychological study of creativity suggests that creative achievements are facilitated by both intrapersonal and interpersonal factors (Amabile, 1996; Simonton, 1994). Yet, despite growing interest in the field, there is a lack of applied research on creativity (Runco, 2004). As a result there remains important gaps in the literature in terms of our understanding of the influences on, and antecedents of, creative achievement (Chamorro-Premuzic & Furnham, 2010). In particular, several potentially important individual difference constructs have been neglected in the literature; these include, entrepreneurial tendencies, perfectionism (Frost, Marten, Lahart & Rosenblate, 1990), and the motivational construct employee engagement (Schaufeli, Bakker, Salanova, 2006). Accordingly, the aim of the current study was to address these research gaps in order to direct future research and further educate practitioners. The following sections outline the rationale for expecting significant relationships between these constructs and creative achievement.

Entrepreneurial Personality and Creative Achievement

Studies 3 to 7 of the current thesis showed that entrepreneurial personality, as assessed by META, is positively related to various entrepreneurial activities and achievements, including corporate entrepreneurship, social entrepreneurship, number of businesses started and currently operating, and salary level. On the other hand, the influence of META has not yet been examined in relation to wider outcomes, beyond entrepreneurship, such as creative achievements. Nevertheless, it can be expected that entrepreneurial tendencies will be related to creative success. There are several reasons for this; first, past studies (i.e. Study 1 & 2) have shown META to be moderately related to the Big Five trait Openness to Experience. The literature on creative achievement indicates that Openness, in

turn, is the strongest predictor of creative achievement (Feist, 1998). For instance, Barron and Harrington (1981) concluded that creative individuals had "high valuation of aesthetic qualities in experience, broad interests, attraction to complexity…and finally, a firm sense of self as 'creative'" (p.453). In line, Chamorro-Premuzic and Furnham (2005) reviewed the Big Five correlates of creativity and concluded that Openness was the most important factor to discriminate between more and less creative people.

Second, Study 6 demonstrated that entrepreneurial individuals prefer artistic and creative work environments. Given that vocational interests partly influence the environment a person is likely to inhabit (Armstrong et al., 2011), and that exposure to environments, in turn, influence personality development and achievement, it is reasonable to expect entrepreneurial individuals who gravitate towards creative environments to achieve more in these environments, than non-entrepreneurial individuals. Fourth, given that creative output and achievement is likely to be a function of not only creative ideas (Runco, 2004), but also the application of those ideas (Amabile, 1996), it is reasonable to expect tendencies related to recognising and exploiting opportunities, and to create value, to be related to creative success (Sternberg & O'Hara, 2000). However, apart from the results found in previous studies (see Study 3 to 7), that indicated that META is related to innovation output (i.e. innovative entrepreneurship), no research has directly examined these assertions. Thus, the current study extends findings from Study 2 to 7 and by investigating the relationship between META and a wide range of creative achievements.

Perfectionism and creative achievement

Although the study of perfectionism has a long history both in clinical research and personality psychology (Hewitt & Flett, 1991), research on its relationship to creativity is relatively scarce. Perfectionism has been conceptualised as a multidimensional construct characterised by setting excessively high standards for oneself, accompanied by concern for

mistakes, uncertainty regarding actions and beliefs, and an overemphasis on order, organisation, and neatness (Frost, et al., 1990; Hewitt & Flett, 1991; Terry-Short, Owens, Slade, & Dewey, 1995). Research has found perfectionism to be strongly associated with the Big Five traits of Conscientiousness and Neuroticism (Rice, Ashby & Slaney, 1998; Stoeber & Childs, 2010).

Several researchers have pointed to the fact that perfectionists' rigidity in thinking may cause them to become inflexible, which, in turn, might inhibit their ability to think creatively (e.g. Scott, Moore & Micelli, 1997; Sirois, Monforton & Simpson, 2010). Although relatively sparse, the literature has supported this hypothesis (Burns & Fedewa, 2005; Gallucci, Middleton, & Kline 2000; Sirois et al., 2010). For instance, Burns and Fedewa (2005) investigated preferred thinking styles in perfectionists, and found that more perfectionistic individuals tended to prefer less creative cognitive styles (Burns & Fedewa, 2005). Sirois et al. (2010) similarly investigated preferred ways of thinking in perfectionists, and found that perfectionists tended to suppress opportunities for creative solutions. Gallucci et al. (2000) investigated a sample of intellectually gifted children, and found a negative correlation between creativity and overall perfectionism. Thus, the second aim of the current study was to extend past literature on the relationship between these variables, by looking at the impact of perfectionism on self-reported creative output (Torrance, 1972).

Engagement and creative achievement

Schaufeli and colleagues (2002, p.74) defined employee engagement as a "positive, fulfilling, work-related state of mind" that can be viewed as a combination of vigor, dedication and absorption; thus, workers who are more engaged are more energetic at work, more dedicated to their job, and more absorbed with the tasks of the job. Engagement has been related to a number of work related outcomes, including productivity, commitment, financial performance, and turnover (Harter, Schmidt, & Keyes, 2002). Although little direct

evidence on the impact of engagement on creativity exists, it is reasonable to expect a positive association between these variables. For instance, Harter et al. (2002) hypothesised that employee engagement is a construct that fosters positive affect in individuals at work, which in turn leads to creativity. In line, a longitudinal study by Amabile, Barsade, Mueller, and Staw (2005) found that positive affect (a concept related to engagement) was positively and significantly related to creative thinking. Further support for an association between engagement and creativity is suggested by the positive relationships between job characteristics and engagement (Saks, 2006), and creative output (Greenberg, 1992). As a result it was hypothesised that engagement would be positively related to creative achievement.

The present study

Based on the arguments above, the present study intended to empirically examine the relationship between individual differences in creative achievement as a function of entrepreneurial personality, perfectionism, and employee engagement. It was also of interest to examine the relationship between entrepreneurial personality and perfectionism. Although there is little in the literature that speaks directly to how these constructs may relate, it is possible to derive some hypotheses. For example, entrepreneurial individuals need to be able to think differently and change directions when they spot opportunities and want to pursue them (Shane & Venkataraman, 2000). Given that perfectionism is related to rigidity in thinking and inflexibility (Scott, et al., 1997; Sirois, et al., 2010) it can be expected to inhibit this process. Accordingly, it is reasonable to expect a negative relationship between the two constructs. Based on the arguments above, therefore, it was hypothesised that:

H1: META would be significantly and negatively correlated to perfectionism.

H2: META would be significantly and positively correlated with creative achievement.

H3: Perfectionism would be significantly and negatively correlated with creative achievement.

H4: Employee engagement would be significantly and positively correlated with creative achievement.

Method

Participants

In all, 210 participants (93 males & 117 females) took part in the study. One hundred and sixty nine participants were full time employees, 24 participants were part-time employees and 17 were self-employed. The data consisted of 142 employees, 39 managers, 24 directors and 5 CEOs. Thirty-eight (18.1%) participants fell into the age category of 18 to 24, 98 (46.7%) were between 25 and 34 years of age, 63 (30.0%) were between 35 and 54 years of age, and 11 (5.2%) participants were 55 or older.

Measures

Multidimensional Perfectionism Scale (MPS; Frost et al, 1990). This is a 35-item questionnaire designed to measure six dimensions of perfectionism: Concern Over Mistakes (e.g. "If I fail at work/school, I am a failure as a person"), Doubts About Actions (e.g. "I usually have doubts about the simple everyday things I do"), Personal Standards (e.g. "I set higher goals than most people"), Parental Expectations (e.g. "My parents set very high standards for me"), Parental Criticism (e.g. "As a child, I was punished for doing things less than perfect"), and Organisation (e.g. "I am a neat person"). Participants are required to answer questions using a five point Likert scale from "strongly disagree" to "strongly agree". Principal Axis Factoring (PAF) and a Varimax rotation revealed a 6-factor solution. In accordance to Frost, Heimberg, Holt, Mattia, & Neubauer, (1993), a composite perfectionism factor was computed, excluding the "Organisation" variable, which was treated separately. The reliabilities of the scales were acceptable (see Table 9).

Measure of Entrepreneurial Tendency and Ability. The 61-item META was retained for the current study for further evaluation. The reliabilities of the scales were acceptable (see Table 9).

Utrecht Work Engagement Scale – Short Version (UWES; Schaufeli, Bakker, Salanova, 2006). This 9 item self-report scale assesses three aspects of work engagement: Vigor (3 items; e.g., "At work, I feel full of energy"), Dedication (3 items; "I am enthusiastic about my job"), and Absorption (3 items; "I feel happy when I am working intensely"). Participants responded using a 7-point Likert scale ranging from 0 (Never had this feeling) to 6 (Always). The scale is a shortened version of UWES-17, which has shown good reliability and factorial validity (Schaufeli, Martínez, Marques-Pinto, Salanova, & Bakker, 2002), as well as cross-cultural validity (Shimazu et al., 2008). PAF with a Varimax rotation revealed a dominant factor. The reliabilities of the separate engagement scales were in an acceptable range (see Table 9).

Creative Achievement Questionnaire (CAQ; Carson, Peterson & Higgins, 2005). The CAQ is a self-report checklist consisting of 96 items, which requires participants to answer ten questions with multiple-choice answers, referring to different domains of creative talent. These are Visual Arts, Music, Dance, Architectural design, Creative Writing, Humour, Inventions, Scientific Inquiry, Theatre & Film, and Culinary Arts. For each question, participants are asked to place a check mark beside a relevant item to indicate that they have accomplishments, or achievements, in the given domain. In accordance to Carson et al. (2005), two composite factors were computed: *Creative Achievements Arts* (CA Arts: visual arts, music, theatre and film, creative writing, Dance & Humour) and *Creative Achievement Science* (CA Science: architectural design, scientific discovery & inventions. The reliabilities of these composite factors were acceptable (see Table 9).

Entrepreneurial Achievements

In addition to the factors assessed in the CAQ, the current study also added a further dimension to the analysis to assess "entrepreneurial achievements". Although CAQ includes "entrepreneurial ventures" as an additional domain it assess this domain through only one item (as opposed to 7 items included in other domains). Accordingly, the current study included 8 additional items relating to entrepreneurial achievements. These items comprised of activities related to (a) corporate entrepreneurship (e.g. items: "I have found new applications for existing products/services"; "I have brought in 'new business' within current organisation"), (b) number of businesses started, and (c) annual income. A PAF confirmed a 3-factor structure corresponding to the above-mentioned domains.

Procedure

The questionnaire battery was hosted on an online survey website, and distributed through LinkedIn, Facebook, Twitter, forums and email. Participants gave informed consent, were appropriately debriefed, and had to provide an answer to each item in order to complete each following measure. The sampling method was random sampling, and the data was obtained through the host website and saved in an Excel spread sheet. Ethical approval for the research was obtained through Goldsmiths, University of London.

Results

Bivariate correlations, descriptive statistics and internal consistency reliabilities are presented in Table 9. Cronbach's alpha coefficients for all measures and facets were satisfactory (alpha values above .70 are considered appropriate; George & Mallery, 2003). There were no missing values on the data as a whole; however, there were 5 missing values for the variable Income as this was not a compulsory question to answer. In order to deal effectively with this data, mean substitution in SPSS was used to replace the missing values with estimates based on the mean (Tabachnick & Fidell, 2005). The distribution of all variables was normal, with the exception of the variables Business Creation, Creative Achievement

variables, and engagement. On the engagement variable there were two outliers that exceeded the critical value of 3.29; accordingly they were removed from the data set by selecting. A Log transformation was used on Business Creation and Creative Achievement variables to achieve normality. After the transformation skewness and kurtosis were considerably reduced so the variable could be considered normal. Variables were not multi-collinear with one another, no singularity was found, and there were no multivariate outliers in the dataset. All variables appeared to be linear and homoscedasticity of variance was assumed (Tabachnick & Fidell, 2005). Two multivariate outliers in the data set were found, as these cases showed values higher than the critical value. These were also removed from the data set, leaving a total of 206 responses.

As hypothesised, META and employee engagement were significantly correlated with several creative achievement outcomes. There were also some small significant correlations between the predictor variables (i.e. between META dimensions and perfectionism dimensions, between META dimensions and engagement dimensions, and between perfectionism dimensions and engagement dimensions). Contrary to predictions, perfectionism was not related to creative achievement. Given its relationship to engagement, however, it was nevertheless kept in the proceeding analysis.

To assess the incremental validity of personality and engagement in the prediction of creative achievement, Structural Equation Modelling (SEM; Amos 5.0 software, Arbuckle, 2003) was carried out.

Structural Equation Modelling

Given the intercorrelations between the four (observed) META dimensions, the two perfectionism dimensions, and between the creative achievement factors, a parsimonious latent model was tested. In this model all four META facets were loaded onto a latent META total factor. The two observed variables of perfectionism were loaded on a latent overall

Perfectionism factor. Similarly, art and science composite scores were loaded onto a single latent factor to represent overall Creative Achievement (Carson, et al., 2005). Lastly all three engagement facets were loaded on to a single latent Engagement factor. The Entrepreneurial Achievement outcomes (income, number of business created and a measure of corporate entrepreneurship) were included as observed variables in the model.

In this model, age and sex were specified as exogenous variables; META, perfectionism and engagement constructs were specified as both exogenous and endogenous variables; and creative achievements and entrepreneurial success variables were modelled as endogenous. The directionality of the model was conceptual (considering that sex and age are the variables less affected by environmental factors), followed by personality and engagement constructs, and finally creative achievements.

The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989), the goodness of fit index (GFI; Tanaka & Huba, 1985; values close to 1 indicate good fit); the comparative fit index (CFI; Bentler, 1990; values above .96 are acceptable); and the root mean square residual (RMSEA; Browne & Cudeck, 1993; values below .06 indicate good fit). In the saturated model, paths from the covariates to the mediators and the dependent variable (DV) and from the mediators to the DV were added. The hypothesised model did not fit the data well (χ^2= (86 *df*, p < .01) 255.39, GFI = .87, CFI = .84, RMSEA = .09).

Given this, attempts to identify misspecifications were made. Modification indices, expected parameter change, significance of regression estimates and standardised residuals were used to identify paths that should be deleted or added in the model. Paths were only added if they made theoretical sense. Based on the modification indices and expected parameter change two paths were added to the model – a path from the observed corporate entrepreneurship variable on the latent factor of Creative Achievement, and a path from the latent Perfectionism factor to the observed engagement factor of absorption. As expected, the

Table 9. *Descriptive statistics and alpha coefficients, and bivariate correlations between all the observed variables in the model*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	M	S.D.	α
1. Age	—																2.22	.80	—
2. Sex	-.18**	—															1.56	.50	—
3. Opportunism	.11	-.32**	—														32.21	6.9	.83
4. Proactivity	.15*	-.15*	.66**	—													52.73	8.45	.87
5. Creativity	.03	-.28**	.56**	.44**	—												53.59	8.27	.85
6. Vision	-.12	-.12	.51**	.59**	.37**	—											54.47	7.82	.80
7. P Organisation	.10	-.02	.03	.04	-.16*	-.15*	—										22.9	4.36	.88
8. P Total	-.11	.07	.02	.01	.09	-.23**	-.14*	—									80.10	13.81	.88
9. En Vigor	.13	-.21**	.28**	.40**	.31**	.35**	.06	-.04	—								11.26	2.95	.79
10. En Dedication	.17*	-.13	.07	.25**	.14*	.19**	.06	-.09	.77**	—							12.84	3.1	.85
11. En Absorption	.22**	-.18**	.15*	.25**	.24**	.30**	-.15*	.10	.62**	.71**	—						12.56	2.97	.77
12. CA Arts	-.18*	-.06	.11	-.01	.29**	.02	-.11	.05	.05	-.01	-.05	—					7.29	10.58	.84
13. CA Science	.16*	-.24**	.06	-.02	.26**	.09	-.05	.05	.18**	.13	.17*	.06	—				2.59	6.72	.68
14. Corporate E	.41**	-.34**	.45**	.31**	.41**	.19**	-.02	-.04	.28**	.17*	.22**	.16*	.25**	—			2.82	2.09	.78
15. Income	.53**	-.35**	.38**	.36**	.19**	.22**	.11	-.01	.34**	.24**	.30**	-.09	.18**	.46**	—		6.59	3.05	—
16. B Creation	.24**	-.18*	.25**	.15*	.18**	.08	.04	-.04	.16*	.09	.13	.11	.04	.31**	.30**	—	1.27	3.17	—

** Correlation significant at the .01 level, * Correlation Significant at the .05 level (2 - tailed)

Notes: E = Entrepreneurship, P = Perfectionism, En = Engagement, B = Business, CA = Creative Achievements. Age was scored in the following bands starting

path between the latent perfectionism latent factor and Creative Achievement was non-significant and therefore deleted.Furthermore, the path between perfectionism and the latent engagement factor was also non-significant and consequently omitted. Finally the paths between engagement and Creative Achievements were non-significant and therefore removed from the model**.** The final model shown in Figure 14 fitted the data well (χ^2 = (85 *df*, $p < .05$) 136.08, GFI = .93, CFI = .95, RMSEA = .05).

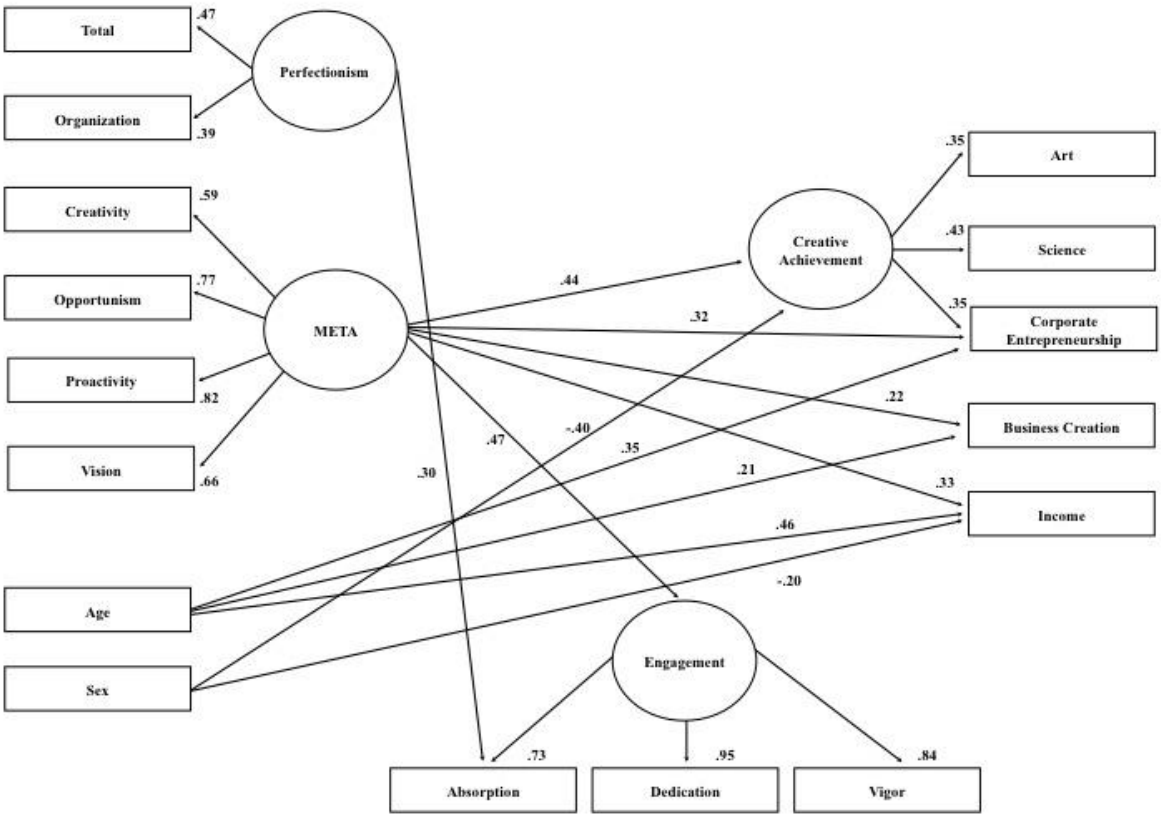

Figure 14. The Final Model. *Note:* For simplicity, the paths between Sex and Age with META, and those below (.20) are not shown.

As shown in Figure 14, the latent META factor significantly predicted all outcome variables (including engagement) with moderate effect sizes. Age and gender significantly predicted outcomes. Specifically, age predicted the observed CA Science variable, number of businesses started, and income, whereas gender was related to the latent Creative Achievement factor and income. The relationship between engagement

and creative achievements was found to be unrelated. AMOS-squared multiple correlations showed that the exogenous variables accounted for 42% of variance in the latent Creative Achievement factor, 43% in income, 10% in number of business created, and 24% in engagement.

Discussion

The main purpose of this study was to explore the impact of individual differences in entrepreneurial personality, perfectionism, and employee engagement, on creative achievement. The results partially supported the hypotheses of the study. First, contrary to expectations, the results demonstrated that perfectionism was unrelated to creative achievements. This undermines the notion that perfectionism, as a construct, is relevant for such outcomes; therefore H3 was not supported. An alternative explanation, however, is that the influence of perfectionism is relatively situation specific. That is, while creativity as a *process* may require divergent thinking and flexibility (i.e. lower perfectionism), creativity as an *achievement* (or product) may require a number of different skill sets, including attention to detail, organisation, and focus (i.e. higher perfectionism; Amabile, 1996; Frost et al., 1993). It could also be that components of perfectionism (e.g. adaptive versus maladaptive) may have a differing impact on creative outputs. These associations were not examined in the current study given that the analysis did not yield the aforementioned two-factor structure of perfectionism. Nevertheless, future research should investigate these links taking into account subcomponents of perfectionism and the influence of moderator variables.

The results also showed that engagement was significantly correlated with specific creative achievement and entrepreneurship outcomes, however, these associations were non-significant after the variance of META and demographic variables

was accounted for in an SEM model. Thus H4 was not confirmed. This finding stresses the need to consider other relevant personality and demographic variables in engagement research, and to examine the incremental validity of engagement in addition to concurrent validity. Indeed, the results indicated that the relationship between engagement and creative outputs could be fully explained by personality and demographic variables.

In line with the first hypothesis of the study (H1), META scales were found to be significantly and negatively related to perfectionism. Specifically, the total perfectionism component was related to the Creativity dimension of META, indicating that perfectionistic tendencies may hamper innovative and creative behaviours (and cognitive processes) of entrepreneurial individuals. However, this relationship was weak, and given that the total perfectionism dimension did not relate to creative achievements, it may arguably have negligible applied significance. On the other hand, both components of perfectionism were related to the Vision dimension of META, with somewhat stronger effect sizes. In other words, it appears that those individuals who are more perfectionistic are likely to struggle with seeing the bigger picture and desire to create value and progress. This finding makes theoretical sense given that focusing on details often comes at a compromise for seeing the big picture (Stoeber & Childs, 2010); however the current study is the first to empirically demonstrate the relationship of perfectionism on entrepreneurial tendencies.

As hypothesised (H2), META was also significantly related to creative achievement. Although this finding was expected, it is worthy of attention. It suggests that individuals who are more entrepreneurial, that is, able to spot and exploit opportunities and innovate with a vision, are more likely to achieve success in a variety of creative domains. The results, thus, support and extend findings from previous studies

(Studies 3-7), to show that META not only predicts entrepreneurial outcomes but also creative achievements. In addition, given the moderate effect sizes, such links may have significant practical implications. Considering the lack of empirical research linking entrepreneurial tendencies to creative achievement, these results should provide an important avenue for future investigations. In particular, it seems that the entrepreneurial personality may have been an overlooked dimension in creativity research. For instance, previous studies have shown that META is a stronger predictor than Openness (which is the strongest predictor of creative achievement; Chamorro-Premuzic & Furnham, 2005), in the prediction of entrepreneurial activity and success (see Study 3-7). It is plausible therefore that the same may be the case also with creative achievements. Although META is a domain-specific measure of entrepreneurship, it may nevertheless prove a practically useful inventory also for the creative disciplines. Indeed, given the importance of the ability to 'apply' creativity (Amabile, 1996), entrepreneurial tendencies and abilities may be the critical component needed for success in creative industries.

Limitations

One limitation of the current study was its reliance on self-report measures of creativity. Although the definition of creative success may be objectively difficult to define (Amabile, 1996), future studies should seek to determine measures of creative achievement, in addition to self-reports, in order to assert the predictive validity of the independent variables used in this study. This could for instance include verifications of the achievements outlined in the CAQ, such as the number of publications, or designs a person has produced. Studies should also include longitudinal designs to disentangle the causal order between the variables examined in the current study. For instance, there may be a reciprocal loop between creative achievements and entrepreneurial tendencies

in that the more a person achieves the more they remain in an industry, and in turn, the more entrepreneurial skillsets they develop.

Furthermore, gender differences in creative achievement were also found — a finding that was not consistent with the general literature (see Baer & Kaufman, 2008). This could indicate that the current sample was not representative of the wider population. On the other hand, the demographic data relating to participants did not indicate any anomalies, rendering this explanation insufficient. Thus, it would be advisable for future research to investigate the generalisability of this finding further. Finally, it is also important for future research to assess the incremental validity of META in particular, beyond more direct measures of creativity, such as divergent thinking tests (Chamorro-Premuzic & Reichenbacher, 2008). Given that divergent thinking tests are domain specific tests aimed at predicting creative achievement, this research is warranted. On the other hand, the results of Study 2 showed that META was not significantly correlated to divergent thinking. Arguably, therefore, META 'should' demonstrate incremental validity beyond these measures of creativity. It could be that the combination of these tests provide researchers and practitioners a potent way of predicting creative success.

Implications

The results of the current study have several important implications. Most notably, they show that in contrast to a commonsense view, the impact of perfectionism and engagement on creative achievements may be limited when other personality and demographic variables are taken into account. They further demonstrate the importance of entrepreneurial tendencies in explaining individual differences in creative output.

In practical terms, there are several avenues that the results of the current study can inform. The first concerns strategies for facilitating individuals' creative

success in different professional domains. Although empirical studies have shown that perfectionism traits can be problematic in certain personal and professional contexts, the results suggested that this might not be the case within the domain of creativity. Thus, professional and educational institutions may not need to be concerned about such tendencies, if achieving creative or entrepreneurial success is the aim. A focus on entrepreneurial potential, on the other hand, may be a potentially fruitful strategy.

In the same vein, increasing engagement levels may not be crucial for creativity inside or outside organisations. That is not to say that engagement (or indeed perfectionism) is not important for creativity or innovation. On the contrary, engagement has been found to be highly important for a range of positive performance outcomes, which in turn may facilitate creativity (Harter et al., 2002). Rather, the results suggest that the entrepreneurial personality may be an important factor to consider *alongside* engagement, in particular, when the aim is to increase creative output.

A final implication of these results regards vocational guidance. For instance, relevant personality profiling could be used as a career guidance tool for young individuals, or placement tool for professional adults, where individuals are guided to, or relocated into roles where creative thinking is beneficial, or necessary.

3.7. Study 9: The effect of organisational structure and work autonomy on entrepreneurial tendencies, locus of control, and performance

Abstract

There is a great deal of research demonstrating the impact of organisational structure and work autonomy on incumbents' personal behaviours, traits, and performance. However, there is no research specifically looking at how these organisational factors may influence entrepreneurial tendencies within organisations, and their impact on individuals' job performance. Accordingly, the current study investigates the effect of organisational structure and work autonomy on entrepreneurial personality (as assessed by META), locus of control, and job performance. Findings reveal that components of organisational structure are significantly related to work autonomy and job performance but, contrary to expectations, organisational structure did not impact on individual level traits. As expected, entrepreneurial potential and locus of control were significantly and positively related to job performance. Importantly, work autonomy influenced both entrepreneurial tendencies and locus of control, and displayed significant indirect effects, via these individual level traits, on job performance. Implications are discussed with regards to facilitating productivity and innovation within organisations.

Research indicates that both the structure and design of work, as well as individual characteristics contribute to people's performance at work (Hurrell & Murphy, 1992; Katz & Kahn, 1978). It is also clear that organisation level factors may have both a direct and an indirect influence on performance, via individual level factors (Bond & Bunce, 2003; Hackman & Oldham, 1976). For instance, the impact of features such as organisational structure and work autonomy on various individual level traits has been shown in a number of studies (Kristof-Brown, Zimmerman & Johnson, 2005). Furthermore, a number of authors have hypothesised that these organisational factors (i.e. structure and autonomy) may have an impact also on entrepreneurial tendencies and achievements (Gupta, Macmillan, & Surie, 2004). Given that organisations are increasingly interested in fostering corporate entrepreneurship and innovation (Kuratko, 2007), it would be critical to empirically confirm this assertion. Despite this however, no literature exists on this issue. In line, the current study aimed to take a step in this direction, by examining the influence of organisational structure and autonomy on entrepreneurial tendencies (as assessed by META) and job performance. The following sections provide an outline of the key variables assessed in the study, as well their hypothesised relationship to job performance.

Organisational structure and job performance

Organisational structure refers to the way job tasks are formally divided, grouped, and coordinated (Robbins and Judge, 2008); this includes policies, procedures and rules (Donaldson, 1996). Two core components of organisational structure are formalisation and centralisation (Robbins & Judge, 2008). Formalisation is defined as the degree to which jobs within an organisation are standardised, typically through written regulations (Hall, 1991), whereas centralisation is the degree

to which the power to take decisions at work resides with one individual (e.g. leader) or unit (e.g. senior management). In this sense, there is a close link between formalisation, centralisation, and the level of autonomy workers have at work (Robbins & Judge, 2008).

Increasing research has demonstrated the impact of organisational structure on job-performance outcomes. For instance, a study on public sector institutions conducted by Pandey and Welch (2005) found that formalised organisational structures may have a negative impact on employee performance and motivation. In their research, Pandey and Welch (2005) found that a high degree of formalisation limits managers' decision-making authority, thereby leading to feelings of work alienation. Similarly, Sarros et al. (2002) found that a higher degree of centralisation, indicated by the number of hierarchical levels in the organisation, led to feelings of work alienation among fire officers.

Kakabadse, Kakabadse and Kouzmin (1999) proposed that when organisational processes are highly centralised and formalised, self-managed teams can engage in counterproductive behaviours such as 'groupthink', which may negatively impact group, as well as organisational performance. Tata and Prasad (2004) found support for this assertion in their research on self-management and team effectiveness at work. Specifically, the researchers found that fewer rules, policies and procedures (i.e. lower formalisation) in the organisation, were associated with increased team effectiveness and self-management. Other studies have shown that organisational structure can have an influence on job satisfaction (Johari, Yahya & Omar, 2011), organisational justice perceptions (Schminke, Ambrose & Cropanzano, 2000), counterproductive work behaviours (Kacmar, Bozeman, Carlson & Anthony, 1999), and job stress (Aizzat, Ramayah & Yeoh, 2006). Because larger organisations

are generally higher on both centralisation and formalisation (Robbins & Judge, 2008), size was another category measured in the current study.

Autonomy and job performance

Autonomy can be defined as the degree to which a job provides employees with freedom, independence, and discretion to plan out and execute their work (Ganster, 1989; Hackman & Oldham, 1975). Several theories of work design indicate that providing people with autonomy boosts both individual and organisational level outcomes, including job satisfaction, performance, and productivity. For instance, the job characteristics model (Hackman & Lawler, 1971), the sociotechnical systems approach (e.g., Emery & Trist, 1960), action theory (Frese & Zapf, 1994; Hacker, Skell, & Straub, 1968), and the demands-control model (Karasek, 1979), all include this variable (autonomy) as important predictor of performance at work. In their review of the literature, Terry and Jimmieson (1999) noted that there is consistent evidence to show that high levels of worker autonomy are associated with a number of organisational outcomes including productivity, employee well-being, and job performance. Similarly, longitudinal research conducted by Bond and Bunce (2003) indicated that increasing autonomy could improve people's mental health, absenteeism levels, and self-rated performance.

Entrepreneurial personality and job performance

The impact of META scores (i.e. opportunistic, innovative, and visionary tendencies) on entrepreneurial activity and success, as well as creative achievements, has been demonstrated in previous studies (see Studies 3 to 8). However, how these entrepreneurial tendencies relate to the more generic aspects of job performance, has not been examined. Despite this, there is reason to believe that entrepreneurial personality should also predict more traditional aspects of job performance. Certainly,

it could be argued that the tendency and ability to come up with new solutions to problems (Creativity), to spot gaps in markets (Opportunism), and proactively pursue opportunities (Proactivity) to create value (Vision), would be beneficial for performance more generally – not only in entrepreneurship. The correlations found between META and corporate entrepreneurship in previous studies (see Studies 3-8) would indeed support this notion. The current study is the first to investigate this assertion empirically.

Organisational structure and entrepreneurial potential

A number of authors have also hypothesised about the influence of organisational characteristics such as structure and autonomy on entrepreneurial potential in the workplace. For instance, Hornsby, Kuratko & Zahra (2002) suggested that managers can enable employees to engage in entrepreneurial activities by making the organisation's structure less resistant to change. Similarly, research by Kim and Lee (2006) indicated that high levels of formalisation and centralisation in the organisation can limit knowledge-sharing capabilities – an important factor for entrepreneurial activity between employees (Harper, 2008). Furthermore, Gupta, Macmillan, and Surie (2004) argue that managing entrepreneurial potential involves moving away from the focus on control, planning and administration, which introduces rigidity in the workforce. They argue that the decentralisation of formal practices (i.e. empowerment) result in value being created from an increase in entrepreneurial behaviours. Support for this assertion comes from research that looks at structural changes, including decentralisation of processes, on innovation in organisations (Fernald, Solomon, & Tarabishy, 2005; Ryan & Tipu; 2013).

Work autonomy and entrepreneurial potential

The literature concerned with studying the personality of entrepreneurs indicates that a core trait of these individuals is need for autonomy (Rauch & Frese, 2007). It is reasonable to assume therefore that providing more autonomy to entrepreneurial individuals will increase their performance because of this alignment between traits and work environments (Chamorro-Premuzic, 2011). In line, Mumford, Scott, Gaddis and Strange (2002) suggest that a way to increase the performance of entrepreneurial people is to grant them autonomy to explore individual initiatives, thereby capitalising on their creative and opportunistic insights. Support for this notion comes from research showing that autonomy in completion of tasks is key to remaining explorative and exploitative (Ensley, 2007; Judge, Fryxell & Dooley, 1997). Furthermore, Burgess (2013) shows that a lack of autonomy (i.e. decision-making power) may have an inhibitory effect on flexibility, learning, and acquiring necessary resources to implement entrepreneurial ideas.

Locus of control

In addition to META, a relevant personality trait included in the current study was locus of control. Locus of control describes the extent to which people believe that they can successfully influence events in their lives. Those with an internal locus of control perceive that they can manage situations with their decisions and behaviours, whilst those with an external locus of control believe that what happens to them is beyond their influence: a result of luck or fate (Rotter, 1966). Given that a core element of locus of control is autonomy (i.e. control) over outcomes, it was deemed important to investigate the link between this trait, organisational structure, and autonomy, in the prediction of job performance. Given that locus of control has been heavily researched in studies of both job performance (Jex, 1998) and entrepreneurship (Rauch & Frese, 2007), it was deemed important to gauge the

incremental validity of META in predicting job performance, beyond locus of control. Although the incremental validity of META beyond CSE, a sub facet of which is locus of control, was demonstrated in Study 4, it would be desirable to show that META predicts performance also beyond a measure that specifically assesses locus of control.

Based on the arguments above, therefore, it is hypothesised that:

H1: Organisational structure will be significantly correlated with to work autonomy, META, locus of control, and job performance

H2: Work autonomy will be significantly and positively correlated with META, locus of control, and job performance

H3: META will significantly and positively correlated with locus of control and job performance

H4: Locus of control will be significantly and positively correlated with job performance

Method

Participants

The present study used 181 participants (74 male and 107 female), all of whom were in full-time employment. The average age of participants was in the category of 25 to 32 years[26] with a range of 18 to 61 years. The respondents came from a large cross-section of organisations in a range of sectors including finance, security, aviation, telecommunication, insurance and retail. The job roles of these incumbents consisted of 127 employees, 25 managers, 15 line-managers, 6 business-partners, 10 directors, and 4 CEOs. Most participants were from the UK although a number of other

[26] The age category the participant belonged to, rather than his or her specific age, was prompted in the survey.

nationalities were included in the sample. Of the 273 surveys sent out to potential participants, a total of 181 responses were received and then tabulated.

Measures

Measure of Entrepreneurial Tendencies and Abilities. The 61-item META was retained for the current study. Cronbach's alpha for the META scales in the present study were acceptable.

Work Locus of Control Scale (WLCS: Spector, 1988)

The 16-item Work Locus of Control Scale was used to measure the participant's perceptions of their locus of control at work. The measure has been found to relate to several organisational variables, including job performance and satisfaction (Spector, 1988). Participants were asked to rate their locus of control at work along the 6-point Likert scale (1 = "disagree very much"; 6 = "agree very much"). Sample items from the questionnaire include: "A job is what you make of it" and "Promotions are given to employees who perform well on the job".

Organisation Structure Questionnaire (Pugh, Hickson, Hinings, & Turner, 1969).

This is an 11-item questionnaire assessing 3 dimensions of organisational structure. The first dimension is concerned with the size of the organisation, measured in number of employees (10-10,000+). The second dimensions assess the formalisation of the organisation along a 5-point Likert scale (1 = "very inaccurate"; 5= "very accurate"), with example items including "There is a complete written job description for most jobs in my organisation". The third dimension assesses the centralisation procedures within the organisation with items including "How many decisions are made at lower levels of your organisation?".

Work Design Questionnaire (WDQ: Morgeson & Humphrey, 2006)

This is a 9-item questionnaire measuring 3 dimensions of work autonomy. The 3 dimensions are work-scheduling (e.g. "The job allows me to make my own decisions about how to schedule my work"), decision-making (e.g. "The job allows me to make a lot of decisions on my own"), and work-methods (e.g. "The job allows me to decide on my own how to go about doing my work"). Responses are rated along a 5-point Likert scale (1 = "strongly disagree"; 5 = "strongly agree").

Job Performance (Johari, Mit & Yahya, 2009)

This is a 25-item self-report questionnaire, which measures two components of job performance, namely, task (e.g. "I perform tasks that are expected of me") and contextual performance (e.g. "I help others who have problems with their work"). Participants were asked to give responses about their performance at work along a 7-point Likert scale (1 = "strongly disagree"; 7 = "strongly agree").

Procedure

Data was collected from employees from a wide cross-section of organisations, using an online survey. The survey began with 18 demographic followed by items that measured META, the organisation's structure, job performance outcomes, locus of control, and autonomy. Participants received a short debriefing on the research aims and reasons for studying the themes upon completion of the survey. Ethical approval for the research was obtained through Goldsmiths, University of London.

Results

Descriptive statistics, internal consistencies, and bivariate correlations for all measures are shown in Table 10. There were no scores out of range and no missing cases on any of the personality measures. The distribution of all variables was normal and there were no multivariate outliers in the dataset. All scales that were used in the

study demonstrated good internal consistencies (Cronbach's alpha values above .7 are considered appropriate; George & Mallery, 2003).

As expected, there was a significant positive correlation between the META dimensions and task, as well as contextual, performance. All META factors except Proactivity also significantly and positively correlated with all work autonomy variables, namely work scheduling, decision making and work methods. Finally, META correlated with locus of control as well as age. In addition, there are significant correlations between all work autonomy variables and task as well as contextual performance. Locus of control correlated with all variables in the model, with the exception of organizational size. Moreover, all organisation structure variables correlated with task performance, and two out of the three organisation structure variables correlated with all work autonomy variables. Given these results, the relation between the variables in the model was further tested using structural equation modeling.

Table 10. *Descriptive Statistics, Cronbach's Alpha Coefficients and Bivariate Pearson Correlation Coefficients for All Measures Employed in the Study*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	M	SD	α
1. O																34.15	6.87	.77
2. P	.65**															55.46	8.45	.76
3. C	.52**	.61**														54.02	9.01	.83
4. V	.63**	.57**	.60**													191.11	10.02	.86
5. TP	.23**	.23**	.22**	.31**												85.16	13.99	.71
6. CP	.31**	.31**	.38**	.41**	.71**											49.11	10.77	.95
7. WS	.18**	.10	.16*	.16*	.39**	.41**										11.17	3.56	.93
8. DM	.16*	.08	.28**	.20*	.39**	.43**	.72**									11.23	3.32	.94
9. WM	.17*	.08	.25**	.22**	.41**	.43**	.80**	.85**								11.12	3.35	.91
10. LC	.26**	.29**	.34**	.34**	.55**	.51**	.42**	.40**	.45**							67.64	10.60	.95
11. F	.02	.03	.06	.14	.21**	.16*	.04	.09	.12	.20**						18.00	6.09	.90
12. C	-.11	-.07	-.11	-.06	-.17*	-.12	-.24**	-.31**	-.23**	.25**	-.07					5.53	1.41	.71
13. Size	.04	.07	.09	.00	-.19**	-.14	-.19**	-.27**	-.20**	-.09	.31**	-.12				2.83	2.51	.77

14. Age	-.18*	-.14	-.16*	-.26**	.19*	.12	.16*	.08	.16*	.09	.16*	.09	.07				
15. Sex	-.03	.01	-.07	.07	.27**	.15*	.14	.09	.10	.14	.11	.02	-.09	.01		1.59	0.49

Note: P = Proactivity, V = Vision, C = Creativity, O = Opportunism, TP = Task Performance, CP = Context Performance, WS = Work Scheduling, DM = Decision Making, WM = Work Methods, F = Formalisation, C = Centralisation, LC = Locus of Control. **Correlation is significant at .01 level (2-tailed). * Correlation significant at .05 level (2-tailed).

Structural Equation Modeling (SEM)

Structural equation modeling was carried out using AMOS 5.0 (Arbuckle, 2003). Given the inter-correlations between the performance measures and between the META facets a latent model was tested, where all four META facets were loaded onto a latent META total factor, the two performance measures were loaded onto a latent performance factor, and all work autonomy measures were loaded onto a latent work autonomy factor. In this model, age, gender, and organisational structure were specified as exogenous variables, work autonomy, locus of control and META as both exogenous and endogenous, that is mediators, and job performance as endogenous. The choice of ordering is rarely straightforward in SEM (Kenny, 1979; Pearl, 2000); accordingly the directionality of the model is conceptual rather than causal, considering that gender, age, organisational structure and work autonomy, are arguably less likely to be affected by the psychological and performance variables in the model, namely, locus of control, META, and performance.

The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989; tests the hypothesis that an unconstrained model fits the covariance or correlation matrix as well as the given model; ideally values should not be significant); the goodness of fit index (*GFI*; Tanaka & Huba, 1985; a measure of fitness, where values close to 1 are acceptable); the comparative fit index (*CFI*; compares the fit of a target

model to the fit of an independent model - a model in which the variables are assumed to be uncorrelated; values greater than .95 indicate a very good fit; Bentler, 1990); and the root mean square residual (*RMSEA*; Browne & Cudeck, 1993; values of .08 or below indicate reasonable fit for the model).

In the hypothesised model, saturated paths from the exogenous variables to the mediators and the DV (i.e. performance factor), and from the mediators to the DV were added (paths were only added if correlations between the variables were found to be significant in the correlational analysis). This model, which included 10 paths between exogenous and endogenous variables, did not fit the data well: χ^2 = (83 *df*, *p* < .01) 185.65, *GFI* = .88, *CFI* = .90, *RMSEA* = .08. Accordingly, steps were taken to identify misspecifications. Modification indices, expected parameter change and standardized residuals were considered to evaluate whether paths should be deleted or added to the model. Only paths that made substantive sense in predicting outcomes were added to the model, and fit statistics were investigated after each addition and deletion.

Based on the modification indices and expected parameter change, 5 direct paths were added to the model; these were from the three organisational structure dimensions to job performance, age to job performance, gender to task performance, and size to decision making. Moreover, a correlational path between locus of control and META was also included. These paths were added one at a time, and all other path coefficients and fit statistics were examined after each addition to determine its effect on these values. In addition, several paths were found to have non-significant values and were subsequently removed from the model one parameter at a time, starting with the lowest t-value. The modified model, showed adequate fit to the data: χ^2 = (79 *df*, *p* < .01) 139.38, *GFI* = .92, *CFI* = .95, *RMSEA* = .06. AMOS-squared

multiple correlations indicated that the relevant predictors accounted for 50% of variance in job performance. Examining indirect effects, it was found that META and locus of control significantly mediated the relationship between work autonomy and performance (the effect size was .06, p = .04).

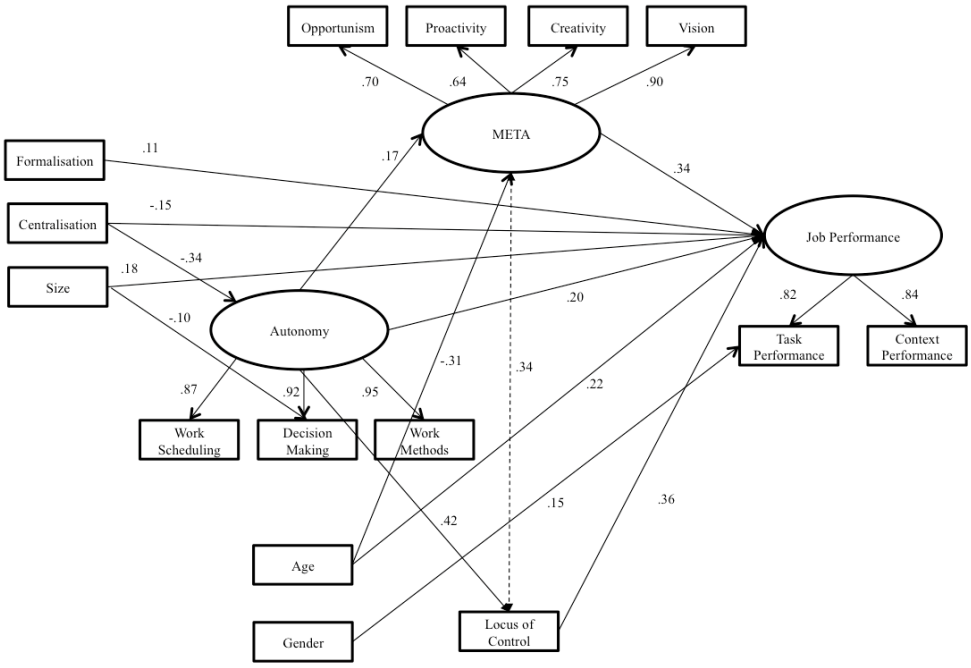

Figure 15. The modified model. The dashed path indicates a correlation.

Discussion

The aim of the current study was to examine the association between organisational structure and work autonomy and entrepreneurial personality, locus of control, and performance. The results partially supported the hypotheses of the study. As expected (H1), components of organisational structure were significantly related to work autonomy and job performance variables. Consistent with the literature, centralisation in, and size of, organisations is negatively related to work autonomy (Robbins & Judge, 2008; Engel, 1970; Kalleberg, & Van Buren, 1996). Centralisation, in addition also inversely related to job performance; that is, the more business decisions are

centralised around one person or unit, the lower the performance of employees. This is consistent with literature on engagement, which indicates that lower empowerment is related to lower engagement, and in turn, job performance (Christian, Garza & Slaughter, 2011; Salanova, Agut & Peiró, 2005)). Interestingly, formalisation and size were found to be positively related to job performance. That is, the more formalised and clear the rules are and the bigger the organisation is, the better people perform at work. It seems, therefore that whilst lack of empowerment may harm performance, providing clear rules and guidelines may not; in fact, the latter may actually benefit employee performance. Contrary to expectations, organisational structure was not related to individual level traits, only partially supporting H1.

As hypothesised in a number of theories of work design (Robbins & Judge, 2008), the current results demonstrated the importance of work autonomy for individual level behaviours (i.e. entrepreneurial personality and locus of control), including job performance. In particular, the results indicate that higher autonomy at work, enables people to enact their entrepreneurial tendencies, have higher sense of empowerment (locus of control), and in turn perform better. Although this is in line with theoretical work suggesting that autonomy is a key factor in facilitating corporate entrepreneurship and innovation within organisations (Robbins & Judge, 2008, Lee & Lim, 2009; Covin & Wales, 2012), this is the first study to support this assertion empirically. Given that autonomy had a direct influence on work performance further demonstrates the importance of this variable for organizational outcomes (Bond & Bunce, 2003).

As expected, META (entrepreneurial personality) also significantly and positively influenced job performance. Given that there is a conceptual overlap between entrepreneurial achievements within organisations and job performance, this

finding was expected. Nevertheless, this relationship demonstrates that entrepreneurial employees may be desirable for organisations, not only in terms of boosting innovation and entrepreneurial activity, but also traditional work performance and productivity. In addition, given that more than 50% of employees in the current sample came from organisations with more than 1,000 incumbents, demonstrates that the benefit of entrepreneurial potential is not restricted to small organisations, or start-ups.

In line with previous research (Peterson & Albrecht, 1996), locus of control was also significantly and positively related to job performance (confirming H4). Perhaps unsurprisingly, the influence of Autonomy on locus of control was greater than on entrepreneurial potential, given that an inherent element of this trait is sense of control over things and events (i.e. autonomy). Also confirming the expectations of this study, there was a significant and positive correlation between locus of control and META. This is in line with entrepreneurship research which suggests that locus of control is a key trait of entrepreneurial success (Rauch & Frese, 2007). Of note is the observation that META demonstrates incremental validity in the prediction of job performance even when locus of control is taken into account. The fact that the weight of the paths between META and job performance and locus of control and job performance are equal, attests to the usefulness of META (in addition to locus of control) in these settings.

Limitations and future research

One limitation to this study was the use of self-report in assessing job performance. It would be desirable for future research to include performance ratings also from managers and peers (and subordinates), or objective performance indicators (e.g. productivity, sales, ROI etc.). At the same time, research indicates that self-

ratings are not necessarily less valid indicators of performance than objective criteria (Rauch et al., 2009), suggesting that this may not constitute a major limitation for the results. Future research should also investigate the incremental validity of the META and locus of control, over and above the Big Five personality traits, in the prediction of job performance. Although META has demonstrated incremental validity over the Big Five in predicting entrepreneurial achievements (see Study 2), future research needs to confirm that this is also the case in relation to more traditional job performance measures.

Another avenue for research is to conduct longitudinal research in this field. It would be particularly interesting to investigate the impact of changes in work autonomy (and organisational structure), on META scores and locus of control in the long term; this would be useful to corroborate the directionality (or causality) of the current results. One option would be to conduct a two-wave quasi-experimental designs (e.g. Bond & Bunce, 2008), to see whether changes in autonomy at time 1 predict changes in entrepreneurial tendencies and locus of control in time 2, and how this relates to improvements in performance metrics. Whilst it is reasonable to expect that organisation level factors such as structure and autonomy are less malleable than entrepreneurial potential and locus of control, the reverse argument is also possible. That is, it could be that entrepreneurial individuals and those with high locus of control are able to 'manipulate' their work environment, which enables them to have more control over things; alternatively they may be biased to perceive a sense of control because of these dispositional traits (Siu, Spector, Cooper, Lu, Yu, 2002).

Implications

The current study has a number of practical implications. First, whilst the influence of organisational variables such as structure and work autonomy on job

performance are well established (Robbins & Judge, 2008; Engel, 1970, Kalleberg, & Van Buren, 1996), the current study suggest that these variables may have an important impact also on the entrepreneurial tendencies and performance of employees. For managers, this means that granting entrepreneurial people the autonomy to plan their own schedules, organise the order in which things are done, and empower them to take decisions, may be a lucrative way to increase their performance at work. As Mumford et al. (2002) suggest, allowing entrepreneurial individuals to explore and take initiative is a great way to capitalise on their creative and opportunistic insights. Of course, the results do not indicate h*ow much* autonomy should be granted to such individuals, or how entrepreneurial a person should be to be granted with 'extra levels' of autonomy. In this sense, it would be interesting to explore nonlinear and interaction effects between work autonomy and entrepreneurial potential (and locus of control).

A second implication of the results is that recruiting and hiring people with higher entrepreneurial potential may be beneficial not only for corporate entrepreneurship and innovation, but also for more traditional job performance (i.e. task and contextual performance). That is, entrepreneurial individuals may be valuable assets for organisations because they both perform better and innovate more than individuals lower on this potential. Thus recruiting and selecting such individuals, as well as individuals higher on locus of control, may be a fruitful strategy for organisational productivity. Likewise, it may be desirable to develop and train entrepreneurial potential of current employees in order to improve the innovativeness and performance of the workforce.

3.8. Study 10: Engage or Lose: Exploring the Associations between Entrepreneurial Potential, Employee Engagement, and Intentions to Quit a Job

Abstract

Given the rise in employee mobility in the current business environment, it is of paramount interest to understand why certain high potential employees choose to leave one organisation for another, or to venture out on their own. The literature on why entrepreneurial individuals within organisations leave, is particularly scarce. The present study attempted to fill this gap by investigating associations among individual differences in entrepreneurial personality, as assessed by META, employee engagement, start-up plans, and intentions to quit one's job, in a sample of 224 currently-employed individuals. Results showed that META scores were positively related to engagement, but also to start-up plans. Engagement was negatively related to intentions to quit, whereas start-up plans were positively related to intentions to quit. Inconsistent mediating effects of engagement and start-up plans were investigated between META and intentions to quit using structural equation modeling. The results indicate that entrepreneurial employees are likely to be more engaged at work but consider starting their own business as an attractive career option. Implications are discussed in terms of the importance of engaging entrepreneurial employees in order to retain them within organisations.

A number of authors have suggested that entrepreneurial employees have a leading role in the creation and development of new business products and services, and therefore a key element in the growth and progress of both large and small/medium-sized enterprises (c.f. Anoncic & Hisrich, 2003). Indeed, this notion is supported by the current research, which shows that more entrepreneurial individuals achieve more success in several domains, including corporate entrepreneurship (Study 2 to 8), innovation output (Study 8), and job performance (Study 9). On the other hand, there is good reason to believe that more entrepreneurial employees are also more likely to leave, or "quit" their current organisation than less entrepreneurial incumbents (Cromie & Hayes, 1991). Accordingly, the entrepreneurial personality may be a 'double-edged sword' for organisations. Inevitably, both internal and external forces are likely to play a role in an individual's decision to remain in or "quit" the organisation. It is of critical importance, therefore, to understand the factors that positively or negatively influence quit intentions among these entrepreneurial employees. However, very little research has actually investigated this. The aim of the current study, therefore, was to take an initial step in this direction, and fill arguably a key gap in the literature. Specifically, it examines two factors that may mediate the relationship between entrepreneurial potential and intentions to quit, namely, employee engagement and intentions to start a business.

Predictors of intentions to quit: Engagement

Past research on employee turnover has shown that both situational and personal variables are related to quit intentions and behaviour. Situational variables include organisational leadership (Mendes & Stander, 2011), healthy versus unhealthy work environments (Snyder & Lopez, 2002), and autonomy (Kidd & Green, 2006). Personal factors that impact on quit intentions and behavior include employee Conscientiousness (Barrick & Mount, 1996), Negative Affectivity (Thoresen, Kaplan & Barsky, 2003), Risk-taking (Chow, Ng, & Gong, 2012), Internal Locus of Control (Blau, 2011) and Core Self-Evaluations (Harris, Harvey, & Kacmar, 2009).

In more recent years, however, the literature on employee turnover has paid particular attention to the concept of employee engagement. Indeed, an accumulating number of studies in the past 10 years have demonstrated that employee engagement is one of the most important antecedents of organisational turnover (Harter, Schmidt, & Hayes, 2002; Roberts & Davenport, 2002; Simpson, 2009). Schaufeli and colleagues (2002, p.74) defined engagement as a "positive, fulfilling, work-related state of mind" that can be viewed as a combination of vigor, dedication and absorption; thus, workers who are more engaged are more energetic at work, more dedicated to their job, and absorbed with the tasks of the job. Given this definition, it is unsurprising to find that employees who are more engaged at work are also more likely to remain in their current organisation than are their less engaged colleagues (Harter et al., 2002).

Research examining the antecedents of employee engagement shows that both situational and personal factors can have an impact on engagement levels at work (Saks, 2006). Situational factors influencing employee engagement include job resources, such as autonomy, employee support, and appropriate feedback, whereas personal factors include cognitive resources such as self-efficacy, optimism (Bakker

& Demerouti, 2007) as well as broad personality traits such as the Big Five. With regards to personality traits, employee engagement has been strongly and systematically associated with the Big Five personality factors (Costa & McCrae, 1992a). In particular, Extraversion has been linked to experiencing higher vigor at work (Brief & Weiss, 2002), and a combination of low Neuroticism and high Extraversion has been shown to reliably distinguish between engaged and non-engaged employees (Langelaan, Bakker, Van Doornen, & Schaufeli, 2006).

Given that engagement is a consequence of personal factors such as personality traits and cognitive resources, and an antecedent of organisational outcomes such as employee turnover (Schaufeli & Bakker, 2004; Simpson, 2009), it can be considered to be a mediator between personal antecedents and organisational consequences (Saks, 2006).

Predictors of intentions to quit: Entrepreneurial Personality

Studies 2 to 9 in the current research have shown that entrepreneurial personality (as assessed by META) is positively related to both entrepreneurial and non-entrepreneurial achievements within organisations, including salary level, innovation activity, corporate entrepreneurship, and job performance. This research also shows that entrepreneurial potential is associated to the number of businesses an employee actually starts. Consistent with this latter finding, past research shows that employees with higher entrepreneurial orientation have higher intentions to start their own business, compared to their less entrepreneurial colleagues (Global Entrepreneurship Monitor Report, Bosma, Wennekers, & Amoros, 2011; Cohen & Levin, 1989; Lee, Wong, Foo & Leung, 2011). Given that starting one's own business often (even if not always) involves quitting one's job, it is reasonable to expect that entrepreneurial potential will be significantly related to intentions to quit one's current

organisation. Consequently, start-up plans are likely to mediate the relationship between META and intentions to quit.

On the other hand, other research suggest that having higher entrepreneurial potential, paradoxically, may positively contribute to work engagement and consequently *lower* persons' intentions to quit their current job. For example, individuals with high META scores were found to have a more positive and optimistic mindset, be more proactive at work, and have a higher self-regard (see Study 3 and 4). In line, research has found that employees who are self-efficacious, and have a positive and optimistic mindset are "most likely to experience high levels of work engagement" (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009; p.241). Indeed, Study 8 confirmed this hypothesis by demonstrating a direct (and positive) link between META and engagement. Thus, there is both theoretical and empirical reason to expect a positive relationship between entrepreneurial personality and employee engagement. This link, in turn, is likely to contribute to a negative relationship between entrepreneurial personality and intentions to quit.

In line with the above arguments and previous research, therefore, one may expect conflicting associations between META and intentions to quit. On the one hand, higher META scores are expected to correlate with higher levels of engagement, which, in its turn, is predicted to correlate negatively with intentions to quit. On the other hand, META is expected to correlate positively with an individual's start-up plans, which are expected to correlate with higher intentions to quit. Therefore, one may expect both negative and positive links between META and intentions to quit, with the negative link mediated by engagement, and the positive link mediated by start-up plans. However, there is no previous research examining these assertions. Accordingly, the present study intended to empirically examine the

relationship between individual differences in entrepreneurial personality (i.e. META), employee engagement, start-up plans, and its influence on intentions to quit one's job. Based on the arguments above, it is hypothesised that:

H1: META will be significantly and positively correlated with engagement;

H2: Engagement will be significantly and negatively correlated with intentions to quit;

H3: META will be significantly and positively correlated with start-up plans;

H4: Start-up plans will be significantly and positively correlated with intentions to quit.

Method

Participants

In total, 224 participants (109 male, 115 female) took part in the study. The mean age was 35.9 (SD = 9.1), ranging from 20 to 64 years. Participants were mostly from the UK (75.4%), or other European countries (14.3%). 85.7% of the participants were employed full-time (the rest were employed part-time), with 42.4% of them in employee roles, and 53.1% in managerial roles. Participants came from wide range of industries including Businesses (21.4%), Technology (17%), Banking (10%), and Creative Industry (7.1%). The mean income of the sample ranged from £40,000 to £60,000 p/a before tax deduction.

Measures

Utrecht Work Engagement Scale – Short Version (UWES; Schaufeli, Bakker, Salanova, 2006). This 9 item self-report scale assesses three aspects of work engagement: Vigor (3 items; e.g., "At work, I feel full of energy"), Dedication (3 items; e.g. "I am enthusiastic about my job"), and Absorption (3 items; e.g. "I feel happy when I am working intensely"). Participants responded using 7-point Likert

scale ranging from 0 (“Never had this feeling”) to 6 (“Always”). The scale is an acceptable shortened version of UWES-17, which has shown good reliability and factorial validity (Schaufeli, Martínez, Marques-Pinto, Salanova, & Bakker, 2002), as well as cross-cultural validity (Shimazu, Schaufeli, Kosugi et al., 2008).

Measure of Entrepreneurial Tendencies and Abilities. The 61-item META was retained for the current study. The 4 scales showed good reliabilities (see Table 11).

Start-up plans. This scale comprised 3 items that measured the extent to which participants were determined to create a firm in future, how much effort they would make to start and run their own business, and whether entrepreneurship was their professional goal. Participants used 5-point Likert scale to respond to the statements, ranging from 1 (“Total disagreement”) to 5 (“Total agreement”). Similar items have been used in previous research to measure entrepreneurial intentions (e.g., Linan & Chen, 2009).

Intentions to quit. Intentions to quit the current workplace were measured by 3-item scale, adapted from previous research (Bozeman & Perrewe, 2001; Poon, 2004;). Items included “I feel like quitting my job”, “I have been booking for another job recently” and “I am reluctant to change my job”. Participants responded using 5-point Likert scale, ranging from “Total disagreement”(1) to “Total agreement”(5). The 3-item scales to measure intentions to quit have shown good reliability and validity in the past (e.g., Poon, 2004).

Procedure

Participants completed the survey on-line, through a website advertised on various social-media websites. Participants first completed the work engagement scale, followed by start-up plans and intentions to quit scales; then they completed the Measure of Entrepreneurial Tendencies and Abilities. On average, the survey took 10-

15 minutes to complete. Ethical approval for the research was obtained through University College London.

Results

Descriptive statistics, internal consistencies, and bivariate correlations for all measures are shown in Table 11. Data screening showed that there were no scores out of range and no missing cases on any of the personality measures. The distribution of all variables was normal and there were no multivariate outliers in the dataset. Variables were not multi-collinear with one another and no singularity was found. All variables appeared to be linear and homoscedasticity of variance was assumed (Tabachnick & Fidell, 2005). All scales that were used in the study demonstrated good internal consistencies (Cronbach's alpha values above 0.7 are considered appropriate; George & Mallery, 2003).

Table 11. *Descriptive Statistics, Cronbach's Alpha Coefficients and Bivariate Pearson Correlation Coefficients for All Measures Employed in the Study*

	M	SD	α	2	3	4	5	6	7	8	9
1. Opportunism	35	7.3	.87	.73**	.65**	.60**	.17*	.09	.15*	.58**	.10
2. Proactivity	57	8.1	.77	-	.54**	.61**	.29**	.22**	.20**	.40**	.01
3. Creativity	56	8.3	.84		-	.55**	.13	.09	.14*	.42**	.10
4. Vision	129	7.99	.81			-	.31**	.25**	.36**	.36**	-.02
5. Vigor	3.5	1.2	.84				-	.85**	.67**	-.03	-.51**
6. Dedication	3.9	1.3	.90					-	.73**	-.17*	-.58**
7. Absorption	4.0	1.04	.68						-	-.04	-.44**
8. Start-up plans	2.7	1.2	.94							-	.29**

9. Intentions to quit	2.9	1.1	.73	-

Note: ** = Correlation is significant at the 0.01 level (2-tailed). * = Correlation is significant at the 0.05 level (2-tailed).

The correlation between META and intentions to quit was non-significant. There was a significant positive correlation between META and engagement. The correlation between engagement and intentions to quit was significant and negative. META also significantly and positively correlated with start-up plans. Finally, start-up plans correlated significantly and positively with intentions to quit. Although, for *complete mediation*, there should be a significant correlation between META and intentions to quit (Baron & Kenny, 1986), a test of *inconsistent mediation* (a mediation when at least one mediated effect has a different sign than the other mediated or direct effect in the model, resulting in a non-significant relationship between the initial and the outcome variable; MacKinnon, Fairchild, & Fritz, 2007) may still be tested. Accordingly, this was done using structural equation modeling.

Structural Equation Modeling (SEM)

Structural equation modeling was carried out using AMOS 5.0 (Arbuckle, 2003). The choice of ordering is rarely straightforward in SEM (Davis, 1985; Kenny, 1979; Pearl, 2000), and a predictive rather than causal model was tested, primarily to provide a general picture of the relationship between target variables. The nine observed variables included in the hypothesised model (META dimensions, engagement factors, start-up plans and intentions to quit) were modelled as shown in Figure 16. META and engagement were modelled as latent variables (given intercorrelations between META sub-dimensions and engagement sub-dimensions), whereas start-up plans and intentions to quit were treated as observed variables. Finally, a correlational path between engagement and start-up plans was specified.

The model's goodness of fit was assessed via the χ^2 statistic (Bollen, 1989; tests the hypothesis that an unconstrained model fits the covariance or correlation matrix as well as the given model; ideally values should not be significant); the goodness of fit index (*GFI*; Tanaka & Huba, 1985; a measure of fitness, where values close to 1 are acceptable); the comparative fit index (*CFI*; compares the fit of a target model to the fit of an independent model - a model in which the variables are assumed to be uncorrelated; values greater than .95 indicate a very good fit; Bentler, 1990); and the root mean square residual (*RMSEA*; Browne & Cudeck, 1993; values of .08 or below indicate reasonable fit for the model).

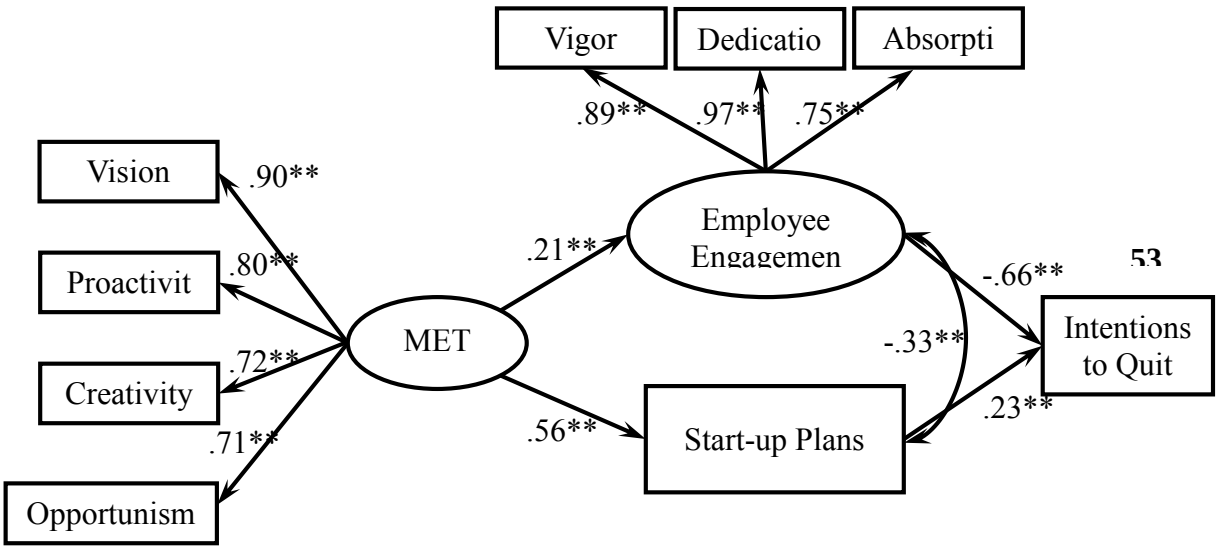

Figure 16. The model of the relations between META, engagement, start-up plans, and intentions to quit. All paths coefficients (**) are standardised and significant at the p = .01 level. Total variance in intentions to quit accounted for by the relevant predictors is indicated in bold.

The hypothesised model, which included 5 paths between exogenous and endogenous variables, fit the data well: χ^2 = (60 *df*, $p < .01$) 116.43, *GFI* = .93, *CFI* = .97, *RMSEA* = .065 (.05-.08). AMOS-squared multiple correlations indicated that the

relevant predictors accounted for 53% of the variance in intentions to quit, 32% of start-up plans, and 4% of engagement.

Discussion

The purpose of the present study was to empirically examine the factors that positively or negatively influence intentions to quit among entrepreneurial employees. This was done by investigating the relationship between entrepreneurial personality, employee engagement, start-up plans, and intentions to quit current employment. The results generally supported the hypotheses of the study.

As predicted, an inconsistent mediation was found, where both positive and negative links between META and intentions to quit were mediated by engagement and start-up plans. In line with the prediction (H2), and consistent with previous research (Saks, 2006), engagement was found to be a strong negative predictor of intentions to quit, suggesting that engaged employees also reflect less about leaving their current employment. Also in line with our predictions (H1), META was found to be a significant predictor of employee engagement, indicating that individuals with higher entrepreneurial personality are also more engaged at their current workplace. This corroborates the results from Study 8, and is in line with the assumption that positive, optimistic and self-efficacious employees tend to be more entrepreneurial *and* more engaged at work (Xanthapoulou et al., 2009).

Consistent with the third hypothesis of the study (H3), participants with higher META scores reported having significantly higher start-up plans. This finding indicates that opportunistic, proactive, creative, and visionary dispositions (as assessed by META) fuel employees' desires to venture out and start their own business. Higher META scores indicate having higher beliefs about one's potential (Study 4), which may facilitate one's start-up plans. This is in line with Scherer,

Adams, Carley and Wiebe (1989) assertions, which emphasise the importance of perceived self-efficacy in self-employment planning. Finally, support was also obtained for the last hypothesis (H4) of the study; that is, start-up plans positively predicted intentions to quit. In case of currently employed individuals, desire to be self-employed implies quitting current employment, hence the correlation between these two variables.

Taken together, the results of the current study indicate that the entrepreneurial personality can be a double-edged sword within organisations. First, entrepreneurial personality has a direct influence on positive performance outcomes within organisations, such as innovation, corporate entrepreneurship, and job performance (see Study 3 to 9). Second, more entrepreneurial employees tend to be 'naturally' more energetic, dedicated, and absorbed at work, that is, more engaged. Thus, the entrepreneurial personality is likely to benefit organisations also indirectly, because higher engagement is related to various organisational outcomes, including, higher productivity, commitment, financial outcomes, and importantly, lower intentions to quit (Schaufeli & Bakker, 2004).

Paradoxically, however, entrepreneurial personality may have a *negative* impact on organisational functioning because it fuels employees' start-up plans, increasing the likelihood of them considering leaving current employment. Thus, it would be critical for organisations to understand and predict the direction of the impact (i.e., whether positive or negative) of entrepreneurial personality on organisational outcomes. The results of the current study show that the negative co-variation between the two mediators is of key importance. Specifically, our findings suggest that entrepreneurial employees who are *more engaged* within organisations will be less likely to want venture out on their own and therefore leave the

organisation. Conversely, those who are less engaged are more likely to reflect about their start up plans and eventually want to leave the organisation. That is, failure to engage entrepreneurial employees may give rise to higher start-up intentions, and in turn augment these employees' intentions to quit the organisation.

Implications

The present research may have important implications for practitioners. First, selecting or promoting entrepreneurial applicants and incumbents can be strategically advantageous given that both engagement and entrepreneurial potential are related to performance (Antoncic & Hisrich, 2003; Schaufeli &Bakker, 2004; Study 8 & 9). Second, engaging entrepreneurially talented employees may be key for sustained innovation and performance within the organisation because these employees are naturally more productive and innovative (as well as engaged). Thus, monitoring and appropriately managing engagement levels, with a particular focus on entrepreneurial employees within the workforce, may be critical for managers both in the short and the long-term. In this respect, it would necessary for future research to investigate the factors that facilitate and harm the engagement levels of entrepreneurial employees.

Finally, the intricate relationship between entrepreneurial personality and engagement suggests that selecting entrepreneurial employees without appropriate management of engagement levels, or the resources to do so, may be unwise. Thus, it may be necessary for organisations to consider current organisational processes and structures that influence engagement levels of the workforce, before focusing on the selection or promotion of entrepreneurial employees.

Limitations and Future Research

One limitation of the present study was the cross-sectional nature of the data. Future research should use longitudinal data in assessing a dynamic factor such as

engagement. This would reveal the causal direction of the relationship between engagement and entrepreneurial intentions, and its relationship to intentions to quit. Second, the current study did not account for external and situational factors that may influence engagement, start-up plans, and intentions to quit. For instance, a factor that may influence start-up plans is involuntary turnover threats (threat of redundancy, relocation, etc.; Barrick, Mount, & Strauss, 2006). It has been shown that occupational choice is not only determined by motivational factors (such as engagement), but also "reality factors" such as unemployment and capital (Shane, 2008); therefore some control over these factors should be exerted in future investigations.

Finally, future research should investigate factors that contribute to engagement (or disengagement) of *entrepreneurial* employees. One such factor could be work autonomy. It has been hypothesised that autonomy, as a non-pecuniary benefit, is important for employees with entrepreneurial tendencies (Hamilton, 2000), because it enables more opportunity-seeking behaviour (Ireland, Hitt, & Sirmon, 2003). Indeed, Study 9 in this research showed that autonomy had a direct influence on entrepreneurial potential, which in turn significantly influenced employee's job performance. Consequently, providing more autonomy for entrepreneurial employees may be a way of not only increasing their performance at work, but also reducing their start-up intentions, and thus keeping them in organisations for longer.

Conclusion

The current study investigated the relationship between entrepreneurial personality, engagement at work, start-up plans and intentions to quit among currently employed individuals. META was a significant positive predictor of engagement at work, and being engaged at work predicted having lower intentions to quit. At the

same time, META positively predicted start-up plans, which in turn augmented intentions to quit current employment. As a consequence, an inconsistent mediation was observed between META and intentions to quit. These results reflect a paradoxical, yet intriguing nature of entrepreneurial employees – a workforce which can be likened to a double-edged sword. Importantly the current study emphasises the need to, and benefit of, appropriately managing and promoting such potential – a moderate risk, high return strategy, which may be critical for innovation and growth of organisations.

Chapter 4: General discussion

4.1. Summary of findings

The aim of this thesis was to investigate individual differences in entrepreneurial personality and its relationship to performance criteria. To this end, an alternative framework for investigating this construct was presented. The framework followed a critical review of the entrepreneurship literature and was aligned with the principles of differential psychology. A new operational definition of entrepreneurship was proposed following a content analysis. This operational definition served as basis for distinguishing between more and less entrepreneurial individuals. In order to empirically investigate individual differences in entrepreneurial personality, a psychometric measure of entrepreneurial tendencies and abilities (META) was developed. The reliability and factor structure of this measure were established, and its construct validity in relation to a multitude of trait measures, as well as performance criteria were investigated. The following sections summarises the results of this research, its limitations, and its practical implications. It concludes by reflecting on future avenues in the field.

The results of this thesis may be summed up in four main points: firstly, a content analysis of the literature (Chapter 1) revealed four core themes to conceptualise entrepreneurship. Consequently, the operational definition of entrepreneurship as business creation was deemed too narrow to provide a comprehensive understanding of this construct. The framework proposed in this thesis

conceptualised entrepreneurship as a set of *activities*, or behaviours. The four themes indicated that the activities (or set of behaviours) comprise (a) the recognition of opportunities, (b) exploitation of opportunities, (c) innovation, and (d) the creation of value. The entrepreneurial personality, in turn, was defined as a person's tendency and ability to engage in these activities and behaviours. Accordingly, those individuals who more often and more capably recognise and exploit opportunities, innovate, and create value, are by definition more entrepreneurial.

Second, a psychometric measure (META) was designed to distinguish between more and less entrepreneurial individuals. META was found to have adequate psychometric properties (Studies 1 & 2) and showed a theoretically meaningful relationship with established personality and ability traits (Chapter 2). Specifically, entrepreneurial individuals were found to be more open to experience and extraverted, confident and emotionally intelligent, somewhat more manipulative and callous, flexible, and interested in business and artistic occupations. On the other hand, entrepreneurial individuals were no more impulsive or aggressive (secondary psychopathy), Machiavellian, intelligent, or creative than their less entrepreneurial counterparts. META demonstrated good concurrent and discriminant validity in relation to the trait measures examined.

Thirdly, META was found to positively and moderately predict entrepreneurial and non-entrepreneurial performance outcomes, over and above (incrementally) several established psychometric tests, assessing both cognitive and non-cognitive traits; these included the Big Five personality traits (Study 1 & 2), Trait Emotional Intelligence (Study 3), Core Self-Evaluations (Study 3), Locus of Control (Study 8), Primary and Secondary Psychopathy (Study 4), Machiavellianism (Study 1), Vocational Interests (Study 5), General Mental Ability (Study 1 & 6), Divergent

Thinking (Study 1), as well as relevant demographic variables. Furthermore, META was consistently found to be the single best predictor of performance outcomes across 9 studies. Beyond entrepreneurial outcomes, META was found to predict creative achievements within arts and sciences (Study 7), task and contextual performance (Study 8), engagement (Study 8 &10), and intentions to quit a current job (Study 10).

In sum, the results of the doctoral thesis provide support for a distinct personality construct, which may be able to explain significant performance differences between individuals. These performance criteria are likely to be of substantial importance for individuals, organisations, and governments alike. The results of this research, therefore, have important theoretical, empirical, and practical implications.

4.2. Implications

Theoretical and Empirical Implications

Firstly, the framework outlined in Chapter 1 makes an important theoretical contribution to the current approach to examining the entrepreneurial personality. Most notable is the theoretical distinction between the personality of entrepreneurs and the entrepreneurial personality. Whilst entrepreneurship researchers widely focus on the former (i.e. establishing the personality differences between business founders and non-business founders), the current thesis suggests that this approach has a number of serious shortcomings. The most important of these is no doubt the pervasive focus on business founders, an occupational group of which most members, on average, are unsuccessful and not very innovative (Shane, 2008). This focus significantly undermines the psychological approach to entrepreneurship because it means that research efforts are aimed at establishing the personality profile of an

unsuccessful group of people, which would hardly be consistent with the concept of the entrepreneurial personality that most people (and researchers) have in mind.

Accordingly, the current thesis proposes a different approach for entrepreneurship research to examining the entrepreneurial personality. This approach is consistent with the theory of individual differences, in that it treats the entrepreneurial personality as other psychological trait construct. Psychological traits are defined as stable patterns in affect, cognition, and behaviour (Chamorro-Premuzic, 2011). Accordingly, it is suggested that the entrepreneurial personality should similarly be understood and studied in the form of stable tendencies in thinking, feeling, and behaving. The content analysis revealed that these are tendencies of spotting and exploiting opportunities, innovating, and creating value. Thus a person who displays these tendencies more often should be, by definition, considered to be more entrepreneurial (i.e. be 'higher' on this trait).

This individual difference approach diverges significantly from the traditional 'trait approach' to entrepreneurship. First, this approach does not put business formation at the heart of entrepreneurship. In theory, a business founder may not be display opportunistic or innovative tendencies, and may not have a desire to create much value. That is, an entrepreneur may or may not be entrepreneurial. Following from this assertion, a non-business founder (e.g. an artist, scientist, or IT specialist) may frequently display such tendencies, and therefore be highly entrepreneurial. Thus, in this theoretical framework, the act of creating a business is neither necessary nor sufficient for a person to be considered entrepreneurial.

Conceptualising the entrepreneurial personality in this way, in turn, would have implications for research activities. Specifically, it would require researchers to adopt new methodologies and designs for studying this construct. First, to understand

whether someone is entrepreneurial, researchers would need to look beyond a person's occupational status or whether or not they are intending to start a business. Nor is it sufficient to simply look at differences between more or less successful business founders. In theory, a business founder may be more successful because of hard work or administrative skills, rather than being opportunistic and innovative. Furthermore, they may still (and are on average more likely to) be less successful and less entrepreneurial than many employed individuals. Thus, one can neither extract entrepreneurial tendencies from success in a start-up.

It is suggested that it is crucial for researchers to instead to look at the personal tendencies and behaviours of individuals, outputs of organisations, and relating these to 'higher order' outcomes like innovation and economic growth. Empirically this would entail assessing personal tendencies through, for instance, psychometric tools like META, or other assessment methods like observations, interviews, and assessment centers. It would entail assessing organisational output such as, for instance, the number of new products and services introduced, new markets explored, new methods implemented etc., and the value of these initiatives (whether in demand or public recognition). This output can then be linked to national and economic variables. This is no doubt a challenging task, but arguably lends itself to a more valid assessment of the link between people, entrepreneurship, and economic progress, and provides a coherent framework for investigating these relationships.

For individual differences researchers, therefore, it is proposed, that development is needed in three research areas: First, there needs to be an agreement on the operational definition of entrepreneurship; this definition should establish the activities that constitute entrepreneurship, beyond starting a business. In the current research, entrepreneurship was defined *and* operationalised as activity relating to the

recognition and exploitations of opportunities, innovation, and creation of value. Whether this operational definition is adopted more widely, however, is not as important as the recognition that development is needed to current definitions. It will therefore be necessary for research to establish a taxonomy of entrepreneurship that specifies *actions, behaviours, and outcomes*, which are relatively distinct to entrepreneurship. This framework can in turn inform measurement of individual differences in tendencies and abilities to engage in those actions and behaviours.

Secondly, researchers are encouraged to pay greater attention to individuals outside the population of business founders. In theory, most (if not all) people are able to recognise an opportunity, exploit an opportunity, innovate, and create value. In other words most people are able engage in entrepreneurial behaviours – not only business founders. Furthermore, individuals will differ in their tendency and ability to engage in these behaviours. That is, some individuals will be more entrepreneurial than others. Researchers are encouraged, therefore, to focus on individual differences in these tendencies and abilities, rather than in occupational status.

Practical Implications

Several guidelines are also suggested for policy makers and practitioners. For policy makers: first, the current concept of entrepreneurs as the engines behind economic progress (Kizner, 1997), has led to a number of initiatives aimed at growing business formation (Hughes 2008). Political leaders and powerful pressure groups are increasingly encouraging more individuals to start their own business (Wooldridge, 2009). Yet, research shows that the average new venture will fail within five years, and even successful founders usually earn 35% less over 10 years than they would, working for others (Shane, 2008). From a practical perspective this means that more people are encouraged to engage in an activity, in which the majority of people

currently fail, in an attempt to increase economic progress. This appears to be an incoherent approach. Logically people cannot fail economically and stimulate economic progress. Indeed, a number of authors have indicated that encouraging more start-ups may actually be bad a social strategy (e.g. Hughes, 2008; Shane, 2008). Correspondingly, decision makers may need to discontinue the 'unconditional' support of business start-ups. Instead there may need to be a careful assessment of individuals' psychological characteristics in order to support business start-ups that are most likely to succeed. Such methods are gradually being adopted in developing countries, and evidence indicates that they can have a substantial impact on the social economy (c.f. Klinger, Khwaja & del Carpio, 2014).

Second, it would be constructive to look beyond new ventures for sources of economic and social progress. For instance, policy makers may potentially benefit more from supporting organisations that have demonstrated a tendency and ability to engage in entrepreneurial activities (whether small, large, new, or old) (Hugh, 2008). Finally, providing vocational guidance, training, and mentoring programmes for young entrepreneurial individuals may also be important in terms of nurturing future entrepreneurial activity. This support may include both skills of creating and running a start-up, as well as of innovating and creating value within established organisations. The key component underlying any governmental initiative, however, should be to first identify those individuals and organisations with higher entrepreneurial potential. As Shane (2008; p. 163) notes, one cannot simply "throw mud against the wall and see what sticks".

For employers: the current research indicates that recruiting entrepreneurial individuals to the organisation may be a significant foundation for competitive advantage. Employees who are more innovative in their work, who perceive and

exploit opportunities using the company's recourses, are also likely to be a strong source of organisational progress and growth. Indeed, evidence presented in this research suggests that entrepreneurial, individuals tend to perform better, innovate more, and be more engaged at work. Thus organisations may benefit from considering the entrepreneurial potential of employees in their recruitment and selection processes. Likewise, training programmes may benefit from focusing on the development of entrepreneurial skills and behaviours.

In general, from an applied perspective, this research indicates that entrepreneurial individuals - be they psychologists, politicians, engineers, managers, or artists[27] - are likely to be an invaluable source of economic and social progress and it is essential to identify, manage, and support them. This thesis indicates that META is a valid tool for identifying these individuals; however, future research should aim to continue this line of work. In this respect, the limitations of this thesis are outlined below.

4.3. Limitations and future outlook

Inevitably, the research compiled in this thesis has some limitations. Most methodological difficulties have been highlighted throughout the studies where appropriate. Of note, however is the limitation of making causal inferences in cross-sectional research designs. That is, the present dissertation only fulfils conditions of concurrent but not of predictive validity, because no longitudinal research was undertaken. Therefore, it might be argued that the associations found between META and performance outcomes cannot be interpreted in terms of causal relationships but merely represent co-occurring events. Furthermore, the number of correlations conducted in the current research also increases the possibility of some of these

[27] Note that this includes business owners but also everyone else who is entrepreneurial.

relationships being significant by chance. Finally, although the use of SEM is assuming a causal model, the same limitations of chance-based correlations and the possibility of reverse causality apply (Tomarken & Waller, 2005). On the other hand, currently unpublished research does indicate that META demonstrates predictive validity in explaining performance variation in the long-term (with a time laps of 9 months; Ahmetoglu, Klinger, Akhtar, & Leutner, in preparation). Furthermore, this research examines objective (i.e. non self-report)[28] outcomes, and is conducted in high-stake settings (i.e. in selection contexts), attesting to the predictive utility of the (META) inventory.

An issue that needs to be addressed by future research is META's test-retest reliability (Kline, 2000). Considering that the entrepreneurial personality, as a construct, has theoretically been placed in the personality domain, it should be able to demonstrate stability in scores (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). Although the internal consistencies of the scales met the standards, a longitudinal research design is needed to provide estimates of test-retest reliability. Similarly, it would be interesting to employ genetic, psychobiological and neurological research methods to disentangle the aetiology of the entrepreneurial personality. For instance, this could be done by studying phenotypes in the context of a) brain imaging, b) twin study designs decomposing given variances into additive genetic, shared and non-shared environment components, and c) genome-wide association studies identifying single nucleotide polymorphisms. Subsequently, it would be desirable to inspect how stable versus malleable entrepreneurial potential is; that is, the extent to which it can be changed, trained, or developed. This would no doubt be of interest to practitioners

[28] Specifically, whether an entrepreneur pays back the loan to the bank (i.e. default or not) 9 months after they received the finance.

in HR and training and development circuits, or government bodies that aim to develop the entrepreneurial potential of business founders[29]. Future research conducting intervention studies and employing experimental designs would be particularly informative in this domain.

Another important area for future research is to examine the moderating effect of context, in the relationship between META and performance. In particular, it would be relevant to see whether, and what, distinct META profiles (i.e. different scores on the individual dimensions) may be optimal for performance, in what settings. For instance, dissimilar META profiles may be required in different jobs roles, industry sectors, organisations, and regions. In this regard, it would be desirable to examine whether there may be curvilinear relationships between META and performance. It would be particularly relevant to observe whether, and in what contexts, elevated META scores may be inversely related to performance. For instance, extremely entrepreneurial individuals may find it harder to adapt to the boundaries inherent in lower levels of large organisations, and in turn perform worse than their less entrepreneurial counterparts.

Relatedly, it would be interesting to see the role of individual profiles, in the performance of teams, units, and departments. Questions that are of interests include the optimal 'entrepreneurial level' (i.e. average entrepreneurial personality score) in teams and units, and the combinations of META profiles in the teams (e.g. are complementary profiles more favourable than equivalent profiles). Finally, it would be interesting to further investigate the role of environmental influences (i.e. in addition to organisational structure and work autonomy) such as organisational

[29] Such as The Start Up Loans Company and Mowgli Mentoring.

culture, leadership, reward systems, and resources that facilitate versus inhibit entrepreneurial tendencies and achievements.

Conclusion

The current PhD thesis has provided a new framework and construct for entrepreneurship research and practice. The theoretical framework presented indicates that research needs to move beyond the profile of entrepreneurs in investigating the entrepreneurial personality. It suggests that the psychological construct of entrepreneurial personality should be examined by assessing differences in people's tendencies and abilities to engage in opportunistic, innovative, and value creating activities. To this end the current research developed a psychometric measure – META – to assess entrepreneurial tendencies and abilities. The empirical studies suggest that this measure assesses a distinct construct that predicts important performance outcomes. Accordingly, it is likely to be useful for both researchers and practitioners in the field.

In particular, researchers should be able to use this measure to assess individual differences in entrepreneurial tendencies of people, whether these are business founders, working adults, or students. This line of research may shed important light into the notion that entrepreneurial people are the change agents behind economic and social progress. It may also shed light into the stability of these tendencies, the ability to develop them and their prevalence in different contexts. From a practical perspective, governments and investors may be able to use META to make better-informed funding, training, and mentoring decisions when it comes to supporting business creation and success. Similarly, HR professionals may be able to use META to make more informed decision in their selection and placement process, development initiatives, and management practices.

The investigation of the entrepreneurial personality is, therefore, likely to be a fruitful avenue for academics, practitioners, and higher decision-making bodies alike. Whilst entrepreneurial people may not be the only source of innovation and value creation, the current research indicates that they are likely to be an important one. Schumpeter (1934) suggested that the entrepreneurial disposition is what differentiates success by sheer hard work, and success by finding new and better ways of doing things – by being opportunistic and innovative. The current research supports this proposition, indicating that entrepreneurial tendencies and abilities may be a key source for individual and organizational competitive advantage.

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Zhao, H., & Seibert, S. E. (2006). The Big Five personality dimensions and entrepreneurial status: A meta-analytical review. *Journal of Applied Psychology, 91*, 259-271.

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APPENDIX 1.

Note to the Reader

Some parts of the research presented in this thesis have been previously published, are currently in press, or under review, including:

1. Ahmetoglu, G., Harding, X., Akhtar, R., & Chamorro-Premuzic, T. (in press). Predictors of Creative Achievement: Assessing the impact of entrepreneurial potential, perfectionism, and employee engagement. *Creativity Research Journal*
2. Ahmetoglu, G., Leutner, F., & Chamorro-Premuzic, T. (2011). EQ-nomics: Understanding the Relationship between Individual Differences in Trait Emotional Intelligence and Entrepreneurship. *Personality and Individual Differences, 51,* 1028-1033
3. Ahmetoglu, G., Scarlett, L., Karsinsky, T., & Chamorro-Premuzic, T (submitted). The effect of organisational structure and work autonomy on entrepreneurial tendencies, locus of control, and performance. *International Journal of Selection and Assessment*
4. Ahmetoglu, G., Virdi, S., Karsinsky, T., & Chamorro-Premuzic, T. (2014). General Mental Ability and Entrepreneurship. *Journal of Entrepreneurship & Organization Management, 2,* Doi 1000109
5. Akhtar, R., Ahmetoglu, G., & Chamorro-Premuzic, T. (2013). Greed is Good? Assessing the relationship between entrepreneurship and subclinical psychopathy, *Personality and Individual Differences, 54,* 420-425
6. Almeida, L. P., Ahmetoglu, G., & Chamorro-Premuzic, T. (2013). Who Wants to be an Entrepreneur? The Relationship Between Vocational Interests and Individual Differences in Entrepreneurship. *Journal of Career Assessment, doi 10*

7. Leutner, F., Ahmetoglu, G., Akhtar, R., & Chamorro-Premuzic, T. (2014). The relationship between the entrepreneurial personality and the Big Five personality traits. *Personality and Individual Differences, 63,* 58-63
8. Nefyodova, V., Ahmetoglu, G., & Chamorro-Premuzic, T. (submitted). Engage or Lose: Examining the association between Entrepreneurial Potential, Employee Engagement, and Intentions to Quit a Job. *Journal of Business Venturing,*

Appendix 2

Complete list of author(s) of the review article, identified definitions, the themes extracted of the definitions, the original author of the definition, and key terms/themes identified from the current content analysis

Author(s) of Review Article	**Definitions**	**Extracted themes**	**Author of conception**	**Terms/themes**
Ahmad and Seymor (2008)	Entrepreneurs buy at certain prices in the present and sell at uncertain prices in the future. The entrepreneur is a bearer of uncertainty.		(Cantillon, 1755/1931)	Bearing uncertainty
	Entrepreneurs are pro-jectors		(Defoe, 1887/2001)	Proj-ector
	Entrepreneurs attempt to predict and act upon change within markets. The entrepreneur bears the uncertainty of market dynamics.		(Knight, 1921)	Predict and act upon change Uncertainty
	The entrepreneur is the person who maintains immunity from control of rational bureaucratic knowledge.		(Knight 1942) (Weber, 1947)	Maintain immunity from control
	The entrepreneur is the innovator who implements change within markets through the carrying out of new combinations. These can take several forms: the introduction of a new good or quality thereof, the introduction of a new method of production, the opening of a new market, the conquest of a new source of supply of new materials or parts, and the carrying out of the new organisation of any industry.		(Schumpeter, 1934)	Innovator Implements change New combinations

	The entrepreneur is always a speculator. He deals with the uncertain conditions of the future. His success or failure depends on the correctness of his anticipation of uncertain events. If he fails in his understanding of things to come he is doomed...		(von Mises, 1949/1996)	Speculator Uncertainty
	The entrepreneur is co-ordinator and arbitrageur.		Walras, 1954)	Co-ordinator arbitrageur
	Entrepreneurial activity involves identifying opportunities within the economic system.		(Penrose, 1959/1980)	Identifying opportunities
	The entrepreneur recognises and acts upon profit opportunities, essentially an arbitrageur.		(Kirzner, 1973)	Recognizing opportunities Act upon opportunities Arbitrageur
	Entrepreneurship is the act of innovation involving endowing existing resources with new wealth-producing capacity.		Drucker, 1985)	Innovation Wealth-creation
	The essential act of entrepreneurship is new entry. New entry can be accomplished by entering new or established markets with new or existing goods or services. New entry is the act of launching a new venture, either by a start-up firm, through an existing firm, or via „internal corporate venturing".		(Lumpkin & Dess, 1996)	New entry (of any kind including within existing business)
	The field of entrepreneurship involves the study of sources of opportunities; the processes of discovery, evaluation, and exploitation of opportunities; and the set of individuals who discover, evaluate, and exploit them.		(Shane & Venkataraman, 2000)	Discovery of opportunities Evaluation of opportunities Exploitation of opportunities

	Entrepreneurship is a context dependent social process through which individuals and teams create wealth by bringing together unique packages of resources to exploit marketplace opportunities		(Ireland, Hitt, & Sirmon, 2003)	Creation of wealth Bringing together of unique resources Exploiting opportunities
	Entrepreneurship is the mindset and process to create and develop economic activity by blending risk-taking, creativity and/or innovation with sound management, within a new or an existing organisation.		(Commission of the European Communities, 2003)	Create economic activity Risk-taking Creativity/innovation Management
	Entrepreneurial activity is the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.		(Ahmad and Seymour, 2008)	Generation of value Creation of economic activity Identifying and exploiting new opportunities
Dees (2001)		Adopting a mission to create and sustain social value (not just private value)		Create and sustain value
		Recognizing and relentlessly pursuing new opportunities to serve that mission,		Recognizing and pursuing opportunities
		Engaging in a process of continuous innovation, adaptation, and learning,		Continuous innovation, adaptation, and

				learning
		Acting boldly without being limited by resources currently in hand		Acting boldly
		Exhibiting heightened accountability to the constituencies served and for the outcomes created.		Accountability
Gartner (1985)		The entrepreneur locates a business opportunity	(Cole, 1965; Kilby, 1971; Maidique, 1980; Schumpeter, 1934; Vesper, 1980).	Locate Opportunity
		The entrepreneur accumulates resources	(Cole, 1965; Kilby, 1971; Leibenstein, 1968; Peterson& Berger, 1971; Schumpeter, 1934;Vesper, 1980).	Accumulate resources
		The entrepreneur markets products and services	(Cole, 1965; Kilby, 1971; Leibenstein, 1968; Maidique, 1980; Peterson & Berger, 1971; Schumpeter, 1934; Vesper, 1980).	Markets products and services
		The entrepreneur produces the product	(Kilby, 1971; Maidique, 1980; Peterson & Berger, 1971; Schumpeter,	Produces the product

			1934; Vesper, 1980).	
		The entrepreneur builds an organization	(Cole, 1965; Kilby, 1971; Leibenstein, 1968; Schumpeter, 1934).	Build an organization
		The entrepreneur responds to government and society	(Cole, 1965; Kilby,1971)	Responds to government and society
Gartner (1990)		Creation of new business		Creation of new business
		New Venture development		New Venture development
		Creation of new business that adds value		Creation of new business Creation of value
		Integrates opportunities with resources to create product or service		Integrates opportunities with resources Create product or service
		Brings resources to bear on a perceived opportunity		Brings resources to bear Exploit opportunity
		Refines a creative idea and adapts it to a market opportunity		Creative idea Exploiting Opportunity
		Innovative		Innovative
Long (1983)	Many managerial talents are required to be a		Jean-Baptiste Say	Obstacles

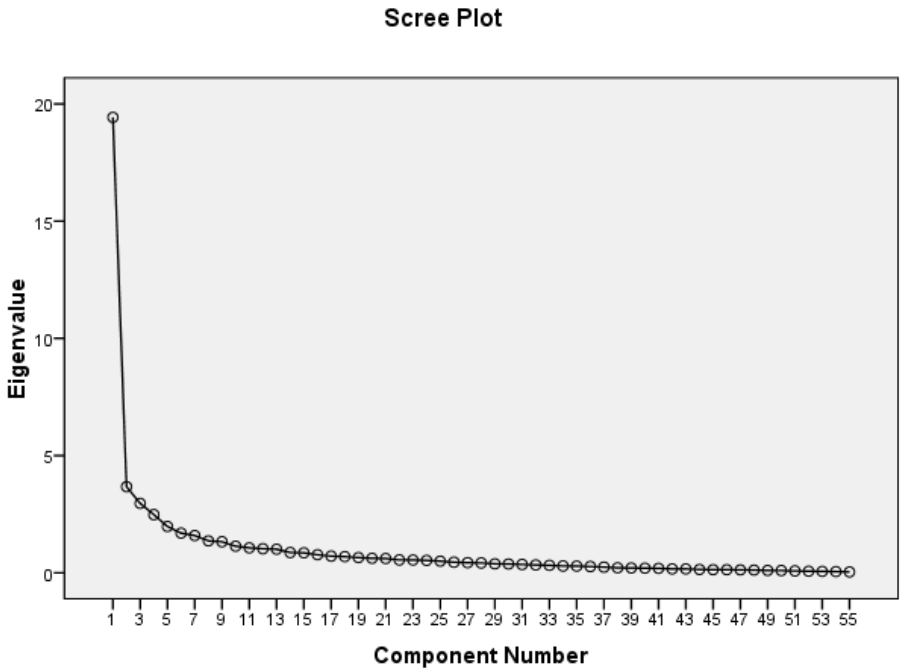
	successful entrepreneur; many obstacles and uncertainties accompany entrepreneurship		(circa 1810)	Uncertainty
	The abilities to be an entrepreneur are different yet complementary with the abilities to be a manager		Alfred Marshall (circa 1890)	N/A
McKenzie et al. (2007)	"Entrepreneurship is the creation of new organizations"		Gartner (1988)	Creation of organization
	Entrepreneurship as a scholarly field seeks to understand how opportunities to bring into existence 'future' goods and services are discovered, created and exploited, by whom, and with what consequences.		Venkataraman (1997)	Discovery of opportunity Creation of opportunity Exploitation of opportunity Bring into existence future goods
	The creation and management of new businesses, small businesses and family firms, as well as the characteristics and special problems of entrepreneurs. The Division's major topic areas include: new venture ideas and strategies, ecological influences on venture creation and demise, the acquisition and management of venture capital and venture teams, self- employment, the owner-manager, and the relationship between entrepreneurship and economic development.		Division (2002); Ucbasaran, Westhead and Wright (2001, pp.58-59)	Creation of new businesses New ideas and strategies Self- employment Economic development
	Entrepreneurship involves individuals and groups of individuals seeking and exploiting economic opportunity.		Proposed (McKenzie et al., 2007)	Seeking economic opportunity Exploiting economic

				opportunity
Morris et al. (1994)		Creation of wealth, creation of enterprise, creation of innovation, creation of change, creation of employment, creation of value, creation of growth		Creation of wealth, creation of enterprise, creation of innovation, creation of change, creation of employment, creation of value, creation of growth
Abu-Saifan (2012)	Entrepreneur is person with a high need for achievement. This need is directly related to the process of entrepreneurship. Entrepreneur is an energetic moderate risk taker.		McClelland (1961)	High achiever, Moderate risk taker
	Entrepreneurs take initiative, organize some social and economic mechanisms, and accept risk of failure.		Shapero (1975)	Take initiative Organise social and economic mechanisms Accept risk
	The entrepreneur is characterized principally by innovative behaviour and will employ strategic management practices in the business		Carland et al. (1984)	Innovative Strategic management
	Entrepreneurship is an attempt to create value through recognition of business opportunities		Kao and Stevenson (1985)	Creation of value Recognition of business opportunities
	Entrepreneurship is a way of thinking acting that is		Timmons and	Opportunity

	opportunity obsessed, holistic in approach and leadership balanced.		Spinelli (2008)	obsession Holistic approach Leadership
Wee (1994)		The entrepreneur as a risk taker	Hawley (1983), Mises (1949) Shackle (1955)	Risk taker
		The entrepreneur as an extraordinarily talented manager	Timmons (1990)	Extraordinarily talented manager
		The entrepreneur as an innovator	Weber (1930)	Innovator
		The entrepreneur as a creative arbitrager	Timmons (1989) Martin (1982)	Creative arbitrager
	"Entrepreneurship is defined as the attempt to create values by an individual or individuals (a) through the recognition of significant (generally innovative) business opportunity; (b) through the drive to manage risk-taking appropriate to that project; and (c) through the exercise of communicative and management skills necessary to mobilize rapidly the human, material, and financial resources that will bring the project to fruition." 25	Strategic orientation: the identification of opportunities Commitment to opportunity: the decision to act Commitment of resources Control of contractual resources: the decision to rent/use or own/employ	Stevenson (1985)	Create value Recognition of business opportunity; Drive Risk-taking Communicative and management skills Strategic orientation Identification of opportunities Acting on opportunity Commitment of

				resources Rent/use or own/employ resources

APPENDIX 3.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Component Number

APPENDIX 4.

Component solution for META S-30[30]

Item	Factor 1	Factor 2	Factor 3	Factor 4
Opportunism	**.85**			
Opportunism	**.78**			
Opportunism	**.76**			
Opportunism	**.73**			
Opportunism	**.70**			
Opportunism	**.69**			
Creativity	**.66**			
Creativity	**.65**		.40	
Opportunism	**.63**			
Creativity	**.53**			
Creativity	**.52**		.41	
Opportunism	**.51**			
Proactivity		**.79**		
Proactivity		**.72**		
Proactivity		**.71**		
Proactivity		**.68**		
Proactivity		**.63**		
Proactivity	.44	**.60**		
Proactivity		**.55**		
Creativity			**.76**	
Creativity			**.55**	
Creativity			**.42**	
Vision				**.78**
Vision				**.71**
Vision				**.58**
Vision				**.52**
Vision				**.52**
Vision				**.51**
Vision				**.48**
Vision	.46			**.53**

Note: O = Opportunism, C = Creativity, P = Proactivity, V = Vision

[30] *Note:* Scoring key not revealed for IP purposes.

APPENDIX 5.

Your age: **Gender:** M / F

Job status (you may select more than one option):

a) employed b) self-employed/business owner c) student d) unemployed e) other

	Strongly disagree				Strongly agree
1. I am quick to spot profitable opportunities	1	2	3	4	5
2. People tend to think of me as highly innovative	1	2	3	4	5
3. I am not very opportunistic	1	2	3	4	5
4. I am constantly on the lookout for new opportunities to generate profit	1	2	3	4	5
5. I have a strong desire for progress	1	2	3	4	5
6. I see profitable opportunities where others do not	1	2	3	4	5
7. I often generate new ideas that can be of commercial or social advantage	1	2	3	4	5
8. If I see an opportunity I jump on it	1	2	3	4	5
9. I'm not particularly interested in creating something of commercial or social value	1	2	3	4	5
10. I am very forward-looking	1	2	3	4	5
11. I'm very alert to opportunities to create commercial or social value	1	2	3	4	5
12. I'm very creative when it comes to finding new ways to generate profit	1	2	3	4	5
13. I don't always grab the opportunities that I have	1	2	3	4	5
14. I'm not very bothered about finding ways to create economic or social value	1	2	3	4	5
15. I am future oriented	1	2	3	4	5
16. If there is a profitable opportunity, I will see it	1	2	3	4	5
17. I have great business ideas before others do	1	2	3	4	5
18. I love inventing products or services that can be commercially profitable	1	2	3	4	5
19. I usually have the innovative ideas in group tasks or projects	1	2	3	4	5
20. I am quick to take advantage of any circumstance of possible benefit to me or others	1	2	3	4	5
21. Even when I spot a profitable opportunity I rarely act on it	1	2	3	4	5
22. It is not enough with making money for myself, I also want projects to be beneficial to others	1	2	3	4	5
23. I always dreamed of creating something (e.g., a product or service) that has an objectively recognised value	1	2	3	4	5
24. I generate lots of constructive and valuable ideas to change things for the better	1	2	3	4	5
25. My aim in life is finding new ways to make economic or social progress	1	2	3	4	5
26. I'm generally the first to see a commercial opportunity when it appears	1	2	3	4	5
27. I'm not very alert to commercial opportunities	1	2	3	4	5
28. Novel ideas for creating profit seem to jump into my head all the time	1	2	3	4	5
29. I see myself as highly innovative	1	2	3	4	5
30. I love creating things that are useful to people	1	2	3	4	5
31. I'm very proactive when it comes to finding new ways to improve things	1	2	3	4	5
32. People think of me as a visionary	1	2	3	4	5
33. Opportunity always comes if you keep your eyes open	1	2	3	4	5
34. I love discovering commercial opportunities that haven't been discovered by others	1	2	3	4	5
35. I like to approach commercial or social problems creatively	1	2	3	4	5
36. I am very good at coming up with novel solutions to problems	1	2	3	4	5

37. If I see a commercial or valuable opportunity I do not hesitate to go for it	1	2	3	4	5
38. It is not that I don't see profitable opportunities, I just don't have the motivation to do anything about them	1	2	3	4	5
39. Creating something that is useful to people and a profitable business for myself is my idea of perfection	1	2	3	4	5
40. I'm very forward looking when it comes to finding new ways to advance things	1	2	3	4	5
41. I always strive to make things better for myself and/or others	1	2	3	4	5
42. I see very early when there is an opportunity to generate profit	1	2	3	4	5
43. I try to take advantage of every profitable opportunity I see	1	2	3	4	5
44. I always know when there is a "gap in the market" for a new product or service	1	2	3	4	5
45. There is little point in trying to find new ways of doing something if old ways work	1	2	3	4	5
46. On an average week I generate many original business ideas	1	2	3	4	5
47. I often identify opportunities for introducing new products or services	1	2	3	4	5
48. People think of me as an opportunist	1	2	3	4	5
49. I often fail to act on valuable opportunities	1	2	3	4	5
50. I rarely think outside the box	1	2	3	4	5
51. I often approach tasks in new and unusual ways	1	2	3	4	5
52. I like following accepted procedures at work or school	1	2	3	4	5
53. I rarely act on profitable opportunities, even when believe they can benefit me or others	1	2	3	4	5
54. I try to stimulate economic or social progress by finding new and better ways of doing things	1	2	3	4	5
55. I would like to be the catalyst of economic or social progress	1	2	3	4	5

META S-30

SD=Strongly Disagree
D=Disagree N=Neutral
A=Agree SA=Strongly Agree

Please give your response to every one of these statements by circling O or striking through X your choice of agreement: SD, D, N, A, or SA. Many thanks for your help.

	SD	D	N	A	SA
1. I am quick to spot profitable opportunities	1	2	3	4	5
2. People tend to think of me as highly innovative	1	2	3	4	5
3. I have a strong desire for progress	1	2	3	4	5
4. I see profitable opportunities where others do not	1	2	3	4	5
5. If I see an opportunity I jump on it	1	2	3	4	5
6. I'm not particularly interested in creating something of commercial or social value	1	2	3	4	5
7. I am very forward-looking	1	2	3	4	5
8. I'm very alert to opportunities to create commercial or social value	1	2	3	4	5
9. I don't always grab the opportunities that I have	1	2	3	4	5
10. I am highly future oriented	1	2	3	4	5
11. If there is a profitable opportunity, I will see it	1	2	3	4	5
12. I have great business ideas before others do	1	2	3	4	5
13. I usually have the innovative ideas in group tasks or projects	1	2	3	4	5
14. Even when I spot a profitable opportunity I rarely act on it	1	2	3	4	5
15. I always dreamed of creating something (e.g., a product or service) that has an objectively recognised value	1	2	3	4	5
16. My aim in life is finding new ways to make economic or social progress	1	2	3	4	5
17. I'm generally the first to see a commercial opportunity when it appears	1	2	3	4	5
18. I see myself as highly innovative	1	2	3	4	5
19. I am very good at coming up with novel solutions to problems	1	2	3	4	5
20. It is not that I don't see profitable opportunities, I just don't have the motivation to do anything about them	1	2	3	4	5
21. Creating something that is useful to people and a profitable for myself is my idea of perfection	1	2	3	4	5
22. I always strive to make things better for myself and/or others	1	2	3	4	5
23. I try to take advantage of every profitable opportunity I see	1	2	3	4	5
24. I always know when there is a "gap in the market" for a new product or service	1	2	3	4	5
25. There is little point in trying to find new ways of doing something if old ways work	1	2	3	4	5
26. I often fail to act on valuable opportunities	1	2	3	4	5
27. I rarely think outside the box	1	2	3	4	5
28. I like following accepted procedures at work or school	1	2	3	4	5
29. I rarely act on profitable opportunities, even when believe they can benefit me or others	1	2	3	4	5
30. I am very creative	1	2	3	4	5

APPENDIX 6.

Discriminant validity of META in relation to the Big Five Personality Factors

Scale Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Opportunism	**0.85**							
Opportunism	**0.83**							
Opportunism	**0.79**							
Opportunism	**0.78**							
Opportunism	**0.75**							
Opportunism	**0.71**							
Opportunism	**0.64**							
Opportunism	**0.64**							
Opportunism	**0.50**							
Opportunism	**0.49**							
Opportunism	**0.49**							
Creativity	**0.48**						0.38	
Creativity							**0.36**	
Neuroticism		**0.75**						
Neuroticism		**0.74**						
Neuroticism		**0.72**						
Neuroticism		**0.71**						
Neuroticism		**0.69**						
Neuroticism		**0.69**						
Neuroticism		**0.68**						
Neuroticism		**0.68**						
Neuroticism		**0.56**						
Neuroticism		**0.48**						

Agreeableness	**0.75**				
Agreeableness	**0.63**				
Agreeableness	**0.63**				
Agreeableness	**0.60**				
Agreeableness	**0.58**				
Agreeableness	**0.56**		-0.37		
Agreeableness	**0.53**				
Agreeableness	**0.52**		0.39		
Agreeableness	**0.52**		-0.41		
Agreeableness	**0.46**				
Conscientiousness		**0.68**			
Conscientiousness		**0.64**			
Conscientiousness		**0.61**			
Conscientiousness		**0.61**			
Conscientiousness		**0.60**			
Conscientiousness		**0.59**			
Conscientiousness		**0.56**			
Conscientiousness		**0.47**			-0.32
Conscientiousness		**0.44**			-0.36
Extraversion			**0.74**		
Extraversion			**0.74**		
Extraversion			**0.73**		
Extraversion			**0.69**		
Extraversion			**0.66**		
Extraversion			**0.65**		
Extraversion			**0.6**		
Extraversion			**0.59**		
Extraversion			**0.46**	0.36	
Extraversion	0.35		**0.44**		

Proactivity	**0.72**		
Proactivity	**0.71**		
Proactivity	**0.70**		
Proactivity	**0.69**		
Proactivity	**0.54**		0.36
Proactivity	**0.53**		
Proactivity	**0.51**		
Proactivity	**0.49**		
Proactivity	**0.31**		
Conscientiousness		**0.61**	
Openness		**0.54**	
Openness		**0.53**	
Openness		**0.52**	
Creativity		**0.52**	
Openness		**0.51**	
Openness		**0.49**	
Openness		**0.49**	
Openness		**0.48**	
Openness		**0.48**	
Openness		**0.47**	
Creativity		**0.46**	
Creativity		**0.46**	
Openness		**0.45**	
Creativity		**0.43**	
Creativity		**0.37**	
Creativity		**0.36**	
Creativity		**0.36**	
Creativity		**0.33**	
Opportunism			**0.47**

Vision		**0.46**
Vision		**0.44**
Vision		**0.43**
Proactivity	-0.31	**0.39**
Vision		**0.38**
Vision		**0.36**
Vision		**0.36**
Vision		**0.35**
Proactivity		**0.35**
Vision		**0.34**
Vision		**0.33**
Vision		**0.32**

Note: O = Opportunism, C = Creativity, P = Proactivity, V = Vision

APPENDIX 7.

Please give your response to every one of these statements by circling O or striking through X your choice of agreement: SD, D, N, A, or SA. Many thanks for your help.

SD=Strongly Disagree
D=Disagree N=Neutral
A=Agree SA=Strongly Agree

	SD	D	N	A	SA
1. I am quick to spot profitable opportunities	1	2	3	4	5
2. People tend to think of me as highly innovative	1	2	3	4	5
3. I have a strong desire for progress	1	2	3	4	5
4. I see profitable opportunities where others do not	1	2	3	4	5
5. If I see an opportunity I jump on it	1	2	3	4	5
6. I am very forward-looking	1	2	3	4	5
7. I'm very alert to opportunities to create commercial or social value	1	2	3	4	5
8. I don't always grab the opportunities that I have	1	2	3	4	5
9. I am highly future oriented	1	2	3	4	5
10. If there is a profitable opportunity, I will see it	1	2	3	4	5
11. I have great business ideas before others do	1	2	3	4	5
12. I usually have the innovative ideas in group tasks or projects	1	2	3	4	5
13. Even when I spot a profitable opportunity I rarely act on it	1	2	3	4	5
14. My aim in life is finding new ways to make economic or social progress	1	2	3	4	5
15. I'm generally the first to see a commercial opportunity when it appears	1	2	3	4	5
16. I see myself as highly innovative	1	2	3	4	5
17. I am very good at coming up with novel solutions to problems	1	2	3	4	5
18. It is not that I don't see profitable opportunities, I just don't have the motivation to do anything about them	1	2	3	4	5
19. Creating something that is useful to people and a profitable for myself is my idea of perfection	1	2	3	4	5
20. I always strive to make things better for myself and/or others	1	2	3	4	5
21. I try to take advantage of every profitable opportunity I see	1	2	3	4	5
22. I always know when there is a "gap in the market" for a new product or service	1	2	3	4	5
23. There is little point in trying to find new ways of doing something if old ways work	1	2	3	4	5
24. I often fail to act on valuable opportunities	1	2	3	4	5
25. I rarely think outside the box	1	2	3	4	5
26. I like following accepted procedures at work or school	1	2	3	4	5
27. I rarely act on profitable opportunities, even when believe they can benefit me or others	1	2	3	4	5
28. I am very creative	1	2	3	4	5
29. I rarely recognize valuable opportunities unless they are really obvious to spot	1	2	3	4	5
30. I constantly strive for progress and want to change things for the better	1	2	3	4	5
31. I find opportunities stimulating and I feel the urge to pursue them	1	2	3	4	5
32. I find it easy to apply my creativity to everyday life	1	2	3	4	5
33. With regard to work matters, I tend to lose sight of the big picture and focus mostly on small details	1	2	3	4	5
34. I spend a lot of time thinking about my future goals	1	2	3	4	5
35. When I see an opportunity I take control and make things happen, rather than just wait for things to occur	1	2	3	4	5
36. I rarely see lucrative opportunities, even if I'm very knowledgeable in the area	1	2	3	4	5
37. I want to make a difference in the world	1	2	3	4	5
38. I would be more upset if I missed a chance than if I invested time and resources on something that didn't work out in the end	1	2	3	4	5
39. I rarely use my creativity to solve everyday problems	1	2	3	4	5
40. When it comes to exploiting opportunities I am often too cautious	1	2	3	4	5
41. I find it hard to come up with ideas for making money	1	2	3	4	5
42. I am rarely afraid to exploit opportunities, even if there is a risk	1	2	3	4	5

43. Even if I know how to do something, I would always try to do it in a different way	1	2	3	4	5
44. I always keep a close eye on the future	1	2	3	4	5

APPENDIX 8.

Participant materials

Standard Invitation:

Study 6: What is your ideal job? Which occupations suit you best? Are you suited to start your own business? Are you an entrepreneurial person? Find out here! This test will help you to identify your strengths and reveal how your motives and interest affect the way you do your job. The test consists of some demographic questions and a number of statements which you must rate your agreement with on a scale of 1 to 5. In total, the test should take around 10-15 minutes to complete. At the end you will get your comprehensive feedback based in the responses you provide. This study has been approved by the UCL Research Ethics Committee [**CEHP/2011/003**]. All information will be used anonymously. Your participation in this research is entirely voluntary - you may withdraw at any time. If you have any questions or comments, please contact **t.chamorro-premuzic@gold.ac.uk** or **patricia.lopez-almeida.10@ucl.ac.uk**. If you have read and agreed to the above, click the "Begin" button below to get started. Thanks for taking part!

Standard Feedback (after completion):

Thank you for taking part in our study, which is part of a four-year research program funded by the UK's *Economic and Social Research Council* (ESRC)[31].

Background to our measure and research: Our questionnaire was designed to assess your entrepreneurial potential. The purpose of this research is to examine the degree to

[31] http://www.esrc.ac.uk/ESRCInfoCentre/index.aspx

which your self-rated tendencies and abilities can predict individual differences in future entrepreneurial behavior - in simple terms, we want to know whether your self-views are a valid measure of your entrepreneurial potential. In order to achieve this, it is crucial to understand the proper meaning of entrepreneurial behavior, a concept that has often been used to denote a variety of outcomes (e.g., starting up a business, working for yourself, or making a lot of money) that are not necessarily indicative of entrepreneurship. What, then, should one understand by entrepreneurial behavior?

Entrepreneurial behavior: Entrepreneurial behavior is any act that involves the recognition and exploitation of opportunities, or innovation, and results in the creation of economic and social value. For instance, a student may come up with a creative idea for funding his or her studies, as Mark Zuckerberg did when he launched a social-networking website called Facebook. Likewise, an employee may decide to supplement his or her income by selling things online. Zuckerberg is now the youngest billionaire in the world, worth over US$4 billion, and Facebook has transformed our ability to find and stay in touch with other people. There are now over 200 e-bay users turning over US$1 million a year, and they provide an invaluable service to millions of others buy enabling them to buy things cheaper, faster, and at any time. Individuals differ in both their ability and willingness to display entrepreneurial behaviors, and our measure is designed to assess these individual differences.

Unique approach: Our approach is unique in that we argue that starting a business is neither necessary nor sufficient for entrepreneurship. There are many people who have not founded companies but contribute to society by displaying entrepreneurial behaviors (e.g., social entrepreneurships). Likewise, the process of starting a business does not have to involve any entrepreneurial behaviors, that is,

recognizing and exploiting opportunities, and innovating (e.g., most businesses are just copies of others).

In our view, all individuals have the potential to perceive and exploit opportunities, and innovate, but some individuals are more able and willing than others. People who are more innovative at work, who perceive and exploit opportunities more often, and, as a consequence, generate a substantial amount of value and progress for society; those are the people we regard as entrepreneurial.

We believe that researchers, employers, and policy-makers must look beyond business owners when searching for the true sources of value creation and economic and social development. Accordingly, to support the identification of entrepreneurial individuals in the wide population we have developed our measure.

If you would like further information on our research or have any questions regarding the questionnaire, please contact us (g.ahmetoglu@gold.ac.uk or t.camorro-premuzic@gold.ac.uk).

Thank you,

Gorkan Ahmetoglu, MSc (Occ Psych), MSc (Research Methods)

Tomas Chamorro-Premuzic, PhD