Title page with All Author Information

The Entrepreneurial Organization: The Effects of Organizational Culture on Innovation Output

Gorkan Ahmetoglu[a]

Reece Akhtar[a]

Dimitrios Tsivrikos[a]

Tomas Chamorro-Premuzic [a]

[a] Department of Psychology & Language Sciences, University College London.

26 Bedford Way,

London, WC1H 0AP, UK.

Address correspondence to: Dr Gorkan Ahmetoglu, University College London, Department of Psychology, 26 Bedford Way, London WC1 (UK); g.ahmetoglu@ucl.ac.uk

+44207679540

Abstract

As organizations face growing economic pressures, leaders need to create work environments that support and encourage entrepreneurial behavior in their workforce in order to drive organizational innovation and growth. In this vein, the current paper examines the effect of an entrepreneurial culture on an employee's innovation output, and explores three mechanisms by which this may be achieved. In a sample of 438 working adults, the relationship between entrepreneurial culture and innovation output was fully mediated by work engagement. Furthermore, entrepreneurial culture positively moderated the relationship between an individual's entrepreneurial personality and innovation output. These findings contribute new theoretical insights to the corporate entrepreneurship literature, and have important practical implications for organizations aiming to become more entrepreneurial.

Keywords: Organizational Culture, Innovation Output, Entrepreneurial Personality, Work Engagement.

Introduction

Organizations in the 21st Century must engage in entrepreneurship to remain competitive (Lumpkin, 2007). Arising from pressures such as technological innovation and disruption (Teece, 2016), changing consumer demands (Priem, Li & Carr, 2012), expectations of Millennials in the workforce (Myers & Sadaghiani, 2010), and women's advancement in management (Schein, 2007), the adoption of an entrepreneurial strategy within organizations is increasingly becoming a necessity for gaining and maintaining competitive advantage (Kuratko, Hornsby, & Covin, 2014; Rauch, Wiklund, Lumpkin, & Frese, 2009). Corporate entrepreneurship and innovation, therefore, are becoming major objectives for many organizations.

A significant body of research has been conducted to identify the internal organizational factors and conditions needed for organizations to become more entrepreneurial (Rauch et al., 2009). Various factors have been proposed over the years, including corporate venturing, strategic entrepreneurship, and entrepreneurial orientation (Thornberry, 2001). The domain that has been dedicated to address this question is known as 'corporate entrepreneurship'. Kuratko and Nagelvoort (2015) define corporate entrepreneurship as entrepreneurial or innovative behavior inside established organizations. An underlying premise within the field is that for organizations to become more entrepreneurial and prosper, an "innovation-friendly" internal environment, or *culture*, that facilitates entrepreneurial behavior needs to exist (Ireland, Kuratko, & Morris, 2006). That is, employee perception of an innovative environment is critical for corporate entrepreneurship (Hornsby, Kuratko, Shepherd, & Bott, 2009). Consequently, the managerial challenge is that of facilitating an innovation-friendly (i.e. entrepreneurial) culture.

Research has made significant contributions to our understanding of antecedents of entrepreneurial culture. For instance, Hornsby, Kuratko, Holt and Wales (2013) identified

four influences on the development of an organizational culture in which entrepreneurial behavior could be expected: (1) *management support* (the willingness of managers to facilitate and promote entrepreneurial behavior, including the championing of innovative ideas and providing the resources people require to behave entrepreneurially), (2) *work discretion/autonomy* (manager's commitment to tolerate failure, provide decision-making latitude, freedom from excessive oversight and to delegate authority and responsibility to middle- and lower-level managers), (3) *rewards* (developing and using systems that reinforce entrepreneurial behavior, highlight significant achievements and encourage pursuit of challenging work), and (4) *time availability* (evaluating workloads to ensure that individuals and groups have the time needed to pursue innovations and that their jobs are structured in ways that support efforts to achieve short- and long-term organizational goals). Most of these factors are in line with broader organizational performance and change models, such as Burke and Litwin (1992) and Weisbord (1976). Accordingly, Hornsby et al. (2013) argue that these four factors are the most important for enabling and supporting *entrepreneurial behavior*.

This research originates from the entrepreneurial orientation construct (EO; Covin & Slevin, 1991), which represents the extent to which an organization's formal policies and practices (i.e. strategy) support and encourage entrepreneurial decision-making and actions (Rauch et al., 2009). Covin and Slevin (1991) propose that organizations who have high levels of EO are characterized by *innovativeness* (a tendency to engage in creativity & experimentation through the introduction of new products/services and R&D), *risk-taking* (have a tendency to make bold & uncertain decisions) and *proactiveness* (a tendency to be opportunity seeking & competitive). As enacted by key decision-makers (i.e. senior leaders, executives & business owners), these three strategic tendencies orientate the organizational

members' attitudes and behavior towards innovation, and the identification and exploitation of opportunities (Lumpkin & Dess, 1996).

The importance of a corporate entrepreneurial strategy for firm performance was demonstrated in a recent meta-analysis by Rauch et al. (2009). Analysing a total of 14,259 companies, the researchers found a moderate relationship between EO and financial and non-financial metrics of firm performance. Intriguingly, the study also demonstrated that these relationships remained significant across cultures, industries, and firm sizes, even if the strength of the relationship varied. Specifically, micro firms (1-49 employees) in high-tech (e.g. computer software and hardware, biotechnology, and new energy) industries benefited more from an EO than larger firms (50-499 and 500+ employees) in non-high-tech industries.

Gaps in the literature

Although past research has made a significant contribution to our understanding of antecedents of entrepreneurial activity within organizations, there remain a number of significant gaps in the literature (e.g. Hornsby et al., 2013; Fayolle, Basso, & Bouchard, 2010). First, the scope of existing corporate entrepreneurship measures has been suggested to be too narrow to capture the complexity of entrepreneurial cultures. For instance, Rauch et al. (2009) criticized existing entrepreneurial culture constructs and measures (e.g. EO) as being overly focused on *formal* organizational factors that pertain to how work is conducted and rewarded (i.e. strategy & work design; Rauch et al., 2009), at the expense of *informal* factors (i.e. collective norms, assumptions, and beliefs) that are likely to be of equal importance when motivating and enabling individuals and organizations to engage in entrepreneurial activities (Kuemmerle, 2008; Licht & Siegel, 2008; West, 2007). Indeed, informal factors are included in several of the more general models of organizational performance. For instance, in their early model for organizing and managing innovation, Tushman & Nadler (1986)

separate informal arrangements (e.g. core values, norms, communication networks) from formal ones (e.g. job rotation, design, and education). Similarly, the Burke and Litwin model of organizational performance also includes a number of informal factors (e.g. leader vision, motivation, and values) predicted to impact performance more generally. Some studies have indeed demonstrated socio-cognitive factors to have a significant impact on entrepreneurial activity (Frese & Gielnik, 2014) and work-related innovation within organizations (Anderson, Potočnik, & Zhou, 2014; Amabile, Conti, Coon, Lazenby & Herron, 1996). Accordingly, it is likely that a broader conceptualization and operationalization of entrepreneurial culture, that captures both formal *and* informal components, is needed in order to get a more comprehensive understanding of the antecedents of entrepreneurial activity within organizations.

Second, most theory and research in the field of corporate entrepreneurship has focused on establishing the factor structure (i.e. the dimensions) of an entrepreneurial culture (e.g. Rauch et al., 2009), and/or the direct link between these dimensions (e.g. processes, strategy, and culture) and organizational outputs (e.g. introduction and transformation of products, services, strategies etc., and financial and non-financial performance metrics). However, few studies have looked at the *mechanisms* by which organizational culture factors produce such organizational outputs. That is, there is little in the literature to inform us both how and why entrepreneurial cultures produce high performance or innovation. Yet, given that corporate entrepreneurship does not occur in a vacuum, understanding these mechanisms is critical. Processes, strategies, or cultures cannot in themselves affect performance. Rather, they do so through the behavior (and ideas) of managers and employees (Hornsby et al., 2009). Accordingly, understanding how, and the conditions under which, cultural factors influence employees' behavior to produce organizational outputs is imperative. Such an understanding would be desirable, if not necessary, to allow organizations to a) formulate

more precise investment strategies on cultural interventions; b) make more informed decisions about when and where to introduce or amend cultural factors; and c) have systematic capacity to understand and, therefore, avoid potential failures of cultural interventions. For instance, an organization aiming to increase its innovative output would need to estimate the likelihood of achieving this objective through an investment in interventions aimed at facilitating an entrepreneurial culture (e.g. making amendments to their reward system, information sharing system, job specifications etc.). Likewise, an organization will want to anticipate the potential factors that may inhibit the success of such investments. Without an understanding of why, and the conditions under which, an entrepreneurial culture leads to innovation output, providing informed answers to such questions is difficult.

There may be a number of mechanisms by which entrepreneurial cultures influence organizational members' entrepreneurial outputs. Here, we posit three that are likely to be essential to this relationship, namely: *reinforcement*, *engagement* and *person-organization (P-O) fit*. Below we describe the theoretical rationale for each of these psychological mechanisms.

Psychological mechanisms

It can be hypothesized that entrepreneurial cultures will influence employees' outputs (e.g. entrepreneurial activity & innovation output) directly, through reinforcement of behavior. For example, Lawler and Jenkins (1992) explain organizational behaviour in terms of the Performance-Outcome expectancy theory, suggesting that employees associate every behaviour with a certain outcome (reward or punishment), and therefore would perform behaviours for which they expect to be rewarded. Reward systems operating in an organization shape its culture, which in turn elicits the congruent patterns of behaviour. For

instance, where employee behavior is in line with an organization's structures, processes and culture, such behavior is more likely to be rewarded and, therefore, reinforced. This increases the likelihood that the employee will behave in a similar way in the future. Similarly, the inverse will happen if the behavior is not in line with such factors and is punished. Given that larger organizations are likely to be more bureaucratic (Hayton, 2005), entrepreneurial behaviors and activities (which are by definition deviant and divergent; Leutner, Ahmetoglu, Akhtar & Chamorro-Premuzic, 2014) are unlikely to be positively reinforced, if the organization's culture does not support or reward such behaviors. Conversely, a culture in which entrepreneurial behavior is reinforced (i.e. positively rewarded), is likely to strengthen the entrepreneurial behavior-reward association and therefore increase the intentions, and occurrence, of that behavior (Kautonen, Van Gelderen & Tornikoski, 2013). Thus, we posit that there will be a direct relationship between increased perceptions of entrepreneurial culture perceptions and an employee's level of entrepreneurial activity and innovation output.

H1: There will be a direct relationship between increased perceptions of an entrepreneurial culture and an employee's level of innovation output

A second mechanism by which an entrepreneurial culture may influence innovation output is through *work engagement*. Work engagement can be defined as the "fulfilling work-related state of mind that is characterized by vigor, dedication and absorption" (p. 702, Schaufeli, Bakker, & Salanova, 2006), and has been found to be an important predictor of heightened performance at the individual, group and organizational level (Saks, 2006). In the literature, the phrases 'work engagement' and 'employee engagement' tend to be used interchangeably (Schaufeli & Bakker, 2010). For the purpose of this paper, we have chosen to refer to the concept as 'work engagement', following considerations presented by

Schaufeli and Bakker (2010). Although the literature on the antecedents of engagement stretches back several decades (Crawford, LePine, & Rich, 2010), few studies have directly examined the impact of entrepreneurial culture on engagement. However, there is good reason to believe that entrepreneurial culture is significantly related to work engagement which, in turn, increases entrepreneurial outputs of employees.

First, meta-analytic research has found that engagement is influenced by a number of work related characteristics; in particular, people tend to be more engaged when they have more control over how they carry out work, have opportunities to learn new skills, are able to make decisions and interact with others in a positive manner (Crawford et al., 2010). Although job characteristics are often more formal dimensions of organizations, they are intimately linked with the informal norms and assumptions held by employees, that is, the culture of the organization (Schneider, Ehrhart & Macey, 2013). Indeed, informal components of work may arguably be equally, or even more, important than formal processes in engaging employees (Kuemmerle, 2008).

Secondly, there is also good reason to believe that engagement is likely to have a significant influence on the innovation output of employees. For instance, Harter, Schmidt and Hayes (2002) conjectured that work engagement is a construct that fosters positive affect in individuals at work, which, in turn, leads to creativity (the precursor of entrepreneurial output). 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 this association is suggested by the positive relationships between job characteristics, engagement (Saks, 2006), and creative output (Bakker & Xanthopoulou, 2013). Similarly, Ahmetoglu, Harding, Akhtar, and Chamorro-Premuzic (2015), found evidence for the relationship between engagement and

entrepreneurial behavior. Consequently, we hypothesize that engagement will be the second mechanism by which entrepreneurial cultures influence entrepreneurial output.

H2: Work engagement will positively mediate the relationship between entrepreneurial culture and innovation output.

The final mechanism by which entrepreneurial cultures may influence entrepreneurial output is explained by the Person-Organization (P-O) fit theory (Tett & Burnett, 2003; Westerman & Cyr, 2004). The P-O fit theory emphasizes that positive work outcomes arise from the congruence between an individual's personality traits and the social norms, values and demands found within the organization (i.e. its culture). Employees who experience a high level of congruence with the culture are likely to have more positive cognitive and affective reactions, and behavioral approach, which, in turn, increases their output and productivity (Gregory, Albritton & Osmonbekov, 2010). Recent research demonstrates a positive relationship between entrepreneurial personality traits (e.g. creativity, vision, proactivity and opportunism) and innovation output (Ahmetoglu, Leutner & Chamorro-Premuzic, 2011; Leutner et al., 2014). The P-O fit theory would predict this relationship to be moderated by entrepreneurial culture. In other words, it would be reasonable to expect an interaction effect between entrepreneurial culture and personality, whereby entrepreneurial cultures foster innovation output by having a disproportionate influence on the productivity of entrepreneurial employees. Such a finding is yet to be tested but would clearly have important theoretical and practical implications for organizations aiming to become more entrepreneurial.

H3: In cultures which are entrepreneurial, employees with elevated levels of entrepreneurial personality traits will have increased levels of innovation output, in comparison to those employees with lower of levels of entrepreneurial personality traits.

The current study

The current study had two main aims. The first was to theoretically and empirically extend existing constructs of entrepreneurial culture to capture *informal*, in addition to formal, components of the construct. Such an objective was inspired by Rauch et al. (2009) who concluded that the strength of the relationship between EO and firm performance may increase if the EO construct is expanded to also describe other critical factors that are likely to influence an organization's, and its employees', ability to engage in entrepreneurial activity and produce innovation. In addition to this, Cooke and Rousseau (1988) also outlined the importance of socialization in shaping organizational culture and employee behavior. As such, it is argued that there is an opportunity to extend the existing corporate entrepreneurship constructs to include informal factors, which describe the various socio-cognitive factors that play an important role in enabling and motivating employees to pursue innovation (West, 2007). Given this theoretical divergence from existing corporate entrepreneurship constructs, the first step in the current study involved the validation of an inventory to assess the informal and social components of entrepreneurial culture. We suggested four components that are fundamental to this: *Leadership Style*, *Employee Values*, *Initiative and Team Behavior*.

Specifically, when describing *Leadership Style,* we draw upon the motivational and inspiring influence of a leader's vision (i.e. an idealized goal to create value, innovate and grow the organization; Ruvio, Rosenblatt & Hertz-Lazarowitz, 2010). Furthermore, *Employee Values* describes the extent to which employees share an entrepreneurial in-group

social identity, in that they view risk-taking, innovation and experimentation as defining features of their organizational identity. Such a salient in-group identity is likely to promote group cohesion, loyalty and a willingness to compete with perceived out-groups (i.e. competitors) — all of which may help to increase an individual's motivation to pursue innovation and enact existing entrepreneurial talent (for a review on social identity, see Hogg, van Knippenberg & Rast., 2012). *Initiative* describes the positive socio-cognitive effect of having increased empowerment and autonomy as facilitated through leadership and middle management (Burgess, 2013; Hmieleski & Ensley, 2007). Lastly, *Team Behavior* describes the extent to which individuals and groups have social capital. That is, they have social connections that provide access to social support and expertise, in addition to novel resources, information and ideas, that can aid the development and implementation of innovation (Burt, 2004; Hülsheger, Anderson & Salgado, 2009).

Although many of these components are described in some capacity by traditional measures of entrepreneurial orientation (Covin & Slevin, 1991) or the four components proposed by Hornsby et al. (2013), in the current study, we operationalize these components based on related socio-cognitive factors and theories. Doing so addresses Rauch et al.'s (2009) criticism of the entrepreneurial orientation construct, while extending the aforementioned corporate entrepreneurship constructs to produce a more holistic measurement and conceptualization of entrepreneurial cultures, due to the integration of relevant psychological theories. Given this, it was hypothesized that:

H4: Measures of *Leadership Style*, *Employee Values*, *Initiative* and *Team Behavior* can positively extend existing corporate entrepreneurship constructs, namely Hornsby et al.'s (2013) four factor framework.

The second aim was to examine the *mechanisms* by which an entrepreneurial culture produces organizational outputs; that is, we wanted to investigate both how and under which conditions entrepreneurial cultures influence employees' innovation output. We postulated three psychological mechanisms that are likely to be essential to this relationship, namely: *reinforcement*, *engagement* and *P-O fit*. Thus, we hypothesized that entrepreneurial cultures will influence employees' innovation output a) directly, through reinforcement, or lack thereof, of specific behaviors, consequently 'shaping' entrepreneurial behaviors, b) indirectly, by engaging employees, and as a result increasing their output, and c) indirectly, by increasing the output of a specific group of individuals within the organization, namely those with a more entrepreneurial personality.

Method

Participants

A sample of 523 participants (260 males) was examined. Their ages ranged from 18 to 72 years (M = 35.74, SD = 12.14; 70.3% were between 18 to 40; 18.4% were aged between 41 to 60). All participants were in some form of employment, with the majority of participants working in lower-level positions (68%). A further 20% of the sample held middle-management positions, 2% held senior management positions, and 10% were executives/directors. Data from self-employed participants was not collected given the study's focus on those individuals working within, and under the employment of, an existing organization. The participants were mostly from the USA (83%), with 17% from the European Union.

Procedure

Participants were recruited through Amazon's Mechanical Turk service (80% of the total sample), alongside professional social network services such as LinkedIn (20% of the total

sample). The limitations surrounding the use of a crowdsourced sample are discussed later. The study was hosted on an online research platform. Participants first gave their consent and completed a demographic questionnaire, then completed the battery of psychometric measures. Upon completion, participants were debriefed with a summary of the study's aims and hypotheses, alongside feedback on their entrepreneurial personality scores.

Measures

Innovation output (Ahmetoglu et al., 2011). The extent to which an individual has produced, or is currently engaging in, innovation was measured via 16 dichotomous items representing three domains of entrepreneurial activity: Corporate Innovation (e.g. "Have you in your past or current employment invented a new product or service to be sold?), Social Innovation (e.g. "In the past have you initiated activities aimed at bettering the community), and Technological Innovation (e.g. "Have you in the past sought an investment for one of your inventions"). Items for the Innovation output inventory were generated based on most common themes in the innovation and entrepreneurship literature (e.g. Kuratko, 2017; Shane & Venkataraman, 2000) and were consistent with related inventories (e.g., Carson, Peterson, & Higgins, 2005; Kalleberg and Leicht, 1991). The factor structure and internal consistency of the inventory have been demonstrated in previous research (e.g. Ahmetoglu et al., 2011; Almeida, Ahmetoglu & Chamorro-Premuzic, 2014; Leutner et al. 2014). The internal consistency of all three components in the current study were above $\alpha = .80$.

Entrepreneurial Culture Inventory (ECI; Akhtar, Ahmetoglu & Chamorro-Premuzic, 2014). The ECI is a 30-item self-report inventory that measures the extent to which an individual perceives their organization to promote and encourage entrepreneurial behaviors and practices. In particular, the items emphasize social identification with, and

entrepreneurial norms found in, an organization. The instrument consists of four dimensions: Leadership (e.g. “Leaders have a vision that I believe in” & “Leaders value original ideas”), Employee Values (e.g. “People are not afraid to fail” & “Brave decisions are recognized – even if they prove to be wrong”), Team Behavior (e.g. “Teams and departments happily share their knowledge and expertise with each other” & “My team share the same vision of success”) and Initiative (e.g. “I have the freedom to choose how I do my job” & “I am encouraged to use my initiative when making decisions”). Respondents are instructed to use a five-point Likert scale that ranges from completely disagree (1) to completely agree (5). A Principal Axis Factoring with Oblimin Rotation procedure revealed four distinct factors, with items corresponding to their hypothesized factor. The internal consistencies of all four factors were acceptable (see Table 1).

Measure of Entrepreneurial Tendencies and Abilities (META; Ahmetoglu et al., 2011). META consists of 40 items and assesses four dimensions of entrepreneurial personality: Proactivity (e.g. “Even when I spot a profitable business opportunity, I rarely act on it”), Creativity (e.g. “I am always trying to find new ways of doing things”), Opportunism (e.g. “I see business opportunities where others do not”), and Vision (e.g. “Great business ideas change the world”). Participants respond to items by rating their agreement via a five-point Likert scale ranging from ‘completely disagree’ (1) to ‘completely agree’ (5). Previous studies have demonstrated the scale to have good internal consistency and concurrent validity with innovation output (Leutner et al., 2014). The factor structure, internal consistency, and construct validity (i.e. validity with regards to other psychological constructs and criterion measures) of the inventory have been demonstrated in a number of previous studies (Ahmetoglu et al., 2011; Ahmetoglu, 2015; Akhtar et al., 2014; Almeida et al., 2014;

Chamorro-Premuzic, Rinaldi, Akhtar & Ahmetoglu, 2014; Leutner et al., 2014). The internal consistency of all four components in the current study were above α = .80.

The Utrecht Work Engagement Survey - 9 items (UWES; Schaufeli et al., 2006). The UWES is a 9-item scale measuring work engagement — the positive motivational and affective states that arise when working. It features three dimensions: Vigor (e.g. "At my work, I feel that I am bursting with energy"), Dedication (e.g. "I am enthusiastic about my job"), and Absorption (e.g. "I get carried away when I am working"). Participants are instructed to respond to each item by rating the frequency with which they experience the feelings described by each item, using a seven-point Likert scale (1 = never to 7 = always). The scale has been found to have excellent internal consistency cross-culturally (α = .85 to α = .92 between 10 countries; Schaufeli, 2006), and is the most predominantly used measure of engagement in the literature (Crawford et al., 2010). Measures of internal consistency are displayed in Table 1.

Corporate Entrepreneurship Assessment Inventory (CEAI; Hornsby et al., 2013). The CEAI is an 18-item scale that measures an organization's entrepreneurial orientation, in particular, their preparedness to engage in corporate entrepreneurship. It measures the extent to which an organization encourages risk-taking, innovative and proactive strategies across four dimensions: Work Discretion (e.g. "I seldom have to follow the same work methods or steps for doing my major tasks from day to day".), Time Availability (e.g. "I feel that I am always working with time constraints on my job"), Management Support (e.g. "My business unit supports many small and experimental projects realizing that some will undoubtedly fail.".), and Reward (e.g. "The rewards I receive are dependent upon my work on the job"). Given the objectives of this study — to extend

corporate entrepreneurship constructs — this measure was used as opposed to the 12 item EO developed by Miller and Friesen (1983), given that it was more recently developed, and captures more aspects of the way work is formally designed for engaging in corporate entrepreneurship. The scale was found to have good internal consistency (average $\alpha = .77$; Hornsby et al., 2013). Measures of internal consistency are displayed in Table 1.

Results

Before any analyses were carried out, both the independent and dependent variables were computed and then inspected to identify responses with missing data and outliers. Independent variables were also checked to ensure that they were normally distributed. No issues were found. As the majority of the participants were from the USA, and 17% of the sample were from the European Union, in order to ensure that the following analyses are generalizable to both geographies, three independent samples *t*-tests were conducted to investigate whether there were mean differences in corporate, technological and social innovations. It was found that across each of the dependent variables, European participants had a significantly higher level of innovation ($p < .010$). Given this, only participants from the USA ($N = 438$) were used in the following analyses. With the data cleaned, the study's hypotheses were ready to be tested.

Descriptive Statistics & Bivariate Correlations

Descriptive statistics, bivariate correlations and internal consistency measures are presented in Table 1. As can be seen, all scales achieved good levels of internal consistency. Of interest were the positive correlations between the ECI subscales and measures of entrepreneurial activity, work engagement and the CEAI (labelled "entrepreneurial orientation"). Similarly, an individual's job level (i.e. how senior they are within their organization) was positively correlated with increased technological and corporate entrepreneurial activities, alongside the ECI and CEAI measures. Based on these results, additional analyses were conducted to further test this study's hypotheses.

Table 1

Confirmatory Factor Analysis

In order to test H4, a second-order Confirmatory Factor Analysis (CFA) was conducted in order to test whether the CEAI construct could be extended with the hypothesized social-cognitive factors (as measured by the ECI). In order to test this hypothesis, three CFA models were tested: the first being a second-order CFA of the ECI (Model 1), the second being a second-order CFA of the CEAI (Model 2), and the third being a second-order CFA model containing both the ECI and CEAI items loading onto their respective latent dimensions, which were then loaded onto a single latent "Entrepreneurial Culture" factor (Model 3). The objective was to test the fit of each model. If the final model was found to fit the data, then H4 would be supported.

The fit for each of the three models were tested using the following indices: the χ^2 statistic (Bollen, 1989; which tests the hypothesis that an unconstrained model fits the

correlation matrix as well as the given model; $p > .05$ is desired); the goodness-of-fit index (GFI; Tanaka & Huba, 1985; values above .90 are acceptable); the comparative fit index (CFI; Bentler, 1990; values above .90 are acceptable); and the root mean square residual (RMSEA; Browne & Cudeck, 1993; values of .06 or below indicate reasonable fit for the model, and values between .06 to .10 being acceptable). The results of each CFA is displayed in Table 2.

It can be seen that each model partially fitted the data, as both the RMSEA and the CFI met the recommended values. Although the GFI and the χ^2 statistic suggest the models to not fit the data, the latter is sensitive to large sample sizes (Byrne, 2013). Given that both the CEAI and ECI items were found to adequately load onto a single latent factor, it can be said that such a latent factor represents the hypothesized entrepreneurial culture. As such, H4 was supported.

Table 2

Structural Equation Modelling

In order to test H1 and H2, a saturated SEM model was specified. Based on the final CFA model, this SEM featured an exogenous latent entrepreneurial personality variable (i.e. the four dimensions of the META) and a latent entrepreneurial culture variable[1]. This latent entrepreneurial culture featured the four dimensions of the ECI, alongside a single observed CEAI score that was used to measure entrepreneurial orientation. It should be noted that although the CEAI has four dimensions, the second CFA model presented in Table 2

[1] Although existing literature commonly explores the influence of the ECI factors individually, the dimensions were loaded onto a latent factor for two reasons. The first is because the current hypothesis was interested in understanding the collective influence of an individual's perceptions of their work environment. The second is that the current data is cross-sectional, and it was not possible to reliably infer the causal relationships regarding the antecedents of an organisation's culture. As such, a single latent factor was decided to be a more conservative approach, as it placed fewer assumptions on the data.

demonstrated the four dimensions to load onto a scale latent factor. Given a desire for parsimony and the objectives of this paper, a single score was used. Additionally, age and gender were treated as exogenous variables, in order to control for demographic effects. Work engagement was also treated as a latent factor, and specified to be both exogenous and endogenous variables. Finally, a latent factor titled 'innovation output' was treated as an endogenous variable. This latent factor represented three variables: technological, social and corporate innovations.

The model's fit was assessed via a handful of indices: the χ^2 statistic (Bollen, 1989; which tests the hypothesis that an unconstrained model fits the correlation matrix as well as the given model; $p > .05$ is desired); the goodness-of-fit index (GFI; Tanaka & Huba, 1985; values above .90 are acceptable); the comparative fit index (CFI; Bentler, 1990; values above .90 are acceptable); and the root mean square residual (RMSEA; Browne & Cudeck, 1993; values of .06 or below indicate reasonable fit for the model). Subsequently, the hypothesized model did not fit the data: $\chi 2\ (112) = 534.80$, $p < .001$; GFI = .87; CFI = .87; RMSEA = .09. In light of this, steps were taken to identify misspecifications. Paths were freed or added and variables removed on the basis of modification indices, expected parameter change statistics, significance levels, standardized residuals and the size of indirect effects (assessed via a bootstrapping method; number of bootstrap samples = 200, bias-corrected confidence intervals = .95). Paths were only added or freed if they made theoretical sense, and after each modification, fit indices were checked to ensure improved model fit.

These modifications resulted in the direct path between entrepreneurial culture and innovation output to be freed, as it was non-significant[1]. Similarly, the path between

[1] An additional SEM model was tested that featured just the latent entrepreneurial culture and innovation output factor. A significant path from entrepreneurial culture to innovation output was found ($\beta = .25$, $p < .001$; $\chi 2\ (18) = 55.35$, $p < .001$; GFI = .97; CFI = .98; RMSEA = .06). This model was tested in order to further explore H1 and whether the non-significant path found between the two factors is a result of including engagement in the model (H2).

entrepreneurial personality and the latent engagement factor was removed, as it was non-significant. Lastly, gender was also removed from the model as it held non-significant relationships with endogenous variables. After these modifications, the model adequately fitted the data ($\chi 2$ (93) = 269.42, $p < .001$; GFI = .92; CFI = .95; RMSEA = .06). In the model, the indirect relationship between entrepreneurial culture and TEA through engagement was found to be significant ($\beta = .11$, $p < .001$). Square multiple correlations revealed that a total of 17% of the variance in innovation output scores and 45% of the variance in engagement scores was accounted for by the exogenous variables.

In order to test for the influence of common method bias, Harman's single factor test was carried out: a single factor that accounted for the majority of variance was not found. In fact, a principal components analysis found a five-factor solution that replicated the latent factors fitted in the SEM. Table 3 displays the results of these analyses. These results uggests that common method variance was not of concern (Podsakoff & Organ, 1986). As such, the SEM analyses did not support for H1, but did provide full support for H2. The fitted model is illustrated in Figure 1.

Figure 1

Table 3

Moderation

In order to test the hypothesis that entrepreneurial culture moderates the relationship between an individual's entrepreneurial personality and tendency to engage in entrepreneurial activities (H3), four hierarchical multiple regressions were specified. The dependent variables were a composite innovation output score, alongside the three innovation variables: corporate, technological and social. In order to test for moderation effects, age and gender were entered into the first model to control for demographic effects, while centered versions of entrepreneurial culture and personality scores, alongside an interaction term, were entered into the second model. The results are presented in Table 4.

Table 4

Of the three regressions tested, a significant interaction effect was only found when regressing the variables on to corporate innovation. In order to further explore this effect, Gaskin's (2012) "StatsTool" statistics package was used to produce a two-way interaction visualization. This is illustrated in Figure 2. This significant interaction suggests that entrepreneurial culture positively moderated the relationship between an individual's entrepreneurial personality and the likelihood to pursue corporate innovations. In fact, the data suggested that if an individual has low levels of entrepreneurial personality, being in an entrepreneurial culture does not increase the tendency to produce such innovations. Yet, high levels of an entrepreneurial culture can significantly increase the tendency to produce corporate innovations, if the individual has high levels of entrepreneurial personality. Together, these findings provide partial support in H3, as the moderation effect was only found for corporate innovation.

Figure 2

Discussion

Given that organizations are facing increasing technological and economic pressures, engaging in corporate entrepreneurship is becoming a requisite for firms looking to stay innovative, competitive and relevant (Kuratko et al., 2014). Accordingly, there has been much work exploring the way organizations can develop internal environments, or cultures, that are conducive to the pursuit of entrepreneurship and innovation. Yet, as noted by Rauch et al. (2009) such understanding is limited, as it has traditionally ignored several relevant factors that are likely to influence employees' cognitions and behaviors. Given the wealth of literature demonstrating the importance of socialization on employee behavior (Anderson et al., 2014; Cooke & Rousseau, 1988), it was argued that there is an opportunity to extend existing corporate entrepreneurship constructs (e.g. Covin & Slevin, 1991; Hornsby et al., 2013). In particular, it was argued that such constructs could be extended through the integration of socio-cognitive factors (e.g. *Leadership Style, Employee Values, Team Behavior* and the promotion of *Initiative*) in order to have a better understanding regarding both how and why entrepreneurial cultures produce high performance and innovation. Similarly, given that corporate entrepreneurship does not occur in a vacuum, we aimed to explore the various mechanisms through which informal and formal factors influence employees' tendency to engage in innovation. In light of these aims, the following section will discuss each hypothesis, its equivalent results, and highlight the implications of the findings for theory and practice.

H1: There will be a direct relationship between increased perceptions of an entrepreneurial culture and an employee's level of innovation output

The theory of Performance-Outcome expectancy was hypothesized to be one psychological mechanism through which entrepreneurial culture (e.g. a combination of both formal and informal factors) influences employee behavior and their production of innovation. In particular, it was suggested that entrepreneurial cultures reward employees who behave in an opportunistic, proactive and innovative manner. Doing so, signals what behaviors the organization expects its employees to display. In turn, this increases the likelihood that such employees will behave in a similar manner in the future and produce innovation (Kautonen et al., 2013). This hypothesis was not supported.

Although there were positive and significant correlations between culture dimensions and innovation output, when demographic variables, entrepreneurial personality, and engagement were included in an SEM model (Figure 1), there was no significant relationship between the entrepreneurial culture and innovation output. This finding suggests that the effect of culture on an employee's innovation output is not direct. As evidenced in Figure 1, the influence of supporting and rewarding entrepreneurial behavior is expressed indirectly, specifically, through the influence of work engagement.

H2: Work engagement will positively mediate the relationship between entrepreneurial culture and innovation output.

Work engagement was hypothesized to mediate the relationship between entrepreneurial culture and innovation, given that the construct is influenced by both formal (i.e. process, structures & strategies) and informal (i.e. social interaction & meaningful work)

factors (Crawford et al., 2010). Given that entrepreneurial cultures can be characterized by such factors, it was thought that the motivation, commitment and dedication experienced by employees towards their work would heighten their willingness to put in the effort to partake in entrepreneurial activity and develop innovation. This hypothesized was supported.

Our findings thus suggest that entrepreneurial culture indirectly influences innovation output by impacting an employee's state of mind and affectivity. Such a finding is noteworthy as there is a lack of research exploring the relationship between entrepreneurial culture and engagement, and it demonstrates the importance of measuring and understanding the various psychological mechanisms that are impacted when organizations engage in corporate entrepreneurship. Similarly, it extends Ahmetoglu et al.'s research (2015) which found a positive relationship between entrepreneurial personality and engagement. Given that work disengagement is a critical motivator for becoming self-employed (Kirkwood, 2009), these findings may have important implications also in terms of employee attrition and retention, particularly relating to more entrepreneurial employees.

H3: In cultures which are entrepreneurial, employees with elevated levels of entrepreneurial personality traits will have increased levels of innovation output, in comparison to those employees with lower levels of entrepreneurial personality traits.

Based on person-organization fit theory (Tett & Burnett, 2003; Westerman & Cyr, 2004), it was hypothesized that organizations which have an entrepreneurial culture, are likely to benefit from increased innovation amongst their *entrepreneurial* employees. This is the result of congruence between an employee's personality and the organization's values and social norms. This congruence not only activates relevant traits, skills and abilities, but also enables the individual to freely express their behavioral dispositions — in this case, the

tendency to behave in a creative, proactive, opportunistic and visionary manner in the pursuit of innovation (Leutner et al., 2014). Testing such a hypothesis sought to build upon recent developments in the field of corporate entrepreneurship and individual differences, by demonstrating how individual and organizational approaches can be integrated and used to help organizations better support and facilitate innovation and value creation (Kautonen et al., 2013; Leutner et al., 2014; Shane & Venkataraman, 2000). This hypothesis was supported when predicting corporate innovation (but not social or technological innovation).

The results demonstrate that entrepreneurial culture has a disproportionate effect on employees with high levels of entrepreneurial personality. That is, entrepreneurial employees are significantly more likely to produce innovation output when they are in an entrepreneurial culture. Similarly, while entrepreneurial people are still likely to innovate in non-entrepreneurial cultures (albeit to a lesser degree), this contextual influence has no effect on individuals with low levels of entrepreneurial personality. This has practical implications for organizations looking to increase their capacity for innovation through cultural or training interventions. In particular, our results suggest such efforts and resources would be most effectively invested on individuals with high levels of entrepreneurial personality. In other words, placing entrepreneurial people in entrepreneurial environments (i.e. teams, departments & divisions) is the most 'efficient' way of fostering and producing innovation. Note that our data does not recommend against recruiting entrepreneurial people when the organizational culture is not entrepreneurial given that these individuals are more likely to innovate even in bureaucratic cultures. The results merely suggest that putting them in cultures that are not in line with their personality (e.g. bureaucratic cultures), would be substantially underutilizing their potential. Such insights are likely to be relevant for practitioners looking to build talent management strategies centered around entrepreneurial and innovative activity.

H4: Measures of *Leadership Style*, *Employee Values*, *Initiative* and *Team Behavior* can positively extend existing corporate entrepreneurship constructs, namely Hornsby et al.'s (2013) four factor framework.

This final hypothesis sought to extend existing corporate entrepreneurship constructs, namely the entrepreneurial orientation and Hornsby et al.'s (2013) four factor model (e.g. the CEAI inventory). This follows Rauch et al.'s (2009) call for developing more comprehensive corporate entrepreneurship constructs and demonstrating the importance of socialization in shaping an individual's innovation output (Cooke & Rousseau, 1988). Thus, we wanted to go beyond the focus on organizational strategy and work design factors, that are characteristic of existing models (Covin & Slevin, 1991; Hornsby et al., 2013). Drawing upon the existing psychological literature on the socio-cognitive processes involved in innovation (Anderson et al., 2014), four additional factors were hypothesized to extend the existing entrepreneurial culture models. These were the role of leadership's vision (*Leadership Style*; Ruvio et al., 2010), group identity (*Employee Values*; Hogg et al., 2012), social capital (*Team Behavior*; Burt, 2004) and empowerment (*Initiative*; Hmieleski & Ensley, 2007). As demonstrated by the confirmatory factor analyses presented in Table 2 and the SEM in Figure 1, this hypothesis was supported.

The findings presented in this paper demonstrate that both formal and informal organizational factors are compatible and associated with positive organizational outcomes — engagement and innovation. It can, therefore, be said that the more an individual perceives the organization's culture to support and reward entrepreneurial activity and innovation, alongside having compatible formal operations, strategies and structures, the more likely they

are to hold positive attitudes towards pursuing innovation, and to have the motivation to behave entrepreneurially.

Limitations & Future Research

The foremost limitation of the presented study is the use of single-source, self-report methodology. It would have been ideal to include outcome variables that featured objective measures of achievement. Nonetheless, support for the use of self-report measures of entrepreneurial achievement comes from the meta-analysis by Rauch et al. (2009) who found a negligible difference between the effect sizes of organizational factors on subjective and objective measures of firm performance. The second limitation is that the sample used was primarily from the USA. The findings, therefore, may be culture-bound; for instance, previous research indicates that national cultural values and attitudes (e.g. individualism and power distance) can influence the level of corporate entrepreneurship observed in organizations in that nation (Turró, Urbano, & Peris-Ortiz; 2014).

The final limitation concerns the use of crowdsourced sample, in particular Amazon's Mechanical Turk. The use of crowdsourced samples in social science is the subject of a lively debate, where their use is either questioned due to potential limitations surrounding their reliability and external validity (Harms & DeSimone, 2015), or championed as such samples have greater socio-economic, geographical and ethnic diversity (Landers & Behrend, 2015). Although this debate is far from settled, with both perspectives highlighting important issues, it is important to not only acknowledge the limitations with such a sampling method, but also justify our use of a crowdsourced sample and argue that our findings have external validity.

Firstly, although a crowdsourced sample was used for convenience reasons, we argue that it remains a suitable sample given that participants had to be in full-time employment, more specifically, participants could not work fulltime for Amazon's Mechanical Turk

platform. Secondly, we were interested in how individuals perceive their organization's work environment, specifically its culture. As such, we feel that collecting data from, and comparing across, specific organizations is not needed to suitably test our hypothesis (despite being an interesting line of future research). Lastly, additional analyses found no significant differences in average entrepreneurial personality scores (as measured by META) between the participants recruited from Amazon's Mechanical Turk and those from professional social networking sites such as LinkedIn (a subset of the sample that has arguably more external validity). Although this finding does not guarantee for our findings to have external validity, it does suggest that both samples are as entrepreneurial as each other (Leutner et al., 2014).

To address the above limitations, future research should seek to adopt objective data, targeted populations, and a longitudinal design in order to ascertain the predictive validity of the relationships identified in this cross-sectional sample. For instance, collecting such data from a variety of organizations, based in different industries and countries, would allow multi-level models to assess within and between group variation in entrepreneurial culture on innovation. Such an analysis may also shed more light on the extent to which increased innovation is due to entrepreneurial culture versus effective management (Bakker & Demerouti, 2008). Additionally, given that an individual's job level (i.e. how senior they are within the organization) was positively related to entrepreneurial activities, future research should seek to explore how less senior employees can be encouraged and supported to engage in such activities. The most plausible interpretation of this finding is that senior members of staff have more autonomy and opportunities to engage in entrepreneurial activities (Burgess, 2013). Future research should also attempt to replicate the extended corporate entrepreneurship constructs, in order to determine whether the social and contextual factors included in this study are appropriate and suitable in other industries and

organizational settings. Lastly, it would be desirable to replicate the findings with non-crowdsourced samples to ensure their generalizability.

Practical Implications

Notwithstanding these limitations, several practical recommendations can be made to managers and consultants looking to promote entrepreneurial behavior and innovation within organizations. First, given the direct relationship between entrepreneurial personality and innovation in this and previous research, identifying, selecting, and onboarding employees who possess higher levels of entrepreneurial talent is perhaps the most efficient way to increase innovation output within an organization. However, identifying entrepreneurial talent may not always be straightforward. For instance, it is not easy to gage in interviews and can also be difficult to 'observe' on the job given that entrepreneurial behaviors are often discouraged in organizations (Hayton, 2005). This can be rectified by the use of valid psychometric tests that reliably predict entrepreneurial behaviors and achievements. The inventory used in the current study (i.e. META) is one of the most commonly used measurement instruments of the characteristics of entrepreneurial individuals (Muñiz, Suárez-Álvarez, Pedrosa, Fonseca-Pedrero, & García-Cueto, 2014), although several other measures conceptually aligned to this purpose exist, including the Entrepreneurial Alertness measure (Kaish & Gilad, 1991), various Innovativeness measures (e.g., Kirton, 1976), and the individual level Entrepreneurial Orientation Scale (Langkamp Bolton & Lane, 2012).

Second, coaching and training programs could focus on increasing entrepreneurial tendencies, especially for employees who are in important strategic roles for innovation, or have lower levels the entrepreneurial personality traits. Such interventions could be aimed at increasing key competencies of entrepreneurial talent, namely, creativity, the recognition and exploitation of opportunities, and the formulation and communication of inspirational vision.

For instance, Chamorro-Premuzic (2015) gives valuable suggestions on how to increase employees' creativity. The proposed initiatives include bringing people out of their comfort zone with challenging tasks and projects outside their main field of expertise, giving employees the freedom to work on tasks they enjoy, and even promoting meditation. Strategies to make employees more proactive may be centered around developing their tendency to act on the opportunities they spot. Campos et al. (2017) found that boosting personal initiative in entrepreneurs had an almost three times larger effect on business performance than traditional business training. Their tested training program aimed to teach business owners an entrepreneurial mindset of innovation, recognizing and exploiting opportunities and self-starting behavior, through classroom sessions and assistance with implementation of the new practices.

Third, our study demonstrates that fostering an entrepreneurial company culture results in higher engagement, which in turn increases innovation. Therefore, an effective way for organizations to facilitate both engagement and innovation is by creating an environment that allows for, and rewards the exploration and exploitation of new opportunities, creative ideas, and inspirational goals. To this end, practitioners working with an organization's leadership can focus on four areas. The first is leadership: ensuring that managers support entrepreneurial practices and regularly communicate a vision for innovation, growth and progress (Ruvio et al., 2010). Managers should lead by example and act as role models for the rest of the organization in order to dispel skepticism and doubt.

The second is employee values: leaders should aim to build an entrepreneurial in-group social identity. One way for organizations to achieve this is through setting a clear and powerful mission statement that has emotional meaning to employees (Amabile & Kramer, 2012). This helps to create a common sense of purpose and interdependence of their objectives, which not only drives collaboration, but also boosts innovation output (Hülsheger

et al., 2009). The statement needs to be reflective of innovativeness, creativity and risk-taking as defining features of the organization, to guide employees.

The third area to focus on is Initiative. The key to motivating employee initiative is to make them empowered. Based on the concept of leadership empowerment behavior (Arnold, Arad, Rhoades & Drasgow, 2000), Dewettinck and van Ameijde (2010) suggest several practices that leaders should adopt in order to give their employees a sense of empowerment. For example, they stress the importance of joint decision making as an opportunity for employees to have an impact within the organization. Introducing a hybrid reward structure that combines rewarding innovative performance on a team level with incentives for individual contribution (Pearsall, Christian & Ellis, 2010) can also provide meaning and motivation for individual efforts, create greater team cohesion and knowledge sharing (De Dreu, 2007), while also minimizing social loafing.

Finally, practitioners should focus on Team Behaviour to boost employees' access to social capital and enhance cohesiveness within the social networks. Practitioners may start with tools such as Social Network Analysis (Wasserman & Faust, 1994) to identify the stage of social capital development, and subsequently use this information to modify communication channels and collaborative practices (Cross & Parker, 2004). Off-site meetings are an effective way to build relationships, engage people and initiating networks. Depending on the phase of the relationships within the organization, the specific interventions should be modified, ranging from encouraging non-work related communication as a way of establishing rapport, to building a shared vision through discussion of an ideal project (Cross & Parker, 2004). Critically, all these interventions need to have innovation communicated as their fundamental objective.

Of course, consultants and managers should be cognizant of the fact that only dimensions which have deficits may need changing, rather than all dimensions. If an

organization has a clear vision but not enough social capital, then investment should obviously focus on the latter. Thus, profiling the cultural dimensions at the start of any intervention is a good way to identify whether, and where, investments should be made.

The final intriguing finding of our study was to show that an entrepreneurial culture does not make the whole workforce more innovative, but rather accelerates the productivity of *entrepreneurial* employees. From a practical point of view, this means that although recruiting entrepreneurial employees or facilitating an entrepreneurial culture may be fruitful methods for increasing innovation output, organizations would get biggest return on investment by focusing on matching entrepreneurial people to entrepreneurial environments. This is not an easy task, but relevant strategies do exist. One way of achieving this is by the three-step process: a) identifying where entrepreneurial talent is located within the organization (e.g. teams, departments), b) profiling the culture of those locations to identify which dimensions are particularly low, and c) trying to work to enhance and make these cultural dimensions more entrepreneurial. This could simply mean focusing on a team or a department rather than engaging in an organization-wide intervention.

The reverse alternative is to identify, through culture profiling, teams or departments within the organization that have an elevated entrepreneurial culture and strategically place entrepreneurial employees in those locations. Often it is not realistic to expect large organizations to change their company culture (e.g. to become more entrepreneurial). It may be easier, therefore, to place entrepreneurial employees in environments where the "microclimate" is entrepreneurial. For instance, research on team climate suggests that entrepreneurial individuals who feel confident to introduce, develop and express new ideas tend to prefer environments in which the team supports creativity and innovation (Burch & Anderson, 2004). This will, of course, need on-boarding practices in place, but could be an

effective way to increase the productivity and innovation output of these individuals, teams, and organization as a whole.

Conclusion

This paper sought to address gaps in the corporate entrepreneurship literature, through the inclusion of socio-cognitive factors, alongside investigating three psychological mechanisms through which entrepreneurial culture influences an employee's level of innovation output. In particular, work engagement was found to mediate the relationship between entrepreneurial culture and innovation output. Furthermore, entrepreneurial culture moderated the relationship between entrepreneurial personality and innovation output. It is hoped that this paper will stimulate related research to further develop both theory and practice.

Acknowledgements

We would like to thank Sofya Yutisheva for her invaluable input into writing this manuscript.

References

Ahmetoglu, G. (2015). *The entrepreneurial personality: A new framework and construct for entrepreneurship research and practice* (Doctoral dissertation, Goldsmiths, University of London).

Ahmetoglu, G., Harding, X., Akhtar, R., & Chamorro-Premuzic, T. (2015). Predictors of Creative Achievement: Assessing the Impat of Entrepreneurial Potential, Perfectionism, and Employee Engagement. *Creativity Research Journal*, *27*(2), 198-205.

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*(8), 1028-1033.

Akhtar, R., Ahmetoglu, G., & Chamorro-Premuzic, T. (2014). *Entrepreneurial Culture Inventory*. Unpublished Measure (available upon request).

Almeida, P. I., Ahmetoglu, G., & Chamorro-Premuzic, T. (2014). Who wants to be an entrepreneur? The relationship between vocational interests and individual differences in entrepreneurship. *Journal of Career Assessment*, *22*(1), 102-112.

Amabile, T. M. (1993). Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. *Human resource management review*, *3*(3), 185-201.

Amabile, T. M. & Kramer, S. J. (2012). How leaders kill meaning at work. Retrieved from https://www.mckinsey.com/featured-insights/leadership/how-leaders-kill-meaning-at-work

Amabile, T. M., Barsade, S. G., Mueller, J. S., & Staw, B. M. (2005). Affect and creativity at work. *Administrative science quarterly*, *50*(3), 367-403.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of management journal*, *39*(5), 1154-1184.

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and Creativity in Organisations: A State-of-the-Science Review, Prospective Commentary, and Guiding Framework. *Journal of Management*, *40*(5), 1297-1333.

Arnold, J. A., Arad, S., Rhoades, J. A., & Drasgow, F. (2000). The empowering leadership questionnaire: The construction and validation of a new scale for measuring leader behaviors. *Journal of Organizational Behavior*, 249-269.

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career development international*, *13*(3), 209-223.

Bakker, A. B., & Xanthopoulou, D. (2013). Creativity and charisma among female leaders: the role of resources and work engagement. *The International Journal of Human Resource Management*, *24*(14), 2760-2779.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238-246.

Bollen, K. A. (1989). Structural equations with latent variables. New York: Wiley.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Burgess, C. (2013). Factors influencing middle managers' ability to contribute to corporate entrepreneurship. *International Journal of Hospitality Management*, *32*, 193-201.

Burke, W. W., & Litwin, G. H. (1992). A causal model of organizational performance and change. *Journal of management*, *18*(3), 523-545.

Burt, R. S. (2004). Structural holes and good ideas. *American journal of sociology*, *110*(2), 349-399.

Byrne, B. M. (2013). *Structural Equation Modelling with AMOS: Basic concepts, applications, and programming*. Routledge.

Campos, F., Frese, M., Goldstein, M., Iacovone, L., Johnson, H. C., McKenzie, D., & Mensmann, M. (2017). Teaching personal initiative beats traditional training in boosting small business in West Africa. *Science*, *357*(6357), 1287-1290.

Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, validity, and factor structure of the creative achievement questionnaire. *Creativity Research Journal*, *17*(1), 37-50.

Chamorro-Premuzic, T. (2015, February 23). You Can Teach Someone to Be More Creative. *Harvard Business Review*. Retrieved from https://hbr.org/2015/02/you-can-teach-someone-to-be-more-creative

Chamorro-Premuzic, T., Rinaldi, C., Akhtara, R., & Ahmetoglu, G. (2014). Understanding the motivations of female entrepreneurs. *Journal of Entrepreneurship & Organization Management*, *3*(111), 2-6.

Cooke, R. A., & Rousseau, D. M. (1988). Behavioural Norms and Expectations A Quantitative Approach To the Assessment of Organisational Culture. *Group & Organisation Management*, *13*(3), 245-273.

Covin, J. G., & Slevin, D. P. (1991). A conceptual model of entrepreneurship as firm behaviour. *Entrepreneurship theory and practice*, *16*(1), 7-25.

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: a theoretical extension and meta-analytic test. *Journal of Applied Psychology*, *95*(5), 834-848.

Cross, R. L., & Parker, A. (2004). *The hidden power of social networks: Understanding how work really gets done in organisations*. Cambridge, MA; Harvard Business Review Press.

De Carolis, D. M., & Saparito, P. (2006). Social capital, cognition, and entrepreneurial opportunities: A theoretical framework. *Entrepreneurship Theory and Practice*, *30*(1), 41-56.

De Dreu, C. K. (2007). Cooperative outcome interdependence, task reflexivity, and team effectiveness: a motivated information processing perspective. *Journal of applied psychology*, *92*(3), 628.

Dewettinck, K., & van Ameijde, M. (2011). Linking leadership empowerment behaviour to employee attitudes and behavioural intentions: Testing the mediating role of psychological empowerment. *Personnel Review*, *40*(3), 284-305.

Fayolle, A., Basso, O., & Bouchard, V. (2010). Three levels of culture and firms' entrepreneurial orientation: A research agenda. *Entrepreneurship and Regional Development*, *22*(7-8), 707-730.

Frese, M., & Gielnik, M. M. (2014). The Psychology of Entrepreneurship. *Annual Review of Organisational Psychology and Organisational Behaviour*, *1*(1), 413–438.

Gaskin, J., (2012), "Group Differences", Stats Tools Package. Retrieved from http://statwiki.kolobkreations.com

Gregory, B. T., Albritton, M. D., & Osmonbekov, T. (2010). The mediating role of psychological empowerment on the relationships between P–O fit, job satisfaction, and in-role performance. *Journal of Business and Psychology*, *25*(4), 639-647.

Harms, P. D., & DeSimone, J. A. (2015). Caution! MTurk workers ahead—Fines doubled. *Industrial and Organisational Psychology*, *8*(2), 183-190.

Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: a meta-analysis. *Journal of applied psychology*, *87*(2), 268.

Hmieleski, K. M., & Ensley, M. D. (2007). A contextual examination of new venture performance: entrepreneur leadership behaviour, top management team heterogeneity, and environmental dynamism. *Journal of Organisational Behaviour*, *28*(7), 865-889.

Hodgetts, R. M., Kuratko, D. F., & Kuratko, D. F. (1998). *Effective small business management*. Fort Worth: Dryden Press.

Hogg, M. A., van Knippenberg, D., & Rast III, D. E. (2012). The social identity theory of leadership: Theoretical origins, research findings, and conceptual developments. *European Review of Social Psychology*, *23*(1), 258-304.

Hornsby, J. S., Kuratko, D. F., & Zahra, S. A. (2002). Middle managers' perception of the internal environment for corporate entrepreneurship: assessing a measurement scale. *Journal of business Venturing*, *17*(3), 253-273.

Hornsby, J. S., Kuratko, D. F., Holt, D. T., & Wales, W. J. (2013). Assessing a measurement of organisational preparedness for corporate entrepreneurship. *Journal of Product Innovation Management*, *30*(5), 937-955.

Hornsby, J. S., Kuratko, D. F., Shepherd, D. A., & Bott, J. P. (2009). Managers' corporate entrepreneurial actions: Examining perception and position. *Journal of Business Venturing*, *24*(3), 236-247.

Hülsheger, U. R., Anderson, N., & Salgado, J. F. (2009). Team-level predictors of innovation at work: a comprehensive meta-analysis spanning three decades of research. *Journal of Applied psychology*, *94*(5), 1128-1145.

Ireland, R. D., Covin, J. G., & Kuratko, D. F. (2009). Conceptualizing corporate entrepreneurship strategy. *Entrepreneurship theory and practice*, *33*(1), 19-46.

Ireland, R. D., Kuratko, D. F., & Morris, M. H. (2006). A health audit for corporate entrepreneurship: innovation at all levels: Part I, *Journal of Business Strategy*, *27*(1), 10-17.

Kaish, S., & Gilad, B. (1991). Characteristics of opportunities search of entrepreneurs versus executives: Sources, interests, general alertness. *Journal of business venturing*, *6*(1), 45-61.

Kalleberg, A. L., & Leicht, K. T. (1991). Gender and organizational performance: Determinants of small business survival and success. *Academy of management journal*, *34*(1), 136-161.

Kautonen, T., Van Gelderen, M., & Tornikoski, E. T. (2013). Predicting entrepreneurial behaviour: a test of the theory of planned behaviour. *Applied Economics*, *45(*6), 697-707.

Kirkwood, J. (2009). Motivational factors in a push-pull theory of entrepreneurship. *Gender in Management: An International Journal*, *24*(5), 346-364.

Kirton, M. (1976). Adaptors and innovators: A description and measure. *Journal of applied psychology*, *61*(5), 622.

Kuratko, D. F. (2017). Corporate Entrepreneurship & Innovation. In The Wiley Handbook of Entrepreneurship (eds G. Ahmetoglu, T. Chamorro-Premuzic, B. Klinger and T. Karcisky).

Kuratko, D. F., & Nagelvoort, S. K. (2015). Corporate Entrepreneurship. In R. W. Griffin. (Ed.), *Oxford bibliographies in management*. New York, NY: Oxford University Press.

Kuratko, D. F., Hornsby, J. S., & Covin, J. G. (2014). Diagnosing a firm's internal environment for corporate entrepreneurship. *Business Horizons*, *57*(1), 37-47.

Landers, R. N., & Behrend, T. S. (2015). An inconvenient truth: Arbitrary distinctions between organisational, Mechanical Turk, and other convenience samples. *Industrial and Organisational Psychology*, *8*(02), 142-164.

Langkamp Bolton, D., & Lane, M. D. (2012). Individual entrepreneurial orientation: Development of a measurement instrument. *Education+ Training*, *54*(2/3), 219-233.

Lawler, E. E., & Jenkins, G. D. (1992). Strategic reward systems. *Dennette, MD, Handbook of Industrial and Organizational Psychology*. *Consulting Psychologists Press, Palo Alto, California*.

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.

Licht, A. N., & Siegel, J. I. (2008). The Social Dimensions of Entrepreneurship. In A. Basu, M. Casson, N. Wadeson, & B. Young (Eds.), *The Oxford Handbook of Entrepreneurship* (pp. 511-540). Oxford: Oxford University Press.

Lumpkin, G. T. (2007). Intrapreneurship and innovation. In J. R. Baum, M. Frese & R. Baron (Eds), *The Psychology of Entrepreneurship* (pp. 237-263). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of management Review*, *21*(1), 135-172.

Miller, D. (2015). A downside to the entrepreneurial personality? *Entrepreneurship Theory and Practice*, *39*(1), 1-8.

Miller, D. & Friesen, P. H. (1983). Innovation in conservative and entrepreneurial firms: Two models of strategic momentum. *Strategic Management Journal, 3*, 1-25.

Muñiz, J., Suárez Álvarez, J., Pedrosa, I., Fonseca Pedrero, E., & García Cueto, E. (2014). Enterprising personality profile in youth: Components and assessment. *Psicothema*, *26*(4).

Myers, K. K., & Sadaghiani, K. (2010). Millennials in the workplace: A communication perspective on millennials' organizational relationships and performance. *Journal of Business and Psychology*, *25*(2), 225-238.

Ozgen, E., & Baron, R. A. (2007). Social sources of information in opportunity recognition: Effects of mentors, industry networks, and professional forums. *Journal of business venturing*, *22*(2), 174-192.

Pearsall, M. J., Christian, M. S., & Ellis, A. P. (2010). Motivating interdependent teams: Individual rewards, shared rewards, or something in between?. *Journal of Applied Psychology*, *95*(1), 183.

Pearsall, M. J., Christian, M. S., & Ellis, A. P. (2010). Motivating interdependent teams: Individual rewards, shared rewards, or something in between?. *Journal of Applied Psychology*, *95*(1), 183.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organisational research: Problems and prospects. *Journal of management*, *12*(4), 531-544.

Priem, R. L., Li, S., & Carr, J. C. (2012). Insights and new directions from demand-side approaches to technology innovation, entrepreneurship, and strategic management research. *Journal of management*, *38*(1), 346-374.

Rauch, A., Wiklund, J., Lumpkin, G. T., & Frese, M. (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship theory and practice*, *33*(3), 761-787.

Ruvio, A., Rosenblatt, Z., & Hertz-Lazarowitz, R. (2010). Entrepreneurial leadership vision in nonprofit vs. for-profit organisations. *The Leadership Quarterly*, *21*(1), 144-158.

Saks, A. M. (2006). Antecedents and consequences of employee engagement. *Journal of managerial psychology*, *21*(7), 600-619.

Schaufeli, W. B., & Bakker, A. B. (2010). Defining and measuring work engagement: Bringing clarity to the concept. *Work engagement: A handbook of essential theory and research*, 10-24.

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire a cross-national study. *Educational and psychological measurement*, *66*(4), 701-716.

Schein, V. E. (2007). Women in management: reflections and projections. *Women in management review*, *22*(1), 6-18.

Schneider, B., Ehrhart, M. G., & Macey, W. H. (2013). Organisational Climate and Culture. *Annual review of psychology*, *64*, 361-388.

Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of management review*, *25*(1), 217-226.

St J. Burch, G., & Anderson, N. (2004). Measuring person-team fit: Development and validation of the team selection inventory. *Journal of Managerial Psychology*, *19*(4), 406-426.

Staddon, J. E. R., & Cerutti, D. T. (2003). Operant conditioning. *Annual review of psychology*, *54*, 115-144.

Tanaka, J. S., & Huba, G. J. (1985). A fit index for covariance structure models under arbitrary GLS estimation. *British Journal of Mathematical and Statistical Psychology*, *38*(2), 197-201.

Teece, D. J. (2016). Dynamic capabilities and entrepreneurial management in large organizations: Toward a theory of the (entrepreneurial) firm. *European Economic Review*, *86*, 202-216.

Tett, R. P., & Burnett, D. D. (2003). A personality trait-based interactionist model of job performance. *Journal of Applied Psychology*, *88*(3), 500-517.

Thomke, S., & Nimgade, A. (2000). *IDEO product development*. Cambridge, MA: Harvard Business School.

Thornberry, N. (2001). Corporate entrepreneurship: antidote or oxymoron? *European Management Journal*, *19*(5), 526-533.

Turró, A., Urbano, D., & Peris-Ortiz, M. (2014). Culture and innovation: The moderating effect of cultural values on corporate entrepreneurship. *Technological Forecasting and Social Change*, *88*, 360-369.

Tushman, M., & Nadler, D. (1986). Organizing for innovation. *California management review*, *28*(3), 74-92.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge University Press.

Weisbord, M. R. (1976). Organizational diagnosis: Six places to look for trouble with or without a theory. *Group & Organization Studies*, *1*(4), 430-447.

West, G. (2007). Collective Cognition: When Entrepreneurial Teams, Not Individuals, Make Decisions. *Entrepreneurship Theory and Practice*, *336*, 77-103.

Westerman, J. W., & Cyr, L. A. (2004). An integrative analysis of person–organisation fit theories. *International Journal of Selection and Assessment*, *12*(3), 252-261.

Table 1: Descriptive Statistics & Bivariate Correlations

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	M	SD	α
1. Age	—																	35.83	12.10	—
2. Gender	.10*	—																1.51	.50	—
3. Job Level	.27**	.04	—															1.45	.86	—
4. Employee Values	.07	-.05	.29**	—														3.23	.79	.89
5. Team Behavior	.04	.08	.06	.59**	—													3.66	.69	.88
6. Leadership Style	.08	.09	.23**	.58**	.59**	—												3.77	.85	.89
7. Initiative	.18**	.03	.37**	.62**	.53**	.51**	—											3.52	.84	.82
8. Entrepreneurial Orientation	.06	-.04	.30**	.78**	.61**	.51**	.64**	—										4.25	1.07	.91
9. Opportunism	-.04	-.19**	.19**	.44**	.30**	.31**	.18**	.36**	—									3.16	.79	.89
10. Proactivity	.09	.00	.23**	.15**	.21**	.23**	.23**	.16**	.40**	—								3.17	.62	.80
11. Creativity	.09	-.02	.19**	.31**	.36**	.29**	.29**	.31**	.54**	.35**	—							3.40	.59	.81
12. Vision	-.03	.03	.08	.18**	.38**	.29**	.21**	.16**	.44**	.29**	.49**	—						3.69	.58	.81
13. Vigor	.26**	-.02	.25**	.46**	.49**	.44**	.46**	.54**	.27**	.25**	.33**	.29**	—					3.42	1.49	.88
14. Dedication	.23**	.06	.20**	.43**	.53**	.44**	.48**	.50**	.22**	.23**	.34**	.31**	.85**	—				3.86	1.49	.87
15. Absorption	.17**	.09	.20**	.36**	.49**	.42**	.39**	.38**	.24**	.23**	.36**	.35**	.73**	.76**	—			3.90	1.36	.86
16. Corporate Innovation	.05	-.08	.24**	.16**	.00	.08	.09*	.13**	.19**	.01	.17**	-.01	.11*	.09	.10*	—		.16	.27	.80
17. Technological Innovation	.23**	-.03	.25**	.16**	.16**	.15**	.23**	.12**	.19**	.15**	.25**	.12**	.27**	.27**	.27**	.38**	—	.57	.34	.89
18. Social Innovation	-.10*	.03	.05	.07	.09	.07	.06	.08	.14**	.05	.19**	.13**	.07	.08	.10*	.31**	.33**	.26	.30	.82

Note: Correlations significant at the following levels:* $p < .050$ (two-tailed); ** $p < .010$ (two-tailed); ***$p < .001$ (two-tailed). Job Level: 1 = Employees, 2 = Managers, 3 = Senior Managers, 4 = Directors/Executives. *ECI* (4 – 7), *Entrepreneurial Orientation* as measured by the CEAI (8), *Entrepreneurial Personality* as measured by META (9 - 12), *Work Engagement* as measured by the UWES (13 - 15).

Figure 1: The Fitted SEM Model. *Note*: All paths are significant ($p < .001$).

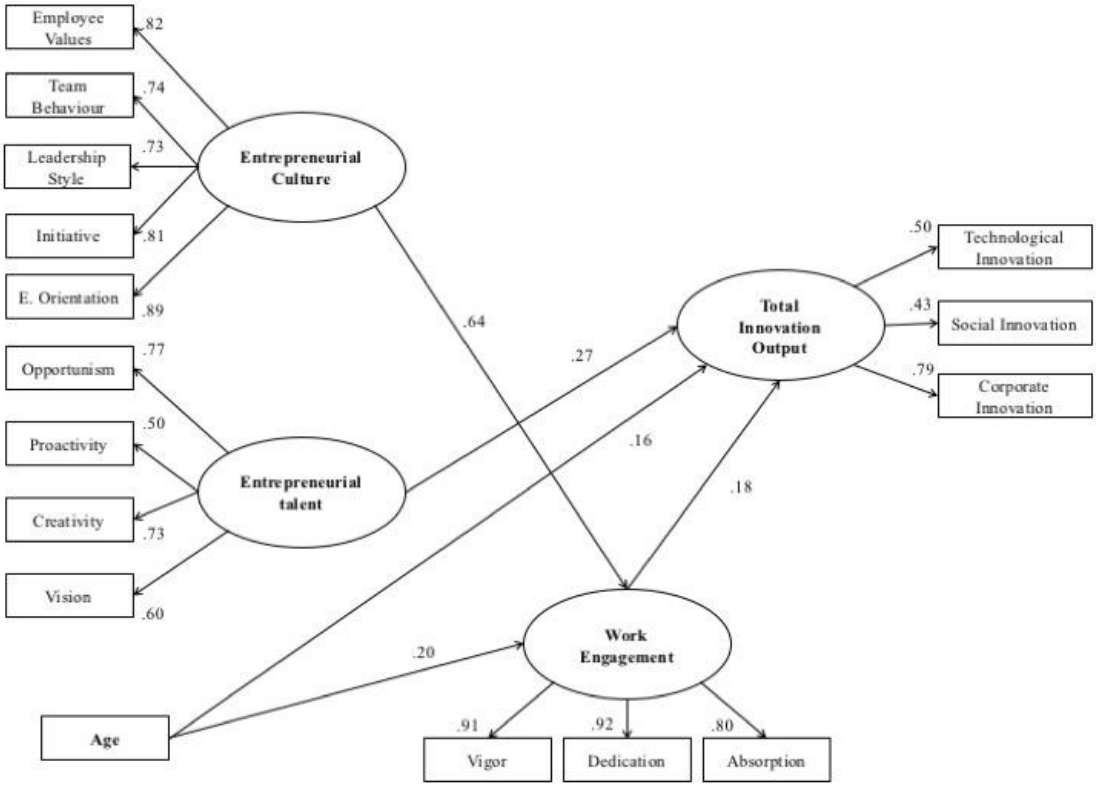

Table 2: The Results of Second-Order Confirmatory Analyses

Model	χ^2 (*df*)	GFI	CFI	RMSEA
Entrepreneurial Culture Inventory	989.56 (401)***	.86	.91	.06
Entrepreneurial Orientation	601.40 (130)***	.86	.90	.09
Entrepreneurial Culture (Model 1 + 2)	2322.87 (1062) ***	.81	.90	.05

Note: *** Indicates χ^2 is significant at the $p < .001$ level. Entrepreneurial Orientation was measured by the CEAI.

Table 3: Results of a Principal Components Analysis.

						Commonalities	
	Comp. 1	Comp 2.	Comp. 4	Comp. 4	Comp.5	Initial	Extracted
Age					**.85**	.75	.25
META Opportunism	**.34**		**.72**			.70	.30
META Proactivity			**.72**		**.37**	.66	.34
META Creativity			**.68**			.67	.33
META Vision			**.62**		**-.33**	.70	.30
Entrepreneurial Orientation	**.86**					.80	.20
ECI Values	**.89**					.84	.16
ECI Team Behavior	**.67**	**.44**				.71	.29
ECI Leadership	**.71**					.60	.40
ECI Decision-Making	**.73**					.65	.35
Engagement Vigor	**.37**	**.79**				.81	.19
Engagement Dedication	**.38**	**.83**				.87	.13
Engagement Absorption		**.85**				.83	.17
TEA - Technology				**.79**		.67	.33
TEA - Corporate				**.70**		.63	.37
TEA - Social				**.75**		.65	.35
Sum of Squared Loadings	3.56	2.81	2.09	1.86	1.21		
Proportion Variance	.22	.18	.13	.12	.08		
Cumulative Variance	.22	.40	.53	.65	.72		
Proportion Explained	.31	.24	.18	.16	.11		
Cumulative Proportion	.31	.55	.73	.89	1.00		

Note: Loadings less than .30 are not presented for presentation purposes.

Table 4: Results of Four Hierarchical Multiple Regressions Testing the Interaction Between Entrepreneurial Culture & Personality on Innovation Output.

		Model 1		Model 2		Model 3		Model 4	
		Total Innovation Output		Corporate Innovation		Technological Innovation		Social Innovation	
	Variables	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Step 1	Age	.11	2.55**	.23	5.25***	.10	2.22**	-.07	-1.59
	Gender	-.10	-.10*	-.10	-2.41**	-.11	-2.50**	-.02	-.34
	$F(2, 431)$ =	**5.35****		**15.62*****		**5.123****		**1.38**	
	Adj R^2 =	**.02**		**.05**		**.02**		**.01**	
Step 2	Age	.09	2.18*	.21	5.05***	.08	1.81	-.08	-1.86
	Gender	-.06	-1.43	-.06	-1.57	-.09	-2.01*	.02	.37
	E. Culture	.11	2.27*	.12	2.60**	.08	1.67	.04	.89
	E. Personality	.28	5.95***	.26	5.53***	.17	3.39***	.23	4.66***
	Culture*Personality	-.04	-1.02	-.09	-2.14*	.04	1.00	-.05	-1.26
	$F(2, 428)$ =	**16.46*****		**21.13*****		**7.51*****		**7.70*****	
	Adj R^2 =	**.13**		**.16**		**.06**		**.06**	

Note: E = Entrepreneurial. * $p < .050$ (two-tailed); ** $p < .010$ (two-tailed); ***$p < .001$ (two-tailed).

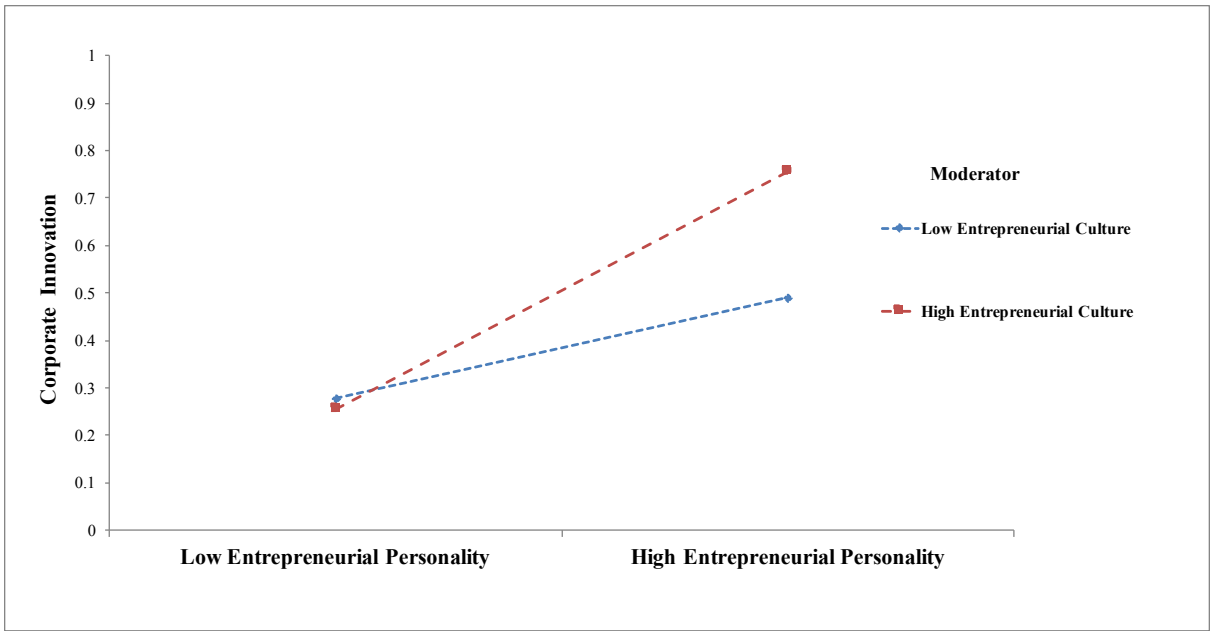

Figure 2: A Two-Way Interaction between Entrepreneurial Culture and Personality, on Corporate Innovation.