Measurement Invariance of Entrepreneurial Personality in relation to Sex, Age, and Self-employment

Álvaro Postigo[1,*], Eduardo García-Cueto[1], José Muñiz[2], Covadonga González-Nuevo[1] and Marcelino Cuesta[1]

[1]Department of Psychology, University of Oviedo, Oviedo, Spain

[2]Rectorate, Nebrija University, Madrid, Spain

*Corresponding author: Álvaro Postigo
Department of Psychology
University of Oviedo
Plaza Feijoo s/n
33003 Oviedo (Spain)
e-mail: postigoalvaro@uniovi.es

Abstract

The analysis of sociodemographic variables such as age and sex has demonstrated their importance in entrepreneurial activity. Therefore, it is important to study the role these variables play in entrepreneurial personality. The aim of this research was to examine measurement invariance of the Battery for the Assessment of the Enterprising Personality (BEPE), and to study the differences in entrepreneurial personality as a function of sex, age, and being self-employed or not. The sample comprised 1,170 participants (>30 years old: 76.1%; women: 60%; self-employed: 13%). We analyzed various levels of measurement invariance: configural, metric, scalar, and residual invariance. The BEPE showed measurement invariance with respect to age, sex and type of employment at all of the invariance levels. We also found differences in entrepreneurial personality as a function of these sociodemographic variables.

Keywords: *invariance; equivalence; factor structure; sex; age; self-employment; entrepreneurial personality*

Introduction

Studying entrepreneurial activity is fundamental for the growth and development of every country (OECD, 2019), as various international reports have shown, including *Entrepreneurship at a Glance* (OECD, 2018) and *Global Entrepreneurship Monitor* (GEM, 2020). When it comes to attempting to explain what underlies someone becoming an entrepreneur there have been various approaches from the economic (Obschonka et al., 2015) and sociological (Chell, 2008), to the psychological (Baum et al., 2007; Frese & Gielnik, 2014). One of the different lines of research in the psychological approach is individuals' personal characteristics, with the study of entrepreneurial personality standing out (Kerr et al., 2018; Rauch & Frese, 2007b). Entrepreneurial personality can be studied from global Big Five-type models (Zhao et al., 2010), or through specific personality traits (Muñiz et al., 2014; Rauch & Frese, 2007a).

In line with the two theoretical approaches, various measuring instruments have been developed based on the Big Five (Sartori et al., 2016) and specific traits of entrepreneurial personality (Muñiz et al., 2014; Rauch & Frese, 2007a). Among the latter, there are many instruments that measure specific traits individually, but far fewer if one looks for a questionnaire that combines the traits that make up entrepreneurial personality (Suárez-Álvarez & Pedrosa, 2016). One of the instruments that addresses this issue, evaluating eight specific traits of entrepreneurial personality in a single questionnaire is the Battery for the Assessment of the Enterprising Personality (BEPE; Cuesta et al., 2018). The BEPE shows a good fit to a standard bifactor model with one general factor of entrepreneurial personality and eight uncorrelated specific dimensions (Cuesta et al., 2018). The specific dimensions are: Autonomy, Innovation, Achievement

motivation, Internal locus of control, Self-efficacy, Risk-taking, Stress tolerance, and Optimism.

Autonomy refers to the motivation toward entrepreneurial creation as an attempt to achieve certain individual freedom (Van Gelderen & Jansen, 2006). *Innovation* is defined as the interest in and willingness to search for new ways of doing things (Rauch & Frese, 2007b). *Achievement motivation* is defined as the desire to achieve standards of excellence (Suárez-Álvarez et al., 2013). *Internal locus of control* refers to the causal attribution that the consequences of a behavior depend on oneself (Suárez-Álvarez et al., 2013). *Self-efficacy* relates to the conviction that one can effectively organize and execute actions as well as persist when faced with obstacles in order to achieve desired results (Costa et al., 2013). *Risk-taking* is about people's tendency and willingness to take on certain levels of insecurity that will allow them to achieve a goal that presents greater benefit than the potential negative consequences (Antoncic et al., 2018; Moore & Gullone, 1996). *Stress tolerance* is defined as the resistance to perceiving environmental stimuli as stressful thanks to appropriate use of coping strategies (Lazarus & Folkman, 1986), and *Optimism* is defined as a person's belief about the occurrence of positive rather than negative events in life (Shepperd et al., 2002).

The BEPE battery for adults (Cuesta et al., 2018) originated from a prior version for adolescents (Muñiz et al., 2014; Pedrosa et al., 2016; Suárez-Álvarez et al., 2014). A short version of the battery for adults with 16 items, 2 per specific factor, has recently been developed (Postigo, García-Cueto, et al., 2020), as well as a Computerized Adaptive Test version (Postigo, Cuesta, Pedrosa, et al., 2020). The BEPE has demonstrated relationships to academic performance (Muñiz et al., 2014) as well as to other psychological constructs related to entrepreneurial activity such as emotional intelligence (Muñiz et al., 2014) and grit (Postigo, Cuesta, García-Cueto, et al., 2020).

Given the relative newness of these instruments, one of the aspects that must still be examined more thoroughly is measurement equivalence or measurement invariance (MI). MI is the idea that following the development and validation of an instrument, researchers should ask themselves whether it measures different populations in the same way. If it does not, and it measures different groups differently, it raises the question of whether the scale can be used for comparisons, or making decisions about these populations (Thompson, 2016). Despite that, it is common for researchers to assume that the construct being evaluated is invariant in different populations (Sass & Schmitt, 2013). In this regard, as French and Finch (2016) argued, fairness in instrument construction is essential, as shown by the attention of the legal system, politicians, instrument creators and instrument users, researchers, and the general public, considering an instrument fair when it reflects the same construct for all the people being tested, and when the scores have the same meaning for all individuals (AERA, APA, NCME, 2014). In psychological measurement, an instrument that is designed to measure a trait should show differences between individuals who differ in that trait, and people should not get different scores in this trait just because they belong to a certain group (Amérigo et al., 2020; Thompson, 2016). In this way, MI has become a logical prerequisite for comparisons between groups (Vandenberg & Lance, 2000). In fact, common tests of mean differences (e.g., t-test, analysis of variance) are biased if MI cannot be established for a given scale.

There has been an increase in the study of MI in personality instruments in transcultural studies (Thielmann et al., 2020), as a function of sex and age (Ock et al., 2020), and even as a function of applying the instrument online or in pencil and paper format (Vecchione et al., 2012), among others. However, despite it having been stressed that in order to better understand "entrepreneurial spirit", the modulating effects of

sociodemographic variables such as age and sex should be studied (Bohlmann et al., 2017; Cuesta et al., 2018), the MI of the BEPE battery, which would provide validity evidence justifying unbiased comparisons, has not yet been studied.

When it comes to age, people aged between 18 and 30 are generally more likely to become entrepreneurs (GEM, 2020), and there is a negative relationship between age and becoming self-employed (Bohlmann et al., 2017; Hatak et al., 2015). Other authors have found an inverted-U shaped relationship between age and entrepreneurship (Coduras et al., 2018; Lévesque & Minniti, 2006). Nonetheless, Kautonen et al. (2014) found that entrepreneurial activity increased with age for those who wanted to be self-employed, rejecting the idea of considering youth to be a key part of having entrepreneurial success (Azoulay et al., 2020). More specifically, in order to better understand this link, the relationship between age and different personality traits has been studied, including optimism, self-efficacy, autonomy, innovation, stress tolerance, and risk-taking, which are variables that are positively correlated with age (Baron et al., 2016; Gärtner & Hertel, 2020; Jiménez et al., 2017; Kozubíková et al., 2016; Lévesque & Minniti, 2011), whereas internal locus of control is negatively correlated (Molino et al., 2018).

Another extremely interesting topic is the difference between men and women in terms of entrepreneurial activity (Henry et al., 2016; Marlow & Martínez-Dy, 2018; Verheul et al., 2012), with only one in ten women becoming self-employed compared to two in ten men (OECD, 2017). These differences may be due to women having less desire to become entrepreneurs (Verheul et al., 2012), although other authors have stated that sex has no effect on the intention to start a business (Hatak et al., 2015). Gender differences are also reflected in the personality traits related to entrepreneurial activity, and are greater in more advanced economies (Mueller, 2004). In terms of the

Big Five, female entrepreneurs or women who want to start businesses score higher than men in extraversion, conscientiousness, and openness to experience (López-Núñez et al., 2020; Obschonka et al., 2014). In the specific personality traits, women exhibit more realism, or less optimism (Niederle & Vesterlund, 2007), less self-efficacy (Molino et al., 2018), less tolerance to stress (Falavarjani & Yeh, 2019), and they are less likely to take risks (Perez-Quintana et al., 2017), whereas there are no differences in autonomy between men and women (Kozubíková et al., 2016).

Lastly, it is important to note that entrepreneurs have tended to exhibit high levels in the various specific traits making up entrepreneurial personality (Rauch & Frese, 2007a, b). For example, Baron et al. (2016) found that one reason why entrepreneurs demonstrated lower levels of stress is because they have more psychological resources such as self-efficacy (see, Newman et al., 2019) and optimism, with the latter related to humor (Menéndez-Aller et al., 2020). Other characteristics of entrepreneurs include motivation for success, internal locus of control, and risk-taking (Antoncic et al., 2018; Tyszka et al., 2011).

It is clear that differences between the sexes, age, and working for oneself or not have been studied in relation to entrepreneurship, both through the Big Five and through specific traits of the entrepreneurial personality. However, studies into entrepreneurship with these sociodemographic variables have focused on the analysis of specific traits singly, and studies have not considered the simultaneous analysis of the specific traits making up the entrepreneurial personality (Cuesta et al., 2018; Muñiz et al., 2014; Rauch & Frese, 2007a). In addition, to the best of our knowledge, nor has MI been examined in the BEPE Battery instrument through which these possible differences can be assessed. The objective of this study is to examine the possible differences in entrepreneurial personality, and in the specific traits that make it up, according to age,

sex, and being self-employed or not. This general objective gives rise to two specific objectives. First, to study MI in the BEPE, and so determine whether it is possible to compare the scores in entrepreneurial personality, and the eight specific dimensions making up the instrument, in terms of age (under-30s compared to over 30s), sex, and being self-employed or not. Second, to examine the possible differences in entrepreneurial personality, and the eight specific traits that make it up, as a function of the aforementioned sociodemographic variables.

With regard to the first objective, we hypothesize that the BEPE scores will be invariant with respect to age (under-30s compared to over-30s), sex, and being self-employed or not, and that therefore there will be no differences simply due to the fact of belonging to one group or other. With regard to the second objective, based on results from previous studies by other researchers, we hypothesize that the BEPE scores will show differences according to age, sex, and being self-employed or not, with higher scores from younger people (under 30), men, and the self-employed.

Method

Participants

The sample initially comprised 1,324 Spanish volunteers from the adult population. The sampling was non-probabilistic snowball sampling. The inclusion criteria were to be over 18 years old and to be currently working. The final sample was made up of 1,170 participants, following the removal of those who were insufficiently careful answering the control questions in the questionnaire. The mean age was 42.34 years ($SD = 12.96$). Table 1 gives the distributions according to the groups of interest. Over half (56%) of the participants worked in the tertiary or service sector, 68.5% of the self-employed had been so for more than four years, and 86.4% of those with their own businesses had fewer than five employees.

……..………..……. *Insert Table 1 about here*……………..……..

Instruments

Battery for the Assessment of the Enterprising Personality (BEPE)

The BEPE has 80 items evaluating eight dimensions (ten items per dimension), which have been identified in the literature as the most strongly related to entrepreneurial personality: Self-efficacy, Autonomy, Innovativeness, Internal locus of control, Achievement motivation, Optimism, Stress tolerance, and Risk-taking (Cuesta et al., 2018; Muñiz et al., 2014). The items use a Likert-type scale with five response alternatives (from strongly disagree to strongly agree). To maximize the psychometric properties of the scale, all of the items are given in a direct form (stronger agreement with the item is related to a higher level of the evaluated construct; Vigil-Colet et al., 2020). The instrument's psychometric properties are satisfactory, both from a classical perspective (Cuesta et al., 2018), and Item Response Theory (Postigo, Cuesta, et al., 2020). Cuesta et al. (2018) reported very good results for the BEPE in terms of reliability (α= .808 - .965) and construct validity (adequate fit to a standard bifactor model). In addition, they reported adequate evidence of validity in relation to other variables, such as the well-known entrepreneurial personality instrument, *Measure of Entrepreneurial Tendencies and Abilities* (META; Ahmetoglu et al., 2011). Postigo, Cuesta, Pedrosa, et al. (2020) developed a bank of BEPE items which allowed them to create a Computerized Adaptive Test for evaluation enterprising personality with a reduced number of items with hardly any loss of measurement accuracy.

The α coefficients for the sample in the present study were: Overall Enterprising Personality Score (α = .97), Self-efficacy (α = .88), Autonomy (α = .81), Innovation (α = .88), Internal locus of control (α = .85), Achievement motivation (α = .86), Optimism (α = .89), Stress tolerance (α = .84), and Risk-taking (α = .87). The BEPE battery was

originally developed and validated in Spain (Cuesta et al., 2018), and it was this version used in our study.

Attentional control scale.

This is a scale with 10 Likert-type items with five response alternatives. The scale is used in order to detect participants who respond to the questionnaire at random. Items are of the type "If you read this question you should respond strongly agree", and were included among the items in the BEPE. We removed 154 participants from the sample for responding incorrectly to two or more of these questions.

Procedure

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. Informed consent was obtained from the participants, who were recruited via snowball sampling. Potential participants who met the inclusion criteria (workers over 18 years old) were personally contacted. They were asked to answer the online questionnaire and provide contact details for other potential participants. These new potential participants were asked to collaborate both in answering the questionnaire and in obtaining contact details for more new participants. The response process was open for three months (February to April, 2017). The average response time estimated in the instrument phase was 20 min. Participants did not receive any kind of reward for participating in the study. The anonymity of each participant in this study was scrupulously respected, confidentiality was maintained, and the ethical code of the Official Colleges of Psychologists was followed.

Data Analyses

We used the Multigroup Confirmatory Factor Analysis (MCFA) process to examine MI between the groups, which occurs at different levels; configural, metric, and scalar invariance. Owing to the nested nature of the models that underlie the

different levels of invariance, we used the *forward approach*, which is to successively add restrictions onto a base model (Dimitrov, 2010). This means that each model assumes that the lower levels are invariant. In our study there were four items in the BEPE where none of the participants chose alternative 1, which led us to combine alternatives 1 and 2 together for the MI study in order for the software to be able to produce the models. For estimating parameters, we used Weighted Least Squares, and the Mean and Variance (WLSMV) adjusted as estimation method. When the number of categories is small (fewer than five or six), categorical variable methodology with a robust estimator such as WLSMV within Mplus (Finney et al., 2016; Thompson, 2016) is generally recommended. As a base model, we performed various CFA's under a bifactor structure to examine the fit of the instrument for each group separately. We performed validation studies of the BEPE using a standard bifactor model, assuming a general factor of enterprising personality and eight uncorrelated specific factors. We used X^2/df, the *Confirmatory Factor Index* (CFI), and *Root Mean Square Error of Approximation* (RMSEA) as indices of fit. Fit is adequate when $X^2/df < 3$, $CFI \geq .95$ and $RMSEA \leq .06$ (Hu & Bentler, 1999).

Once the fit of the models was confirmed separately, we performed successive multi-group CFAs to analyze the different types of MI in the instrument. The series of models most often used to evaluate MI is defined by applying sets of between-group constraints on less constrained models, yielding pairings of more-constrained models that are nested within less-constrained models. The first step is the configural invariance model (M0), which posits that the same items belong to the same factor in all of the groups, but that the factor loadings and thresholds vary freely between groups, in other words, the measuring instrument has the same factorial structure in the groups being compared. To identify the model, the variance of each factor was set to one and the

means to zero for both groups. The second step was to estimate the metric invariance, or weak invariance (M1), where the factor loadings are set as equal between the groups, and thus determine that the factor loadings are within the same interval between the groups. The third step was to estimate scalar invariance, or strong invariance (M2), where, in addition to the above, the item thresholds are set as equal, being ordinal data (Pendergast et al., 2017), determining that the units of measurement are equal between the groups. Finally, we examined a new model freeing the residual variances (M3A), to examine the final level of invariance, residual invariance, or strict invariance (M3B), through which the residual variances are restricted. This type of invariance indicates that the differences between groups in means, variance, and covariance is solely due to differences in the latent variable (Dimitrov, 2010; Thompson, 2016). To accept MI, the reduction in CFI must be below .01 (ΔCFI<-.01) and the increase in RMSEA less than .015 (ΔRMSEA<.015) (Chen, 2007).

Following that, we examined the differences in the eight specific dimensions and the general entrepreneurial personality factor with regard to the different sociodemographic variables. We examined whether there were differences between the self-employed and non-self-employed and one sex and the other, and whether there were differences between the under- and over-30s and sex. To do that, we performed two MANOVAs with two independent variables, being self-employed or not and sex, and age and sex, respectively. We used F from Pillai's Trace as the test statistic as it is the most robust test (Meyers et al., 2016). We analyzed the effect size using Cohen's *d*, with values between 0.2 and 0.4 indicating a small effect size, between 0.5 and 0.7 a moderate effect size, and 0.7 and above a large effect size. As we were dealing with 8 variables to compare, we corrected Type I errors using Bonferroni's correction (α=.05/8), producing a level of significance of <.0063 to be considered significant.

The MI analysis was performed with MPlus8 (Muthen & Muthen, 2017). Differences between groups was examined using SPSS 24 (IBM Corp, 2016).

Results

We examined MI in each of the conditions. Table 2 (sex), Table 3 (age), and Table 4 (self-employed or not) show that the BEPE demonstrated adequate fit to a bifactor model in each of the groups we considered (Hu & Bentler, 1999). In addition, both CFI and RMSEA demonstrated that MI was confirmed at all levels, including residual invariance, for all of the conditions studied in the BEPE (sex, age, and being self-employed) (Chen, 2007).

……….……….……… Insert Table 2 about here……………….……...

……….……….……… Insert Table 3 about here……………….……...

……….……….……… Insert Table 4 about here……………….……...

We performed two MANOVAs to determine whether there were differences depending on being self-employed or not and sex, and depending on being under- or over-30 and sex. In both MANOVAs the interaction was not statistically significant (self-employment and sex; $p =.857$, age and sex; $p =.303$), thus we moved on to study the main effects. Table 5 gives the differences in direct scores in the general entrepreneurial personality factor, and in the eight specific dimensions, as a function of being self-employed or not, being over or under 30 years old, and of being a man or woman. In terms of self-employment, there were only notable differences in autonomy, with a moderate effect size ($d = 0.43$), with the self-employed scoring higher. In terms of age, there were statistically significant differences in self-efficacy ($d = 0.30$), innovation ($d = 0.25$), internal locus of control ($d = 0.33$), risk-taking ($d = 0.32$), and in the general entrepreneurial personality factor ($d = 0.23$), with young people (under 30) scoring higher. Lastly, there were statistically significant differences with respect to sex

in self-efficacy ($d = 0.21$), autonomy ($d = 0.24$), innovation ($d = 0.22$), stress tolerance ($d = 0.44$), risk-taking ($d = 0.35$), and in the general entrepreneurial personality factor ($d = 0.30$). The power of the test was above .7 in all variables except those mentioned above where no differences were found.

………………. *Insert Table 5 about here*…………………

Discussion

The study of entrepreneurial activity, and in particular the phase related to starting a business (Baron & Shane, 2008), is fundamental to the development of any economy (OECD, 2019). This includes the determinants that surround it, such as personal factors and the study of entrepreneurial personality (Kerr et al., 2018). Research into entrepreneurial personality has needed studies assessing the role of sociodemographic variables (Bohlmann et al., 2017; Cuesta et al., 2018) and this is what frames our study. Despite the importance that MI has acquired in psychometric personality research (Ock et al., 2020; Thielmann et al., 2020), the instruments that assess entrepreneurial personality (see, Suárez-Álvarez & Pedrosa, 2016) need a more thorough assessment of MI, as it is a prerequisite for making comparisons between groups (Thompson, 2016; Vandenberg & Lance, 2000). Given that, our study was split between two specific objectives. One was to assess MI in the BEPE (Cuesta et al., 2018) according to sex, age, and whether the subject was self-employed or not, demonstrating that the BEPE reflected the same construct for the groups being examined, and that the scores it gave had the same significance for everyone assessed (AERA, APA, NCME, 2014). The other was to examine the differences in entrepreneurial personality and the eight psychological traits that make it up between the self-employed and non-self-employed, between men and women, and between the under 30s and the over 30s. The self-employed scored higher in autonomy (Rauch &

Frese, 2007a). Men were more stress-tolerant than women, and lastly, the under-30s

scored higher in self-efficacy, internal locus of control, and risk-taking (Bohlmann et

al., 2017; López-Núñez et al., 2020).

Firstly, we examined MI in the BEPE (Cuesta et al., 2018) to determine whether

there were biases when evaluating the different groups. The bifactor structure of the

BEPE was shown to be invariant at all levels with respect to sex, age, and being self-

employed or not. The invariance demonstrated by the BEPE allows for the comparison

of not only an overall entrepreneurial personality score, but also the eight specific

dimensions, with the possibility of making comparisons of entrepreneurial personality

profiles between different groups (Kerr et al., 2018).

Secondly, we examined the possible differences between the self-employed and

the non-self-employed. Although we might talk about trends in all of the traits, there

were only statistically significant differences in autonomy, with the self-employed

scoring higher than those working for someone else (Rauch & Frese, 2007b), which is

consistent with entrepreneurs having to make decisions without supervisors and

independently develop plans of action (Baum et al., 2007). One unresolved question is

establishing the line separating someone who works for themselves from an

entrepreneur, and the one separating an entrepreneur who starts a business because they

want to, and so has an idea and a project to put into practice, from someone who starts a

business because they need to; such a project, rather than being the result of a

propensity for entrepreneurial activity, may result from the need to *make a living*, as

recent Spanish data shows (GEM, 2019, 2020).

Finally, we looked at the existence of differences in traits of entrepreneurial

personality as a function of sex and age. Sex and age are two variables that have been

shown to be key in entrepreneurial activity (GEM, 2020; OECD, 2017), and essential in

better understanding "entrepreneurial spirit" (Bohlmann et al., 2017). With regard to

sex, men scored significantly higher in all of the entrepreneurial personality traits except

for internal locus of control, motivation for success, and optimism, where we found no

significant differences. The difference in stress tolerance stood out, with men exhibiting

more tolerance of stressful situations (Falavarjani & Yeh, 2019). This may help to

explain the difference in the ratio of entrepreneurs between men and women, where the

business context is a source of stimuli that could be classed as stressful, and where

personality plays a modulating role in stress (Wincent & Örtqvist, 2009). The pattern of

men scoring higher in entrepreneurial personality agrees with previous research which

has looked at some of these traits singly (Molino et al., 2018; Niederle & Vesterlund,

2007), putting these differences down to women valuing external support for starting a

business more than personal characteristics such as self-efficacy (Molino et al., 2018).

With regard to age, it was important to differentiate between the younger

participants (aged 18 to 30) and those over 30, as recent international reports have

indicated that the under-30s demonstrate greater likelihood of becoming entrepreneurs

(GEM, 2020). Optimism and stress tolerance were traits that were stable between the

two age groups, and autonomy was the only trait that gave higher scores as subjects

were older, so both men and women consider these variables important as they age. The

variables which younger participants scored highly (under 30 vs. over 30) were self-

efficacy, innovation, internal locus of control, and risk taking, along with the general

entrepreneurial personality factor, although effect sizes were small. These results are in

line with the idea that age is negatively correlated with entrepreneurial activity

(Bohlmann et al., 2017; GEM, 2020; Hatak et al., 2015), but disagree with other studies

that have shown positive correlations between some specific personality traits

(including self-efficacy, autonomy, and optimism) and age (Baron et al., 2016; Gärtner

& Hertel, 2020; Jiménez et al., 2017; Kozubíková et al., 2016; Lévesque & Minniti, 2011). Generally, levels of entrepreneurial personality decrease with the passage of time, as young people from the age of majority onwards demonstrate high levels in all entrepreneurial personality traits, which is why the evaluation and stimulation of entrepreneurial spirit is so important in the educational context (Muñiz et al., 2014). This is because more attention needs to be paid to the psychological side of things to encourage entrepreneurialism (Frese et al., 2016), training abilities that would help people take on the challenges facing the self-employed (Santos et al., 2018).

There are some considerations that should be borne in mind in terms of future lines of research. In the first place, the sample of self-employed workers in our study was small (13%), future studies should try to have a larger sample of this population. Secondly, entrepreneurial activity is a worldwide phenomenon, which is monitored regularly in most countries owing to its economic, social, and psychological importance (GEM, 2020; OECD, 2019). As such, validating and confirming the invariance of the BEPE and the model it is based on (Rauch & Frese, 2007a) in other cultures would help to provide a transculturally invariant tool for assessing entrepreneurial personality, similar to the HEXACO model of general personality, for example (Thielmann et al., 2020). Thirdly studying how entrepreneurial personality progresses throughout life is extremely important in helping understand what lies beneath this phenomenon, so it would be extremely interesting to have more age groups as well as longitudinal studies to extend the results from our study, and in so doing determine whether there is an inverted-U progression in the psychological traits that has been seen in entrepreneurial activity (Coduras et al., 2018; Lévesque & Minniti, 2006). These results should be taken with some caution because in a bifactor model, such as the one we used to analyze the BEPE, not all of the items have the same loadings in each of the specific factors

analyzed. To consider these differential loadings, one would have to use the factor scores rather than the empirical scores, which would add significant complexity in applied and professional contexts.

Various practical conclusions can be drawn from this study. It shows that the BEPE instrument for entrepreneurial personality is invariant with regard to sex, age, and being self-employed or not, allowing unbiased comparison between the different groups. This confirms that the BEPE may be used to evaluate people of different sexes, ages, and employment conditions, and opens the door to future studies that may look in more depth at the role of enterprising behavior in terms of various sociodemographic, non-cognitive, and cognitive variables. In addition, it provides evidence for the idea that men exhibit higher levels in all of the entrepreneurial personality traits, with the differences in stress tolerance being notable. As Verheul et al. (2012) put it, one of the ways of reducing the differences between men and women in entrepreneurial activity, in addition to government policies aimed at removing obstacles (see, Foss et al., 2019), is to address women's preferences and attitudes towards self-employment, offering help to acquire relevant knowledge and skills, such as training those aspects that make up the entrepreneurial personality (Cuesta et al., 2018), and taking new paths in researching entrepreneurialism in women. It is also important to consider the impact of sociocultural factors that influence these gaps (Dheer et al., 2019), as the stereotypes and beliefs around gender in each culture affect men's and women's opportunities, all too often to the detriment of women, who do not share equal conditions. Finally, we conclude that self-employed workers are more autonomous than those who work for someone else, and that over-30s have lower levels of entrepreneurial personality than those who are younger.

In short, given that the BEPE showed measurement invariance based on sex, age, and employment type, it seems a good starting point to fairly assess the different specific traits of the entrepreneur's personality. So, it will be possible to intervene on them to begin to reduce the entrepreneurial gaps with respect to the sociocultural factors that exist today.

Data Availability Statement

The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Compliance with Ethical Standards

Conflict of Interest statement

The authors declare that there are no conflicts of interest.

Informed Consent to participate

Informed consent to participate was obtained from the participants.

References

AERA, APA, & NCME. (2014). *Standards for educational and psychological testing.* American Psychological Association.

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. https://doi.org/10.1016/j.paid.2011.08.016

Amérigo, M., García, J. A., Pérez-López, R., Cassullo, G., Ramos, A., Venumbaka, S. K., & Aragonés, J. I. (2020). Analysis of the structure and factorial invariance of the Multidimensional Environmental Concern Scale (MECS). *Psicothema, 32*(2), 275-283. https://doi.org/10.7334/psicothema2019.281

Antoncic, J. A., Antoncic, B., Gantar, M., Hisrich, R. D., Marks, L. J., Bachkirov, A. A., Li, Z., Polzin, P., Borges, J. L., Coelho, A., & Kakkonen, M. L. (2018). Risk-taking propensity and entrepreneurship: The role of power distance. *Journal of Enterprising Culture, 26*(1), 1–26. https://doi.org/10.1142/S0218495818500012

Azoulay, B. P., Jones, B. F., Kim, J. D., & Miranda, J. (2020). Age and high-growth entrepreneurship. *American Economic Review: Insights*, *2*(1), 65–82. https://doi.org/10.1257/aeri.20180582

Baron, R., Franklin, R., & Hmieleski, K. M. (2016). Why entrepreneurs often experience low, not high, levels of stress: The joint effects of selection and psychological capital. *Journal of Management*, *42*(3), 742–768. https://doi.org/10.1177/0149206313495411

Baum, J. R., Frese, M., Baron, R. A., & Katz, J. A. (2007). Entrepreneurship as an area of Psychology study: An introduction. In J. R. Baum, M. Frese, & R. A. Baron (Eds.), *The psychology of entrepreneurship* (pp. 1–18). Lawrence Erlbaum.

Baron, R. A., & Shane, S. A. (2008). *Entrepreneurship: A process perspective.*

Thomson South-Western.

Bohlmann, C., Rauch, A., & Zacher, H. (2017). A lifespan perspective on

entrepreneurship: Perceived opportunities and skills explain the negative

association between age and entrepreneurial activity. *Frontiers in Psychology*, *8*,

2015. https://doi.org/10.3389/fpsyg.2017.02015

Chell, E. (2008). *The entrepreneurial personality: A social construction*. Routledge.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement

invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(3),

464–504. https://doi.org/10.1080/10705510701301834

Coduras, A., Velilla, J., & Ortega, R. (2018). Age of the entrepreneurial decision:

Differences among developed, developing, and non-developed countries.

Economics and Business Letters, *7*(1), 36–46.

Costa H., Ripoll P., Sánchez M., & Carvalho C. (2013). Emotional intelligence and self-

efficacy: Effects on psychological well-being in college students. *Spanish Journal*

of Psychology, 16, E50. http://dx.doi.org/10.1017/sjp.2013.39

Cuesta, M., Suárez-Álvarez, J., Lozano, L. M., García-Cueto, E., & Muñiz, J. (2018).

Assessment of eight entrepreneurial personality dimensions: Validity evidence of

the BEPE battery. *Frontiers in Psychology*, *9*, 2352.

https://doi.org/10.3389/fpsyg.2018.02352

Dheer, R. J. S., Li, M., & Treviño, L. J. (2019). An integrative approach to the gender

gap in entrepreneurship across nations. *Journal of World Business*, *54*(6), 101004.

https://doi.org/10.1016/j.jwb.2019.101004

Dimitrov, D. M. (2010). Testing for factorial invariance in the context of construct

validation. *Measurement and Evaluation in Counseling and Development*, *43*(2),

121–149. https://doi.org/10.1177/0748175610373459

Falavarjani, M. F., & Yeh, C. J. (2019). Optimism and distress tolerance in the social adjustment of nurses: examining resilience as a mediator and gender as a moderator. *Journal of Research in Nursing*, *24*(7), 500–512. https://doi.org/10.1177/1744987119839102

Finney, S. J., DiStefano, C., & Kopp, J. P. (2016). Overview of estimation methods and preconditions for their application with structural equation modeling. In K. Schweizer & C. DiStefano (Eds.), *Principles and methods of test construction* (pp. 135–165). Hogrefe Publishing.

Foss, L., Henry, C., Ahl, H., & Mikalsen, G. H. (2019). Women's entrepreneurship policy research: A 30-year review of the evidence. *Small Business Economics*, *53*, 409–429. https://doi.org/10.1007/s11187-018-9993-8

French, B. F., & Finch, W. H. (2016). Detecting Differential Item Functioning. In K. Schweizer & C. DiStefano (Eds.), *Principles and methods of test construction* (pp. 197–217). Hogrefe Publishing.

Frese, M., & Gielnik, M. M. (2014). The Psychology of Entrepreneurship. *The Annual Review of Organizational Psychology and Organizational Behavior*, *1*, 413–438. https://doi.org/10.1146/annurev-orgpsych-031413-091326

Frese, M., Gielnik, M. M., & Mensmann, M. (2016). Psychological training for entrepreneurs to take action: Contributing to poverty reduction in developing countries. *Current Directions in Psychological Science*, *25*(3), 196–202. https://doi.org/10.1057/9781137327734

Gärtner, L. U. A., & Hertel, G. (2020). Age as moderator of the relationship between self-efficacy and effort in occupational teams. *Work, Aging and Retirement*, *6*(2), 118–129. https://doi.org/10.1093/workar/waz024

Global Entrepreneurship Monitor [GEM] (2019). *Global Report 2018/19.* London Business School.

Global Entrepreneurship Monitor [GEM] (2020). *Global Report 2019/20.* London Business School.

Hatak, I., Harms, R., & Fink, M. (2015). Age, job identification, and entrepreneurial intention. *Journal of Managerial Psychology*, *30*(1), 38–53. https://doi.org/10.1108/JMP-07-2014-0213

Henry, C., Foss, L., & Ahl, H. (2016). Gender and entrepreneurship research: A review of methodological approaches. *International Small Business Journal*, *34*(3), 217–241. https://doi.org/10.1177/0266242614549779

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55. https://doi.org/10.1080/10705519909540118

IBM Corp. (2016). *IBM SPSS Statistics for Windows, Version 24.0 [Computer software].*

Jiménez, M. G., Montorio, I., & Izal, M. (2017). The association of age, sense of control, optimism, and self-esteem with emotional distress. *Developmental Psychology*, *53*(7), 1398–1403. https://doi.org/10.1037/dev0000341

Kautonen, T., Down, S., & Minniti, M. (2014). Ageing and entrepreneurial preferences. *Small Business Economics*, *42*, 579–594. https://doi.org/10.1007/s11187-013-9489-5

Kerr, S. P., Kerr, W. R., & Xu, T. (2018). Personality traits of entrepreneurs: A review of recent literature. *Foundations and Trends® in Entrepreneurship, 14*(3), 279–356. http://dx.doi.org/10.1561/0300000080

Kozubíková, L., Vojtovič, S., Rahman, A., & Smrčka, L. (2016). The role of

entrepreneur's gender, age and firm's age in autonomy. The case study from the

Czech Republic. *Economics and Sociology*, *9*(2), 168–182.

https://doi.org/10.14254/2071-789X.2016/9-2/12

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping.* Springer.

Lévesque, M., & Minniti, M. (2006). The effect of aging on entrepreneurial behavior.

Journal of Business Venturing, *21*, 177–194.

https://doi.org/10.1016/j.jbusvent.2005.04.003

Lévesque, M., & Minniti, M. (2011). Age matters: How demographics influence

aggregate entrepreneurship. *Strategic Entrepreneurship Journal*, *5*(3), 269–284.

https://doi.org/10.1002/sej.117

López-Núñez, M. I., Rubio-Valdehita, S., Aparicio-García, M. E., & Díaz-Ramiro, E.

M. (2020). Are entrepreneurs born or made? The influence of personality.

Personality and Individual Differences, *154*, 1–5.

https://doi.org/10.1016/j.paid.2019.109699

Marlow, S., & Martínez-Dy, A. (2018). Annual review article: Is it time to rethink the

gender agenda in entrepreneurship research? *International Small Business Journal*,

36(1), 3–22. https://doi.org/10.1177/0266242617738321

Menéndez-Aller, Á., Postigo, Á., Montes-Álvarez, P., González-Primo, F. J., & García-

Cueto, E. (2020). Humor as a protective factor against anxiety and depression.

International Journal of Clinical and Health Psychology, *20*, 38–45.

https://doi.org/10.1016/j.ijchp.2019.12.002

Meyers, L. S., Gamst, G. & Guarino, A. J. (2016). *Applied multivariate research:*

Design and interpretation, 3er Edition. Sage Publications.

Molino, M., Dolce, V., Cortese, C. G., & Ghislieri, C. (2018). Personality and social

support as determinants of entrepreneurial intention. Gender differences in Italy.

PloS ONE, *13*(6), e0199924. https://doi.org/10.1371/journal.pone.0199924

Moore, S., & Gullone, E. (1996). Predicting adolescent risk behavior using a personalized cost benefit analysis. *Journal of Youth and Adolescence, 15*, 343–359. http://dx.doi.org/10.1007/BF01537389

Mueller, S. L. (2004). Gender gaps in potential for entrepreneurship across countries and cultures. *Journal of Developmental Entrepreneurship*, *9*(3), 199–220.

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), 545–553. https://doi.org/10.7334/psicothema2014.182

Muthén, L. K., & Muthén, B. O. (2017). *Mplus User's Guide*.

Newman, A., Obschonka, M., Schwarz, S., Cohen, M., & Nielsen, I. (2019). Entrepreneurial self-efficacy: A systematic review of the literature on its theoretical foundations, measurement, antecedents, and outcomes, and an agenda for future research. *Journal of Vocational Behavior*, *110*, 403–419. https://doi.org/10.1016/j.jvb.2018.05.012

Niederle, M., & Vesterlund, L. (2007). Do women shy away from competition? Do men compete too much? *The Quarterly Journal of Economics*, *122*(3), 1067–1101. https://doi.org/10.1162/qjec.122.3.1067

Obschonka, M., Schmitt-Rodermund, E., & Terracciano, A. (2014). Personality and the gender gap in self-employment: A multi-nation study. *PLoS ONE*, *9*(8), 1–11. https://doi.org/10.1371/journal.pone.0103805

Obschonka, M., Stuetzer, M., Gosling, S. D., Rentfrow, P. J., Lamb, M. E., Potter, J., & Audretsch, D. B. (2015). Entrepreneurial regions: Do macro-psychological cultural characteristics of regions help solve the "knowledge paradox" of economics ? *PLoS ONE*, *10*(6), e0129332. https://doi.org/10.1371/journal.pone.0129332

OECD (2017). *Gender differences in self-employment rates*, in Entrepreneurship at a

Glance 2017. OECD Publishing. https://doi.org/10.1787/entrepreneur_aag-2017-

22-en

OECD (2018). *Entrepreneurship at a Glance 2018.* https://www.oecd.org/sdd/business-

stats/EAG-2018-Highlights.pdf

OECD (2019). *SME and entrepreneurship outlook 2019.* OECD Publishing.

https://doi.org/10.1787/34907e9c-en

Ock, J., Mcabee, S. T., Mulfinger, E., & Oswald, F. L. (2020). The practical effects of

measurement invariance: Gender invariance in two Big Five personality measures.

Assessment, 27(4), 657–674. https://doi.org/10.1177/1073191119885018

Pendergast, L. L., von der Embse, N., Kilgus, S. P., & Eklund, K. R. (2017).

Measurement equivalence: A non-technical primer on categorical multi-group

confirmatory factor analysis in school psychology. *Journal of School Psychology*,

60, 65–82. https://doi.org/10.1016/j.jsp.2016.11.002

Pedrosa, I., Suárez-Álvarez, J., García-Cueto, E., & Muñiz, J. (2016). A computerized

adaptive test for enterprising personality assessment in youth. *Psicothema*, *28*(4),

471–478. https://doi.org/10.7334/psicothema2016.68

Perez-Quintana, A., Hormiga, E., Martori, J. C., & Madariaga, R. (2017). The influence

of sex and gender-role orientation on the decision to become an entrepreneur.

International Journal of Gender and Entrepreneurship, *9*(1), 8–30.

Postigo, Á., Cuesta, M., García-Cueto, E., Menéndez-Aller, Á., González-Nuevo, C., &

Muñiz, J. (2020). Grit assessment: Is one dimension enough? *Journal of*

Personality Assessment. Advance online publication.

https://doi.org/10.1080/00223891.2020.1848853

Postigo, Á., Cuesta, M., Pedrosa, I., Muñiz, J., & García-Cueto, E. (2020). Development

of a computerized adaptive test to assess entrepreneurial personality. *Psicologia: Reflexão e Crítica, 33*, 6, 1–10. https://doi.org/10.1186/s41155-020-00144-x

Postigo, Á., García-Cueto, E., Cuesta, M., Menéndez-Aller, Á., Prieto-Díez, F., y Lozano, L. M. (2020). Assessment of the enterprising personality: A short form of the BEPE battery. *Psicothema, 32*(4), 575–582. https://doi.org/10.7334/psicothema2020.193

Rauch, A., & Frese, M. (2007a). Born to be an entrepreneur? Revisiting the personality approach to entrepreneurship. In J. R. Baum, M. Frese, & R. A. Baron (Eds.), *The psychology of entrepreneurship* (pp. 41–65). Lawrence Erlbaum.

Rauch, A., & Frese, M. (2007b). Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success. *European Journal of Work and Organizational Psychology*, *16*(4), 353–385. https://doi.org/10.1080/13594320701595438

Santos, G., Marques, C. S., & Ferreira, J. J. M. (2018). What are the antecedents of women's entrepreneurial orientation? *International Entrepreneurship and Management Journal*, *14*(4), 807–821. https://doi.org/10.1007/s11365-017-0481-4

Sartori, R., Ceschi, A., Costantini, A., & Scalco, A. (2016). Big Five for work and organizations: FLORA (Role Related Personal Profile), an Italian personality test based on the Five-Factor Model and developed for the assessment of candidates and employees. *Quality and Quantity*, *50*(5), 2055–2071. https://doi.org/10.1007/s11135-015-0250-9

Sass, D. A., & Schmitt, T. A. (2013). Testing measurement and structural invariance: Implications for practice. In T. Teo (Ed.), *Handbook of quantitative methods for educational research* (pp. 315–346). Sense Publishers.

Shepperd, J.A., Carroll, P., Grace, J. & Terry, M., (2002). Exploring the causes of comparative optimism. *Psychologica Belgica, 42*(1-2), 65–98. http://doi.org/10.5334/pb.986

Suárez-Álvarez, J., Campillo-Álvarez, Á., Fonseca-Pedrero, E., García-Cueto, E., & Muñiz, J. (2013). Professional training in the workplace: The role of achievement motivation and locus of control. *Spanish Journal of Psychology, 16*, 1–11. https://doi.org/10.1017/sjp.2013.19

Suárez-Álvarez, J., & Pedrosa, I. (2016). The assessment of entrepreneurial personality: The current situation and future directions. *Papeles Del Psicólogo*, *37*(1), 62–68.

Suárez-Álvarez, J., Pedrosa, I., García-Cueto, E., & Muñiz, J. (2014). Screening enterprising personality in youth: An empirical model. *Spanish Journal of Psychology*, *17*, E60. https://doi.org/10.1017/sip.2014.61

Thielmann, I., Akrami, N., Babarović, T., Belloch, A., Chirumbolo, A., Čolović, P., de Vries, R. E., Dostál, D., Egorova, M., Gnisci, A., Heydasch, T., Hilbig, B. E., Hsu, K. Y., Izdebski, P., Leone, L., Marcus, B., Međedović, J., Nagy, J., Parshikova, O., … Lee, K. (2020). The HEXACO – 100 across 16 languages: A large-scale test of measurement invariance. *Journal of Personality Assessment, 102*(5), 714–726. https://doi.org/10.1080/00223891.2019.1614011

Thompson, M. S. (2016). Assessing measurement invariance of scales using multiple-group structural equation modeling. In K. Schweizer & C. DiStefano (Eds.), *Principles and methods of test construction* (pp. 218–246). Hogrefe Publishing.

Tyszka, T., Cieślik, J., Domurat, A., & Macko, A. (2011). Motivation, self-efficacy, and risk attitudes among entrepreneurs during transition to a market economy. *Journal of Socio-Economics*, *40*(2), 124–131. https://doi.org/10.1016/j.socec.2011.01.011

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement

invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, *3*(4), 4–70. https://doi.org/10.1177/109442810031002

Van Gelderen, M., & Jansen, P. (2006). Autonomy as a start-up motive. *Journal of Small Business and Enterprise Development, 13*(1), 23–32. http://dx.doi.org/10.1108/14626000610645289

Vecchione, M., Alessandri, G., & Barbaranelli, C. (2012). Paper-and-pencil and web-based testing: The measurement invariance of the Big Five Personality tests in applied settings. *Assessment*, *19*(2), 243–246. https://doi.org/10.1177/1073191111419091

Verheul, I., Thurik, R., Grilo, I., & van der Zwan, P. (2012). Explaining preferences and actual involvement in self-employment: Gender and the entrepreneurial personality. *Journal of Economic Psychology*, *33*(2), 325–341. https://doi.org/10.1016/j.joep.2011.02.009

Vigil-Colet, A., Navarro-González, D., & Morales-Vives, F. (2020). To reverse or to not reverse Likert-type items: That is the question. *Psicothema*, *32*(1), 108–114. https://doi.org/10.7334/psicothema2019.286

Wincent, J., & Örtqvist, D. (2009). A comprehensive model of entrepreneur role stress antecedents and consequences. *Journal of Business Psychology*, *24*, 225–243. https://doi.org/10.1007/s10869-009-9102-8

Zhao, H., Seibert, S. E., & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, *36*(2), 381–404. https://doi.org/10.1177/0149206309335187

Table 1

Sample Distribution by Sex, Age and Employment Type

Sex	Men	Women
	469 (40%)	701 (60%)
Age (years)	≤30	>30
	280 (23.9%)	890 (76.1%)
Employment type	Self-employed	Non Self-employed
	152 (13%)	1,018 (87%)

Table 2

Measurement Invariance for the BEPE Based on Sex

	X^2 (p)	X^2/df	CFI	RMSEA [90% CI]	MC	ΔCFI	ΔRMSEA
Women	7201.054 (<.0001)	2.40	.918	.045 [0.045-0.046]	-	-	-
Men	5462.999 (<.0001)	1.82	.939	.042 [0.040-0.044]	-	-	-
M0	12571.533 (<.0001)	2.09	.926	.043 [0.042-0.044]	-	-	-
M1	11287.037 (<.0001)	1.83	.942	.038 [0.037-0.039]	M1-M0	.016	-.005
M2	11534.313 (<.0001)	1.80	.942	.037 [0.036-0.038]	M2-M1	0	-.001
M3A	12580.809 (<.0001)	1.99	.930	.041 [0.040-0.042]	-	-	-
M3B	11534.313 (<.0001)	1.80	.942	.037 [0.036-0.038]	M3B-M3A	.012	-.004

Note. p = p-value; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = confidence interval; MC = model comparison; M0 = configural invariance; M1 = metric invariance; M2 = scalar invariance; M3A = new model freeing the residual variances; M3B = residual invariance

Table 3

Measurement Invariance for the BEPE Based on Age

	X^2 (p)	X^2/df	CFI	RMSEA [90% CI]	MC	ΔCFI	ΔRMSEA
≤30	4439.842 (<.0001)	1.48	.929	.041 [.039-.044]	-	-	-
>30	8490.128 (<.0001)	2.83	.920	.045 [.044-.046]	-	-	-
M0	11896.606 (<.0001)	1.98	.931	.041 [.040-.042]	-	-	-
M1	10505.282 (<.0001)	1.71	.949	.035 [.034-.036]	M1-M0	.018	-006
M2	10777.212 (<.0001)	1.69	.949	.034 [.033-.035]	M2-M1	0	-.001
M3A	11837.982 (<.0001)	1.88	.936	.039 [.038-.040]	-	-	-
M3B	10777.212 (<.0001)	1.69	.949	.034 [.033-.035]	M3B-M3A	.013	-.005

Note. p = p-value; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = confidence interval; MC = model comparison; M0 = configural invariance; M1 = metric invariance; M2 = scalar invariance; M3A = new model freeing the residual variances; M3B = residual invariance

Table 4

Measurement Invariance for the BEPE Based on Employment Type

	X^2 (p)	X^2/df	CFI	RMSEA [90% CI]	MC	ΔCFI	ΔRMSEA
Self-employed	3871.536 (<.0001)	1.29	.925	.044 [.040-.048]	-	-	-
Non Self-employed	9667.237 (<.0001)	3.22	.917	.047 [.046-.048]	-	-	-
M0	11302.247 (<.0001)	1.88	.934	.039 [.038-.040]	-	-	-
M1	10301.201 (<.0001)	1.67	.949	.034 [.033-.035]	M1-M0	.015	-.005
M2	10443.934 (<.0001)	1.64	.950	.033 [.032-.034]	M2-M1	.001	-.001
M3A	11210.061 (<.0001)	1.78	.939	.036 [.035-.038]	-	-	-
M3B	10443.934 (<.0001)	1.64	.950	.033 [.032-.034]	M3B-M3A	.011	-.003

Note. p = p-value; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = confidence interval; MC = model comparison; M0 = configural invariance; M1 = metric invariance; M2 = scalar invariance; M3A = new model freeing the residual variances; M3B = residual invariance

Table 5

Differences on Entrepreneurial Personality Depending on Employment Type, Age and Sex

	Employment type					Age (years)					Sex				
	M Self-employed	*M* Non self-employed	F	*p*	*d*	*M* ≤30	*M* >30	F	*p*	*d*	*M* Men	*M* Women	F	*p*	*d*
Self-efficacy	37.55	37.22	0.49	.471	0.07	38.43	36.90	17.27	<.001	0.30	37.90	36.84	9.97	.001	0.21
Autonomy	40.64	38.72	24.85	<.001	0.43	38.79	39.03	0.90	.432	0.05	39.62	38.54	14.13	<.001	0.24
Innovation	38.75	38.24	1.33	.228	0.11	39.20	38.03	12.00	<.001	0.25	38.93	37.89	9.65	<.001	0.22
Internal Locus of Control	39.54	39.37	0.18	.718	0.04	40.61	39.01	21.21	<.001	0.33	39.68	39.20	3.30	.095	0.10
Achievement Motivation	39.91	39.18	3.63	.066	0.16	39.88	39.08	5.93	.012	0.17	39.56	39.08	4.59	.076	0.10
Optimism	38.77	38.14	1.86	.188	0.12	38.51	38.13	0.94	.355	0.07	38.59	37.98	4.36	.064	0.11
Stress Tolerance	32.65	32.46	0.04	.720	0.03	32.69	32.42	0.39	.529	0.04	34.08	31.42	35.01	<.001	0.44
Risk-Taking	36.84	35.92	3.28	.051	0.17	37.33	35.63	19.66	<.001	0.32	37.16	35.29	20.52	<.001	0.35
Entrepreneurial Personality	304.66	299.26	3.67	.051	0.17	305.43	298.24	10.03	.001	0.23	305.53	296.24	19.25	<.001	0.30

Note. M = mean; *F* = Pillai's Trace Statistic; *p* = p-value; *d* = effect size.