

The influence of personality and team-member exchange on creativity: a gendered approach

The influence of personality

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Received 24 January 2022
Revised 5 December 2022
14 March 2023
Accepted 19 May 2023

Abstract

Purpose – Given the general consensus that creativity is a crucial driving force for innovation and progress, understanding how to promote it would benefit individuals, companies, society and academia. Therefore, this paper aims to analyze the independent and contingent impact of individuals' personality traits, team-member exchange (TMX) and gender on stimulating creativity.

Design/methodology/approach – The study uses a survey-sample of 639 university students (51.96% women) between the ages of 17 and 50. Confirmatory factor analysis (CFA) demonstrated reliability and validity of its measures. To test hypotheses, using structural equation modeling, hierarchical regression analyses were performed.

Findings – Results show that four of the five personality traits (extraversion, agreeableness, conscientiousness and openness to experience) and TMX positively influence creativity. There are no significant differences between men's and women's creativity. High TMX reinforces the influence of extraversion on creativity, while low TMX harms this relationship. High extravert women are more creative than high extravert men, while low extravert men are more creative than low extravert women. Low emotionally stable women are more creative than low emotionally stable men, while high emotionally stable men are more creative than high emotionally stable women. There are differences in how women and men take advantage of their openness to experience when TMX is considered. That is, while women take advantage of openness to experience for any value of TMX, men only increase their creativity as openness to experience increases for low values of TMX.

Research limitations/implications – Like all studies, ours has some limitations that provide opportunities for future research. First, care should be taken when generalizing these findings to other contexts. We use data from Spanish individuals, specifically university students. While they are suitable for testing our hypotheses, future studies should establish whether the general tendencies that we observe hold true for other kinds of people from Spain and other countries. Even more, this paper's perspective might be biased by the authors' country of origin (south Europe) in terms of gender. According to Hofstede (2001) south European and

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This publication has been co-financed by the European Regional Development Fund (FEDER) and the Department of Economic Transformation, Industry, Knowledge, and Universities of the Junta de Andalucía, within the framework of the FEDER Andalucía 2014-2020 operational program, Thematic objective "01 - Reinforcement of research, technological development, and innovation", through the reference research project (and P20_00856). FEDER co-financing percentage is 80%. This publication is also part of the R+D+i projects PID2020-114751RB-I00, aid financed by MCIN/AEI/10.13039/501100011033.

Funding for open-access publishing: Universidad Pablo de Olavide.



South American countries are more masculine than other cultures (Mensa and Grow, 2022). Therefore, analyzing these questions in different cultures (countries and settings) would facilitate the generalization of the results. Second, the data we use is mainly cross-sectional so strict causality cannot be inferred. The theory we use assumes specific causal directions, but alternative causal relationships cannot be ruled out. Finally, ideally, we should have controlled for additional variables that might influence the relationships in our model.

Practical implications – This paper has practical implications, as it demonstrates that neither gender is more creative than the other. It goes a step further, explaining how men and women can leverage their personality traits to be more creative. Moreover, since TMX could reinforce the impact of personality traits on creativity, this paper could help managers better organize teams and companies that want to be more innovative by taking into account the personality traits of their employees and how to get the best out of women and men.

Social implications – Traditionally, women have considered creativity to be a man's thing. The results of this work favor society, demonstrating that women are just as creative as men and that through personality traits and TMX, both men and women can be more creative. These results help to reduce the gender gap and may favor women's place in today's society.

Originality/value – This work offers academic and practical implications. The main contributions to the creativity and gender literatures are the following: (1) Women are as creative as men. (2) High extravert and low emotionally stable women are more creative than men. (3) High open to experience women with high TMX are more creative than men at any level of TMX. For practitioners, the understanding of what personality traits have higher impact on creativity depending on the levels of TMX for women and men could help companies and politicians in hiring the most suitable people, especially for those positions where creativity is needed. This would increase the quality of their human capital, allowing them to get the most out of their human resources, from the very beginning of the employment relationship.

Keywords Personality traits, Creativity, Team-member exchange, Gender

Paper type Research paper

1. Introduction

The central role of innovation in the long-term survival of organizations, in countries' development, and in personal success generates continuing interest among management, social and psychology scientists and practitioners (Pérez-Luño *et al.*, 2019). There is a consensus that creativity, the generation of novel and useful ideas (Amabile, 1988), is key for guaranteeing innovation success and it is a crucial driving force for progress and civilization (Kandler *et al.*, 2016). Therefore, understanding the determinants of creativity is important for the literature and for society in general. However, despite common agreement that Da Vinci, Edison, Picasso, Mozart or Einstein, for example, were creative people, it is still quite difficult to describe individual differences in creativity. Even more, all of the names on this list are male. However, women have been shown to be just as creative as men (although less publicized; Mensa and Grow, 2022). Therefore, this paper is going to show how gender plays a key role in explaining how personality and TMX impact on creativity.

It is assumed that there is a common set of complementary psychological resources which, in combination, determine an individual's creative capability (Barbot *et al.*, 2016). Among the resources and capabilities that the literature has mentioned as determinants of creativity, personality traits have been emphasized by many researchers (Kandler *et al.*, 2016). However, despite the fact that empirical studies concerning personality and creativity have begun to yield some fairly solid results focusing on openness to experience (Sung and Choi, 2009), the relationship between extraversion, agreeableness, conscientiousness, emotional stability and creativity falls into the area where the literature is not consistent (Jirásek and Sudzina, 2020).

It is widely accepted that individual creativity is favored through a set of social actions (Amabile, 1988). Therefore, individual perception of high-quality connections among peers, defined by Seers (1989) as high-quality team-member exchange (TMX), could directly

increase individuals' creativity and reinforce the direct relationship between personality traits and creativity.

Moreover, a stereotype has long been portrayed, referring to creativity as a masculine activity (Hmieleski and Sheppard, 2019). This stereotype has produced a bias that undervalues women's role in creativity, to the point that, even today, some people still believe that men are more creative (Proudfoot *et al.*, 2015). However, when assessing the fit of personality traits and creativity, it is crucial to keep in mind gender differences (Baer and Kaufman, 2008; Costa *et al.*, 2001). The reason is that creativity still has strong associations with masculinity (Sullivan and Meek, 2012). Creative persons are often described using masculine terms such as risk takers, they have the dare to fail attitude, they are willing to be different, they choose to become a divergent and they are impulsive, fickle and change their mind quite often, while feminine terms such as affectionate and sympathetic are rarely used (Kamaruddin, 2017). Gender stereotypes, which are deeply seated social prescriptions, can hamper the progress of women's creativity as it represents counter-stereotypical behavior (Thébaud, 2010). Individuals who behave in ways that do not conform to stereotypical expectations may be devalued (Ellemers, 2018). Women who challenge norms by pursuing being creative may face negative judgments from their surroundings. Therefore, to reduce these stereotypes, we analyze the moderator role of gender on the relationship between personality traits and creativity.

Based on the above discussion, this paper pursues first, to analyze which personality traits influence people's creativity; and second, to examine if such a relationship is contingent on TMX and/or on the individual's gender. These objectives aim to contribute to the literature by determining which of the five personality traits influence creativity, not just openness to experience, the most researched factor to date (Jirásek and Sudzina, 2020; Sung and Choi, 2009). Second, by explaining how creativity could benefit from team working. Third, by analyzing if creativity is a gendered matter or if men and women are in equal conditions to take advantage of their personality traits and their TMX to be more creative.

2. Literature review and hypothesis

2.1 Creativity

Creativity has been defined using different perspectives, depending on whether the emphasis is on the outcome, on the individual, on the process or on the circumstances in which it occurs (Muñoz-Doyague and Nieto, 2012). However, the vast majority of definitions focus on "something" that is both unique and original, and potentially valuable or suitable (Mumford and Gustafson, 1988). That is, "creativity is the production of novel and useful ideas by an individual or small group of individuals working together" (Amabile, 1988; p. 126).

2.1.1 The influence of the big five-factor model of personality on creativity. The big five-factor model of personality represents a structure of traits, developed over the last six decades (Rothmann and Coetzer, 2003). Factors are defined by groups of interconnected traits, which are stated as facets (McCrae and Costa, 1997). The role of personality traits on creativity has been highlighted by previous studies (Sternberg and Lubart, 2002). In such research openness to experience appears to have the strongest link to creativity, followed by conscientiousness (Jirásek and Sudzina, 2020; Sung and Choi, 2009).

Extraversion is related to the individual's tendency to be energetic, enthusiastic and ambitious (Raja *et al.*, 2004); it includes behaviors such as risk-taking, orientation toward diverse external stimuli, sociability, assertiveness, activity and talkativeness (Kandler *et al.*, 2016; Rothmann and Coetzer, 2003). Extraverts are optimistic, and independent rather than followers. Extraversion is characterized by positive feelings and is, therefore, seen as a positive affect (Clark and Watson, 1991). It encompasses the general tendency to seek stimulation, focuses on

external stimuli and enjoys social attention and interaction (Kandler *et al.*, 2016), necessary for creative thinking. That is, since creativity results from an individual's enthusiasm and proactive behavior, such as actively engaging in new projects or ideas (Sung and Choi, 2009), this paper proposes that extraversion plays a positive role in creativity. Thus:

H1.1. Extraversion is positively related to creativity.

Agreeableness refers to an individual's courteous, trusting and cooperative demeanor (Golberg, 1990). It is related to altruism, friendliness, tolerance and eagerness to help others (Sung and Choi, 2009). Agreeable people believe that others will also help them. The cooperative nature of agreeable individuals may lead to success in situations where teamwork is needed (Judge *et al.*, 1999). This personality trait may also help people to be more creative because of all the knowledge they are able to share and acquire from their cooperative and pleasant relationships, even during any periods of tension that creative ideas might cause (Sung and Choi, 2009). Thus:

H1.2. Agreeableness is positively related to creativity.

Conscientiousness denotes the degree to which a person is purposeful, hardworking, persistent and strives for achievement (Golberg, 1990). It is related to self-control and the active process of planning, organizing and carrying out tasks (Rothmann and Coetzer, 2003). A conscientious individual is focused, persistent and has the motivation to conduct aim-oriented tasks, which in this case, as Karwowski *et al.* (2013) found, can also involve creativity. Thus:

H1.3. Conscientiousness is positively related to creativity.

Neuroticism represents individual differences in adjustment and emotional stability (Jirásek and Sudzina, 2020). A high level of neuroticism indicates that a person has a propensity to irrational thinking, has problems to control impulses and copes poorly with stress. A low level of neuroticism is synonymous with emotional stability (Rothmann and Coetzer, 2003), defined as an individual's degree of calmness and security (Barrick and Mount, 1991). Such people are usually calm, even-tempered, relaxed, self-confident and able to face stressful situations without becoming upset (Sung and Choi, 2009). This paper proposes that low neuroticism or high emotional stability is positively related to creativity (Karkowski *et al.*, 2003) because to be able to generate new ideas, people need to be relaxed and able to face stressful situations without becoming upset. Such calm behavior will help them to integrate information efficiently and seek a new way of thinking that can be promoted by self-confidence and is also associated with emotional stability (Sung and Choi, 2009). Thus:

H1.4. Emotional stability is positively related to creativity.

Openness to experience denotes the extent to which individuals are imaginative, broad-minded, curious and nontraditional (Mount and Barrick, 1995). It includes characteristics such as active imagination, fantasy, aesthetic sensitivity, attentiveness to inner feelings, a preference for variety, intellectual curiosity, tolerance of ambiguity, cognitive flexibility, independence of judgment, broad interests, unconventionality and a willingness to grow, to question authority and to entertain new ethical, social and political ideas (Kandler *et al.*, 2016; Rothmann and Coetzer, 2003). People who are open to experience are willing to entertain novel ideas and unconventional values (Madrid and Patterson, 2016), and they experience both positive and negative emotions more keenly than individuals without this trait. Moreover, openness is related to a wide array of specific, intrinsically motivational

features, in particular, cultural-intellectual and artistic-creative interests (Kandler *et al.*, 2016). For these reasons, openness has been hypothesized as the core trait underlying creativity (Karwowski *et al.*, 2013; McCrae and Costa, 1987). Thus:

H1.5. Openness to experience is positively related to creativity.

2.2 Team-member exchange and creativity

It is widely accepted that individual creativity arises from a set of intricate give-and-take social actions (Amabile, 1988). It mainly occurs from the sharing of information, expertise, know-how and ideas that happens when working together with others (Kirrane *et al.*, 2019). Therefore, the kinds of connections a person has in a working group can foster or inhibit the quality and quantity of ideas they generate. In this vein, Seers (1989) defined TMX as an individual-level variable, indicating the individual perception of the quality of connections among peers that take place in a working context.

TMX is theoretically based on role theory (Katz and Kahn, 1978) and on social exchange theory (Blau, 1964), which suggest that an individual's demeanor is, to a great extent, determined by the kind and quality of relationships they have with the people with whom they are generally in contact. These relationships can result in high-quality TMX, defined by trust and mutual respect, and by cooperation and collaboration between the individual and the group. Therefore, high-quality relationships will translate into increased reciprocity between the peers (Dierdorff *et al.*, 2011). It has been shown that TMX influences individuals' satisfaction and performance, innovative behavior, knowledge sharing (Liu *et al.*, 2011), job involvement and work engagement (Liao *et al.*, 2013), intrinsic motivation, self-efficacy, proactive behaviors (Lai *et al.*, 2021) and helping behaviors (Dierdorff *et al.*, 2011; Farmer *et al.*, 2015), among others. However, research on how TMX can affect individual creativity has not yet been sufficiently explored (Kirrane *et al.*, 2019).

Research on group dynamics supports the idea of the beneficial effects of TMX on individual creativity. For instance, Rogers (1954) suggested that when groups are tightly knit, individuals feel free to suggest new ideas with no fear of looking ridiculous in front of their colleagues. Similarly, Sethia (1991) asserts that team cooperation is a crucial element for bringing an individual's creativity to the surface. Furthermore, helping behaviors have been shown to be beneficial for individual creativity (Farmer *et al.*, 2015). In general, these actions are included in the process of mutual exchange within a group, involving colleagues' willingness to help each other, information and idea sharing, and mutual acknowledgement among group members (Seers, 1989), which characterizes high-quality TMX. Thus:

H2. A high-quality TMX relationship has a positive effect on individual creativity.

2.3 The moderating role of team-member exchange on creativity

Individuals' personality traits are relatively stable over time and allow for common patterns of thinking and experiencing emotions that influence behavior (Tett and Burnett, 2003). However, TMX may be a changing state that could reinforce or harm the relationship between personality traits and creativity. Therefore, this paper proposes a contingent model in which TMX shapes the influence of personality characteristics on individuals' creativity.

Previous research on creativity has emphasized the importance of the socioemotional bases of creativity (Seong and Choi, 2019) by demonstrating the importance of the social environment in explaining individual creativity (Muñoz-Doyague and Nieto, 2012). In addition, several studies have integrated individual and social environment variables with the purpose of

exploring the most appropriate ways to foster individual creativity (Choi, 2011; Deng *et al.*, 2016), emphasizing the motivating function of supportive social environments.

According to social identity (Tajfel and Turner, 2019) and social comparison theories (Festinger, 1954), perceiving high-quality exchanges will reinforce the impact that personality exerts on creative endeavors. That is, personality traits could have a stronger impact on creativity if the individual acquires not only a feeling of closeness to the team but also perceives themselves as having unequalled skills within the team (Dierdorff and Jensen, 2018).

In a social setting, the mindsets and actions of the people closest to individuals influence their creativity (Zhang *et al.*, 2021). Therefore, given that creativity is context-dependent (Deng *et al.*, 2016), we propose that the influence of personality characteristics on creativity can be better explained by considering the moderating influence of an individual's social relationships with their closest contacts. Actually, high-quality TMX reflects team members' disposition to support others, to exchange ideas and expertise with other peers as well as their feelings about the degree of help, knowledge and appreciation they receive from others, so that individuals add up these insights of social interactions among team members, and reciprocal cooperative behaviors emerge (Dierdorff and Jensen, 2018). These social behaviors characteristic of a high-quality TMX are likely to reinforce the positive influence of extraversion, agreeableness, conscientiousness, emotional stability and openness to experience on creativity (Chen, 2018; Liao *et al.*, 2013).

Nevertheless, research on the joint effect of personality traits and TMX is still scarce. For instance, Wu *et al.* (2018) demonstrated that high-quality TMX moderate the positive influences of low degrees of emotional conflict (related with emotional stability) on innovative behavior, while undermining the adverse consequences of higher levels of emotional conflict on it. Social exchanges among individuals are critical to individual performance, as they provide a wide range of performance-related understanding, as well as social and emotional support (Chung, 2020). Accordingly, the reinforcing capability of high-quality TMX relationships for creativity seems highly probable (Chen, 2018).

Altogether, we propose that individuals scoring high in extraversion, agreeableness, conscientiousness, emotional stability and openness to experience will be prone to be more creative when establishing high-quality TMX (Liao *et al.*, 2013). That is, the quality of the exchange relationships in the group amplifies the impact of the personality characteristics on creativity. Thus:

H3. High-quality TMX reinforces the positive effect of:

H3.1. Extraversion on creativity.

H3.2. Agreeableness on creativity.

H3.3. Conscientiousness on creativity.

H3.4. Emotional stability on creativity.

H3.5. Openness to experience on creativity.

2.4 Gender and creativity

When assessing the fit of personality traits and creativity, it is crucial to consider gender differences (Baer and Kaufman, 2008; Costa *et al.*, 2001). Despite the number of studies conducted on creativity, gender differences have not become an important research focus in the literature on either creativity or psychology (Baer and Kaufman, 2008). Even more, previous research has provided little evidence for consistent differences between women and

men in creativity (Kemmelmeyer and Walton, 2016). Almost 50 years ago, Kogan (1974) conducted an exhaustive review of gender differences in creativity, asserting that any behavioral scientist who would argue that one gender is more creative than another would face tremendous scrutiny and a row of critics. With some relief, he concluded his extensive analysis finding relative equality in creativity between men and women. This paper follows this premise, considering men and women to be similar in creativity (Mensa and Grow, 2022). However, it goes one step further, avoiding previous stereotypes and seeking to analyze whether men and women could take advantage of their personality traits differently in relation to their creativity.

Gender differences in personality traits associated with creativity have been documented in previous research (Baer and Kaufman, 2008; Costa *et al.*, 2001). For example, the Sex Role Inventory (Bem, 1974) included the analysis of masculinity and femininity. Bem's masculinity scale is essentially a measure of dominance, whereas femininity is strongly related to love. Dominance and love are the axes of the interpersonal circumplex and have been shown to be rotations of the five-factor model's dimensions of extraversion and agreeableness (McCrae and Costa, 1989). That is, extraversion combines dominance and love, whereas agreeableness combines submission and love. It is clear from this analysis that women should score higher on agreeableness. However, it is less clear whether and how extraversion should be related to gender because it combines both masculine and feminine traits. To solve this inconsistency, Feingol (1994) concluded that women are slightly higher in extraversion. Therefore, we propose that women could benefit of the stereotype of being more affectionate and sympathetic and then, be considered more extravert and agreeable than men. Thus, we expect that this gender will reinforce the positive extraversion–creativity and agreeableness–creativity relationships.

Gender differences in conscientiousness have rarely been examined. Feingol (1994) found seven studies relevant to this trait that suggested that women scored slightly higher than men in this regard. Moreover, society expects women's roles to be caretakers of the family (Ellemers, 2018). Work–family balance may, thus, be more challenging for women, in particular for those who are married and/or have children. However, this stereotype could be positive making women more organized and conscientious. We expect that being a woman will reinforce the conscientiousness–creativity positive relationship.

Maccoby and Jacklin (1974) analyzed gender differences in cognition, temperament and social behavior in children and adults, finding that the only significant difference was that men are more assertive and less anxious than women. Feingol (1994) confirmed this last result and added that women scored lower than men on assertiveness and higher on extraversion, anxiety, trust and tendermindedness. Gender differences in emotional stability have been consistently reported, with men scoring higher than women (Costa *et al.*, 2001). Feingol (1994) reported that men scored lower in anxiety; Nolen-Hoeksema (1987) found that men scored lower in symptoms of depression. Based on the previous arguments, we expect men to be more emotionally stable. Therefore, the fact of being a man will reinforce the positive relationship between emotional stability and creativity and being a woman will reduce such relationship.

Several studies have explored gender differences on openness to experience, with a general finding that women score higher in this regard than men (Baer and Kaufman, 2008; Mirza, 2003), while others found no difference (Hakstian and Farrell, 2001). Therefore, we expect that being a woman will reinforce the positive openness to experience–creativity relationship. Thus:

H4. Gender moderates the positive relationship between the dimensions of the big five-factor model of personality and creativity as follows:

H4.1. Being a woman reinforces the extraversion–creativity relationship.

H4.2. Being a woman reinforces the agreeableness–creativity relationship.

H4.3. Being a woman reinforces the conscientiousness–creativity relationship.

H4.4. Being a woman harms the emotional stability–creativity relationship.

H4.5. Being a woman reinforces the openness to experience–creativity relationship.

All of our hypotheses are summarized in [Figure 1](#).

3. Methods

3.1 Participants

This study explores 639 undergraduate students enrolled on business administration-related courses from two Spanish Universities during the 2018/2019 academic year. The mean age of students was 20.82 years old ($SD = 2.46$), and 332 were women. Participants completed a paper-and-pencil questionnaire that measured creativity, TMX and personality, among other constructs.

3.2 Measures

We used Stata 17 in all the analyses. We measured creativity using a multiitem scale based on [Muñoz-Doyague and Nieto \(2012\)](#). To assess TMX, we used the scale developed by [Seers \(1989\)](#). We measured personality using the scale developed by [De Oliveira et al. \(2013\)](#), adapted from the big five-factor model of personality scale developed by [Costa and McCrae \(1992\)](#). The items of the three main variables are scored on a seven-point Likert-type scale, ranging from 1 (not at all true) to 7 (completely true). We also measured gender using 1 for women and 0 for men. Finally, we controlled for the age of the respondent.

We performed confirmatory factor analysis (CFA) to assess the reliability and validity of the scales. The CFA estimation of creativity, TMX and personality components showed a good data fit. [Table 1](#) shows Satorra–Bentler’s χ^2 statistics, the degree of freedom (d.f.), p -value > 0.05 , root mean-square error of approximation (RMSEASB) ≈ 0 , comparative fit index (CFISB) ≈ 1 , Tucker–Lewis Index (TLISB) ≈ 1 , standardized root mean squared residual (SRMR) ≈ 0 and the coefficient of determination (CD) > 0.8 in all cases ([Appendix 1](#) in the supplementary material).

Cronbach’s alpha confirms the reliability of the scales because in all cases it is greater than 0.7. Convergent validity is confirmed by the average variance extracted (AVE). The AVE values appear in the diagonal of the tables, and in all cases are greater than or equal to 0.5. In the case of F3 extraversion (0.49) and F6 emotional stability (0.50), their AVE coefficients are very close to 0.5, and convergent validity may be assumed ([Zelkowitz and Cole, 2016](#)). Finally,

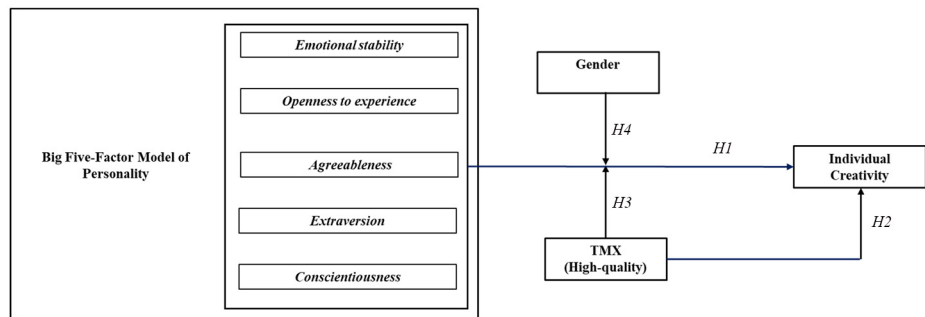


Figure 1.
Research model

Source: Author’s own creation

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1 Creativity	4.52	1.01	1								
2 Age	20.83	2.96	-0.09	1							
3 Gender	0.52	0.50	0.04	-0.08	1						
4 TMX	5.04	1.21	0.29*	-0.13*	0.04	1					
5 Extraversion	4.59	1.24	0.24*	0.03	0.07	0.17*	1				
6 Agreeableness	5.11	1.23	0.22*	-0.06	0.36*	0.10	0.11*	1			
7 Conscientiousness	4.80	1.39	0.14*	0.01	0.09	0.05	-0.01	0.09	1		
8 Emotional stability	4.34	1.41	0.13*	0.12*	-0.11*	0.14*	0.15*	0.08	0.10	1	
9 Openness to experience	4.90	0.84	0.28*	0.02	-0.18*	0.01	0.15*	0.07	-0.03	0.03	1

Note: * $p < 0.01$

Source: Author's own creation

Table 1.
Mean, SD and correlations

we can state that there is discriminant validity because the AVE is greater than the square of the correlations existing between each pair of factors (Fornell and Larcker, 1981; Appendix 2 in the supplementary material).

4. Results

Table 1 displays the mean values, standard deviations and intercorrelations for all the study variables. As Table 1 shows, TMX and all the personality domains – extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience – are positively and significantly correlated with the dependent variable (creativity). In addition, three variables are strongly correlated with gender: agreeableness (positively), emotional stability and openness to experience (negatively). We also find that TMX is highly positively correlated with extraversion and emotional stability. Finally, agreeableness, emotional stability and openness to experience are positively correlated. To ensure that multicollinearity was not an issue, value inflation factors (VIFs) were computed (not reported due to space limitations). None of them was above 2, indicating that we did not find multicollinearity.

To test our hypotheses, hierarchical regression analyses were performed with age (control variable), gender and TMX included in Model 1 (Table 2). The personality dimensions were included in Model 2. The gender \times TMT interaction effect was included in Model 3. TMX \times personality interaction effects were included in Model 4. Gender \times personality dimensions interaction effects were included in Model 5. Finally, even though we did not include a triple interaction in the theory section, following previous literature suggesting gender impact on team working and creativity (Parmenter *et al.*, 2018). Gender \times personality dimensions \times TMX interaction effects were included in the full model (Model 6). Following Williams (2012), postestimation margins and plots were run to analyze in greater depth the marginal effect of the interaction effects (Figures 2–5).

The results of the hierarchical regression shown in Table 2 demonstrate that the addition of independent variables and interaction terms increases the coefficient of determination (R-Squared), indicating a better fit (0.08 Model 1 to 0.26 Model 6). We can see how the direct effects of extraversion, agreeableness, conscientiousness and openness to experience are significant and have a positive effect on creativity. Therefore, we find support for *H1.1.*, *H1.2.*, *H1.3* and *H1.5*. In addition, emotional stability is significant in Models 5 and 6. We also find that TMX has a positive and significant effect on creativity, giving support for *H2*.

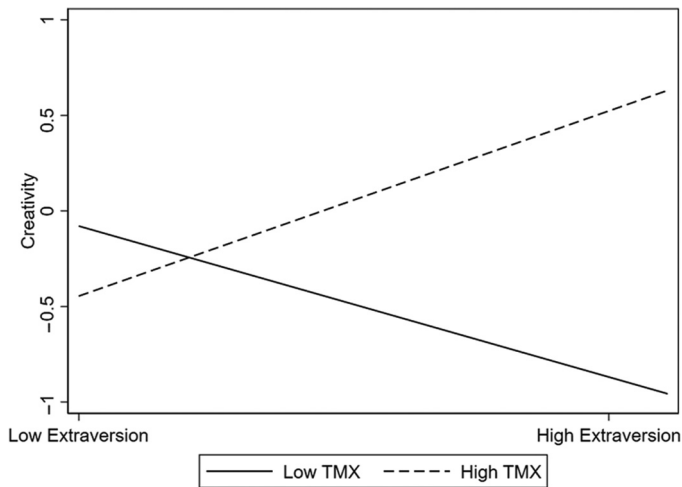
From *H3*, only *H3.1.* is supported by the results presented in Table 2. We can see how TMX moderates the positive relationship between extraversion and creativity (Models 4

Table 2.
Results of the
hierarchical
regression analyses

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	-0.01 (0.01)	-0.01** (0.01)	-0.01** (0.01)	-0.01** (0.01)	-0.01* (0.01)	-0.01** (0.01)
Gender	0.03 (0.05)	0.01 (0.04)	0.01 (0.04)	0.01 (0.04)	0.01 (0.04)	0.03 (0.05)
TMX	0.21*** (0.04)	0.17*** (0.03)	0.16*** (0.06)	0.16*** (0.03)	0.19*** (0.03)	0.18*** (0.06)
Extraversion		0.08*** (0.02)	0.08*** (0.02)	0.05 (0.03)	0.08*** (0.02)	0.04 (0.03)
Agreeableness		0.11*** (0.04)	0.11*** (0.04)	0.16*** (0.06)	0.11*** (0.04)	0.14** (0.06)
Conscientiousness		0.05*** (0.01)	0.05*** (0.01)	0.04** (0.02)	0.05*** (0.01)	0.04** (0.02)
Emotional stability		0.03 (0.02)	0.03 (0.02)	0.07** (0.03)	0.03 (0.02)	0.09*** (0.03)
Openness to experience		0.15*** (0.02)	0.15*** (0.03)	0.11*** (0.03)	0.14*** (0.03)	0.10*** (0.03)
Gender#TMX			0.01 (0.07)			0.03 (0.07)
TMX#extraversion				0.08** (0.03)		0.13** (0.05)
TMX#agreeableness				-0.04 (0.06)		-0.04 (0.09)
TMX#conscientiousness				-0.02 (0.02)		-0.03 (0.03)
TMX#emotional stability				0.02 (0.03)		0.01 (0.05)
TMX#openness to experience				-0.04 (0.03)		-0.14*** (0.05)
Gender#extraversion					0.07* (0.04)	0.08* (0.04)
Gender#agreeableness					-0.12 (0.08)	-0.11 (0.08)
Gender#conscientiousness					0.01 (0.03)	0.00 (0.03)
Gender#emotional stability					-0.09** (0.04)	-0.10** (0.04)
Gender#openness to experience					0.06 (0.05)	0.07 (0.05)
Gender#extraversion#TMX						-0.08 (0.06)
Gender#agreeableness#TMX						0.00 (0.11)
Gender#conscientiousness#TMX						0.01 (0.04)
Gender#emotional stability#TMX						0.04 (0.06)
Gender#openness to experience#TMX						0.17*** (0.07)
Constant	0.15 (0.15)	0.23* (0.14)	0.23* (0.14)	0.26* (0.14)	0.17 (0.14)	0.21 (0.14)
Observations	636	636	636	636	636	636
R-squared	0.08	0.22	0.22	0.23	0.23	0.26

Notes: Robust standard errors in parentheses; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$; Gender (1 = Women). Dependent variable: Creativity

Source: Author's own creation



The influence of personality

Figure 2. Predicted creativity for TMX and extraversion

Source: Author's own creation

and 6). Figure 2 shows this relationship and explains that high levels of TMX increase creativity as extraversion increases, while low TMX harms this relationship.

To analyze the influence of gender on our relationships (H4), we introduced gender as moderator with the personality dimensions in Model 5 and with the personality and TMX in Model 6 of Table 2. We have also conducted a robustness check dividing our population by gender (available in Appendix 3 of the supplementary material).

The results presented in Models 5 and 6 show positive and significant gender–extraversion (H4.1) and negative and significant gender–emotional stability (H4.4) interaction effects on creativity 4. Figures 4 and 5 summarize these results showing that more extravert women and more emotionally stable men are more creative. These findings give support to H4.1 and H4.4.

Figure 3 shows that less extraverted women are less creative than less extraverted men. However, high levels of extraversion are related to higher levels of creativity for women.

Figure 4 shows that less emotional stable women are more creative than men. However, when emotional stability increases, women are less creative than men.

Finally, although we did not hypothesize a triple interaction, due to a possible contribution, we have tested it in Model 6 (Table 2). The results show a gender \times openness to experience \times TMX interaction effect that illustrates a strong, positively significant effect for creativity. This effect can be better understood by analyzing Figure 5. Figure 5 shows the moderating effect of gender on the relationship between openness to experience and TMX. We can see that in the case of people with low levels of openness to experience and TMX, men are less creative than women. However, as TMX levels increase, this situation is reversed, with men becoming more creative than women. Conversely, among people with high levels of openness to experience and TMX, women are less creative than men. However, as TMX levels increase, this situation is reversed, with women becoming more creative than men. Summarizing, high levels of TMX and openness to experience are positive for men and women. However, women harness these more than men.

To reinforce the arguments about the influence of gender on our relationships, we ran the full analysis, clustering for men and women (Appendix 3 of the supplementary material). The results of this analysis show that the addition of independent variables and interaction

GM

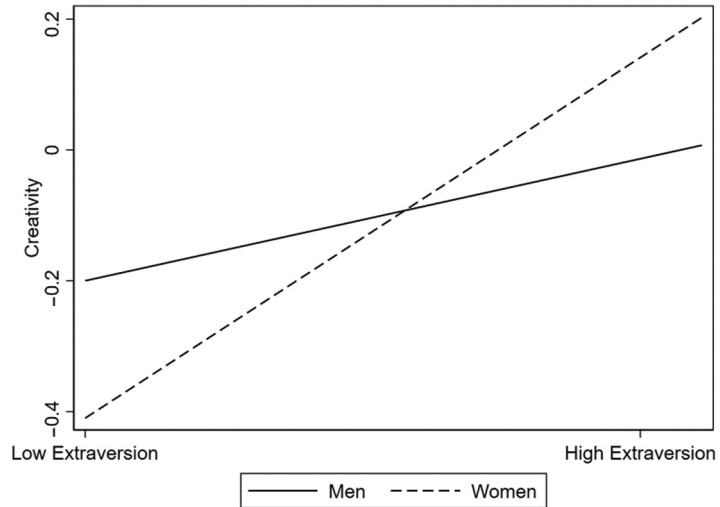


Figure 3.
Predicted creativity
for gender and
extraversion

Source: Author's own creation

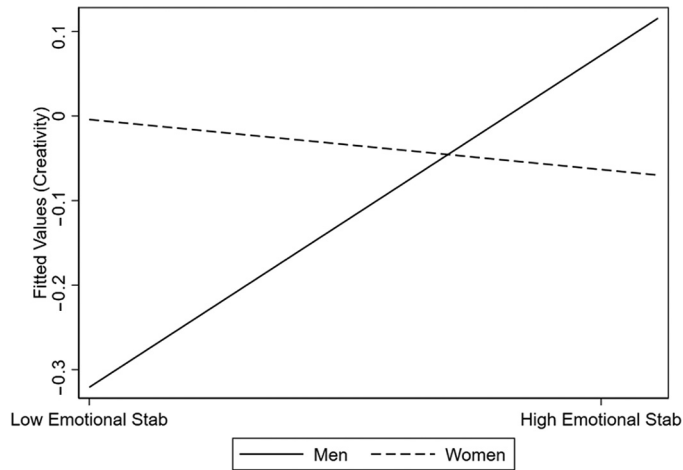
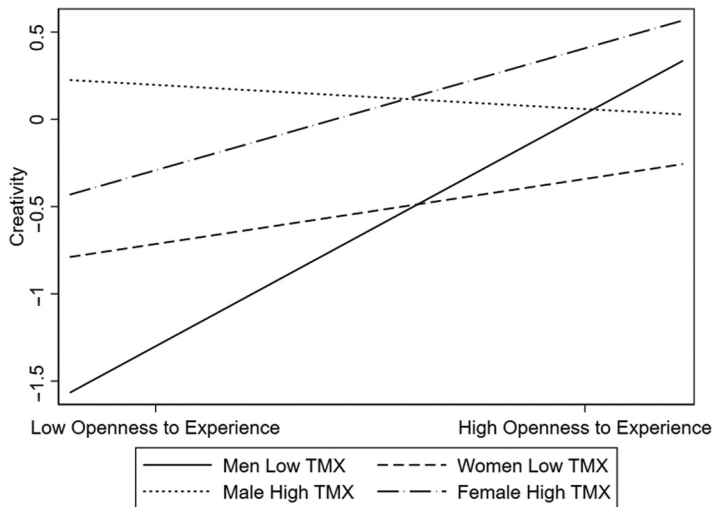


Figure 4.
Predicted creativity
for gender and
emotional stability

Source: Author's own creation

terms increases the coefficient of determination (R-Squared), indicating a better fit (from 0.08 Model 1 to 0.24 Model 3 for the full sample; from 0.068 to 0.24 for the sample of men; and from 0.09 to 0.29 for the sample of women). The direct effect of age is significant and has a negative effect on creativity in the full sample (-0.015 Model 2 and -0.012 Model 3) and the sample of women (-0.025 Model 2 and -0.024 Model 3). The results of Model 2 in Appendix 3, similar to what we already found in the results shown in Table 2, explain that extraversion increases creativity for women and that emotional stability increases creativity for men. Appendix 3 also shows that agreeableness impacts men's creativity (this is a new



The influence of personality

Figure 5. Combined effect of TMX, openness to experience and gender on creativity

Source: Author's own creation

finding compared to Table 2). Conscientiousness and openness to experience influence creativity for both women and men. Appendix 3 also confirms the positive joint effect of extraversion and TMX on creativity, and the contingent effect of openness to experience, TMX and gender on creativity.

5. Discussion

Given the importance of creativity for innovation and for the development of societies, the general aim of this paper has been to identify some of its antecedents. To achieve this objective, this paper addresses four set of hypotheses. The first one was related to the relationship between the dimensions of the big five-factor model of personality and creativity. We find that four of the five-factor dimensions of personality (extraversion, agreeableness, conscientiousness and openness to experience) positively influence creativity. This is an important contribution to the literature and practitioners since previous literature has mostly focused on openness to experience as the main trait explaining creativity (Jirásek and Sudzina, 2020; Sung and Choi, 2009). By adding another three traits determining people's creativity, we open new lines of research and new debates for the literature and for practitioners aiming to work with creative people. Our second hypothesis related high-quality TMX and creativity. This research has demonstrated that high-quality TMX positively impacts creativity. This is also an important contribution for practitioners interested in gaining the most from TMX and for the literature since research on how TMX can affect individual creativity has not yet been sufficiently explored (Kirrane *et al.*, 2019).

Our third set of hypotheses presented a contingent model using TMX to explain the relationship between the dimensions of the big five-factor model of personality and creativity. Our results show that the ideal contingent combinations for creativity are high-quality TMX and extraversion. Research on the joint effect of personality traits and TMX is still scarce and indicates that emotionally stable people will establish stronger links with other individuals (Mayer *et al.*, 2012), and that extravert and agreeable individuals are more

likely to engage in high-quality exchange relationships (Liao *et al.*, 2013). However, the existing literature is scarce on this joint effect, and practitioners will be able to take more advantage of high quality TMX among extravert people.

Our last set of hypotheses presented a model using gender-to-nuance the contingent relationship between the dimensions of the big five-factor model of personality and creativity. This subject re-opens old discussions about how society has stereotyped gender relationships regarding issues such as creativity (Baer and Kaufman, 2008; Kogan, 1974; Mensa and Grow, 2022). Men have historically been viewed as the primary source of all creativity (Hmieleski and Sheppard, 2019). This might be due to the fact that history has mostly been written by men. However, traces of this gender bias exist even today (Mensa and Grow, 2022), as it has been claimed that women are disadvantaged relative to men in creative career fields, in part because the term “creative genius” is more frequently ascribed to men (Miller, 2016). Gender stereotypes can also hinder women from obtaining a job that demands creativity. Employers are heavily male-dominated and biased against women. If women conform to the gender stereotype by acting in a feminine manner, they will fail to be considered as competent and creative as men. If they behave in a masculine way expected of successful men, they will fail to comply with the gender stereotypes and violate gender norms (Balachandra *et al.*, 2019). Either way, women challenge stereotypes, and this lack of external validation could harm them (Strauser *et al.*, 2008). This is why, our findings could help women to better face the labor market, and it could also show employers and policymakers the importance of having women on positions that demand creativity.

Our results, consistent with old extensive (Kogan, 1974) and recent research (Baer and Kaufman, 2008) demonstrate that no gender is more creative than the other. Theoretically, this finding confirms previous literature. However, for practical reasons, this is of utmost importance. That is, women could confirm that they are as creative as men. In this way, the stereotypes that classify men as owners of creativity are completely discredited and employers and politicians should consider other aspects when deciding whether a woman or a man is going to be more creative.

Even more, our research goes a step further, seeking to explain how men and women can take advantage of their personality traits to be more creative. Our findings show that high extravert and low emotionally stable (high neurotic) women are more creative than high extravert and low emotionally stable men, while low extravert and high emotionally stable men are more creative than low extravert and high emotionally stable women. This is very important for practitioners and for the literature since, except for the research conducted by Feingol (1994), there has been little consensus about the how women or men could benefit from their extraversion in relation to creativity. Regarding emotional stability, having found that women score lower levels of this dimension is also very important for the literature, giving arguments about how to make the most of it. Furthermore, this has important practical implications for reducing negative stereotypes. That is, understanding that women with low emotional stability are more creative than men with low emotional stability is relevant and leads us to consider the old idea that neurotic creative people such as artists, erroneously associated only with men, were probably also women.

Finally, since TMX could reinforce the impact of personality traits on creativity, this paper has also explored whether men and women can take advantage of it, finding that there are differences in how women and men take advantage of their openness to experience when TMX is considered. Our results show that, while high open to experience women increase their creativity for any value of TMX, men only increase their creativity as openness to

experience increases for low values of TMX. This contingent view opens new lines of research to the literature and could guide managers to better organize teams and enterprises willing to be more innovative. If we only analyze personality traits and TMX without taking gender into account, the results could lead to wrong conclusions, and practitioners could make worse decisions.

Like all studies, ours has some limitations that provide opportunities for future research. First, care should be taken when generalizing these findings to other contexts. We use data from Spanish individuals, specifically university students. While they are suitable for testing our hypotheses, future studies should establish whether the general tendencies that we observe hold true for other kinds of people from Spain and other countries. Even more, this paper's perspective might be biased by the authors' country of origin (south Europe) in terms of gender. According to Hofstede (2001) south European and south American countries are more masculine than other cultures (Mensa and Grow, 2022). Therefore, analyzing these questions in different cultures (countries and settings) would facilitate the generalization of the results.

Second, the data we use is mainly cross-sectional so strict causality cannot be inferred. The theory we use assumes specific causal directions, but alternative causal relationships cannot be ruled out. Finally, ideally, we should have controlled for additional variables that might influence the relationships in our model.

6. Conclusions

As a summary, this paper further clarifies and emphasizes the importance of personality traits, TMX and gender for creativity.

All these findings contribute to the literature on creativity, gender and personality traits, among others. First, we offer greater insight into the dimensions of the big five-factor model of personality that explains people's creativity. Not only does this fill a gap in the literature, but it also assists practitioners in deciding, for example, what kind of people they should hire for an R&D department. Second, we study whether the joint effect of personality traits with TMX explains this relationship better, as well as the conditions under which TMX is useful, to advance the literature and help practitioners benefit more from their TMX strategies. Third, in opposition to the general stereotype assuming that men are more creative than women (Mensa and Grow, 2022), and that women are better in TMX, we find no significant differences between men and women in their relationships with TMX and creativity. We believe this is an important contribution to the literature in that it helps to shift the gender creativity dialogue away from why women are disadvantaged compared to men and opens up a new line of research on gender relationships with team working. Finally, we show that these relationships are contingent on gender. We consider this to be another very important contribution since it could be the key to understanding why the previous literature has obtained contradictory results. That is, if we only analyze personality traits and TMX without taking gender into account, the results could lead to wrong conclusions, and practitioners could make worse decisions. Moreover, given that for years there have been many stereotypes about gender differences in behavior and some pro-men conclusions, we believe that our results can help to reduce such stereotypes, or at least make us think about them.

In conclusion, it is true that personality has an important impact on people's creativity. However, a contingent model introducing other variables such as TMX and gender is useful in explaining this relationship.

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Further reading

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Supplementary material

The supplementary material for this article can be found online.

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