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Disentangling the Link between Diverse Social Networks and Creativity: The Role of Personality Traits

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Abstract. Past studies have shown that being exposed to ethnocultural diversity can positively impact individual creativity. Yet, little is known about the interplay between situational (i.e., diversity) and dispositional (e.g., personality) factors in predicting creativity. Taking a person-situation approach, we use social network data to test the moderating role of personality in the relationship between having an ethnoculturally diverse network and creativity. Moreover, we investigate these questions in a diverse community sample of immigrants residing in the city of Barcelona (N = 122). Moderation analyses revealed that network diversity predicted higher levels of creativity in migrant individuals with medium to high levels of extraversion, and in those with low to medium levels of emotional stability. These results highlight the need to acknowledge the important role played by interacting individual-level dispositions and more objective meso-level contextual conditions in explaining one's ability to think creatively, especially in samples that have traditionally been underrepresented in previous literature.

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One common belief is that diversity is the mother of creativity. Introducing 'diversity and creativity' in any Internet search engine yields around two million hits. Research has shown that creativity, that is, generating novel and useful ideas (Amabile, 1983), is indeed higher among individuals who have been exposed to ethnocultural diversity (Leung et al., 2008; Leung & Chiu, 2008; Maddux et al., 2010). Specifically, multicultural diversifying experiences provide access to different and novel knowledge systems, which is the basis for creativity (Cheng & Tan, 2017; Dunne, 2017).

Interacting with people from different cultural origins is considered a deep multicultural experience (Aytug et al., 2018). Most studies on the impact of intercultural relationships on creativity, though, stem from the organizational (e.g., Lu et al., 2017) and intergroup contact (e.g., Vezzali et al., 2016) literatures, and focus on subjective (e.g., recalling) or experimental experiences of contact. A few studies have used social network approaches to study how diverse aspects of the composition and structure of individuals' networks within their organization (i.e., professional networks) may predict creativity (e.g., Chua, 2018; Dolgova et al., 2010; Jang, 2017; Perry-Smith & Shalley, 2014). To our knowledge, only two studies have examined the effects on creativity of *actual* ethnocultural diversity in individuals' *habitual* social networks -outside the

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organizational arena (Bobowik, Benet-Martínez, Repke, & Soler-Pastor, 2022; Chua, 2013). This prior research shows that culturally heterogeneous networks promote the flow of novel ideas from cultures other than one's own. One (unpublished) study found that ethnocultural diversity within one's personal social network predicted better creative performance in an immigrant sample (Bobowik, Benet-Martínez, Repke, & Soler-Pastor, 2022).[1]

Creative skills may be particularly relevant for migrant individuals who are inevitably in constant contact with a culturally diverse environment and under a high pressure to learn and accommodate to a new cultural setting. Their experiences of intercultural contact may be qualitatively different (e.g., discrimination, pressure to accommodate to the dominant culture) from those of the typically studied W.E.I.R.D. (White, Educated, Industrialized, Rich, Democratic) participants (Henrich et al., 2010). Yet, prior research on the role of intercultural experiences in boosting creative performance has mostly relied on privileged samples of bicultural individuals, such as highly skilled international professionals (e.g., Lu et al., 2017) and students (e.g., Lee et al., 2012; Maddux et al., 2010), and -with the exception of Bobowik, Benet-Martínez, Repke, & Soler-Pastor, 2022)- little is known regarding the link between diversity and creative performance among immigrants.

Beyond contextual factors, such as diversity, personality has also been argued to predict creativity (see Feist, 1998). Further, due to the interplay between personality characteristics and the context, people tend to seek scenarios that facilitate behavioral expression of their traits (Ickes et al., 1997). Yet, the literature examining the link between intercultural experiences and creativity has largely neglected the interplay between contextual (i.e., diversity) and individual (e.g., personality) ingredients of creativity (for an exception, see Leung et al., 2008).

In the current research, we test the moderating role of the Big Five personality dimensions (Goldberg, 1990; McCrae & John, 1992) in the link between social network ethnocultural diversity and creative performance, and we do so in a community sample of immigrants of diverse.

The Role of Personality in the Diversity-Creativity Link

The person-environment or interactionist framework (Duan & Li, 2018; Duan et al., 2019; Livingstone et al., 1997; Mischel & Shoda, 1995) proposes that particular contexts or situational demands motivate specific responses in people depending on their personality traits. In other words, personality traits are activated and/or expressed in response to trait-relevant situations (Dolgova et al., 2010), and this may differently shape people's behavioral responses to such situations. For example, as Duan et al. (2019) mention, when novel ideas encounter resistance from the environment, some individuals - maybe those that are more agreeable and introverted - may give up on these ideas in order to maintain good relationships and group harmony.

The literature examining the link between intercultural experiences and creativity has largely neglected the interplay between contextual (e.g., intercultural experience) and dispositional (e.g., personality) ingredients of creativity, even though some authors have suggested that an interactionist perspective would help us further understand creative behavior (Zhou & Hoever, 2014).

In this line, some scholars have recently suggested that intercultural experiences may not be sufficient themselves for enhancing creativity. On the one hand, it has been proposed that only individuals with high *dispositional plasticity*, —understood as a tendency toward flexible behavior and a propensity to seek, accept and include diverse and novel information (Mischel, 2004; Silvia et al., 2008)—, show capacity to assimilate or accommodate environmental variability and use it to innovate (Chang et al., 2017). Accordingly, creativity as a result of exposure to intercultural settings would be magnified for those individuals who exhibit higher levels of dispositional plasticity. On the other hand, not much is known about the role in creativity of another type of personality factor, *dispositional stability*. This disposition involves traits related to effectively coping with negative emotions, controlling one's impulses, caring about social norms, and being friendly with others (Feist, 2019). It reflects a tendency toward organized and controlled behavior (Silvia et al., 2008). Even though plasticity has generally revealed larger and more consistent effects, stability shows medium effect sizes, generally in the opposite direction (Silvia et al., 2009). Little is known, though, about the role of the aspects of personality related to dispositional stability in the link between intercultural experiences and creativity.

Plasticity and stability have been found to predict creativity independently (Silvia et al., 2009). However, previous creativity studies using personality have focused in one or two factors, generally related to plasticity, such as openness to experience (Sung & Choi, 2019). Moreover, with the exception of openness to experience, the lack of robust evidence in the literature linking personality traits to creativity suggests that researchers should move beyond models that include personality only as a director predictor, and think of it as a potential moderating variable. In the current study, we take a comprehensive approach and empirically test the moderating role of all Big Five (Goldberg, 1990;

[1]After controlling for gender and age.

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McCrae & John, 1992) personality traits related to both plasticity and stability, in the relationship between ethnocultural network diversity and creativity.

The Role of Plasticity: Openness and Extraversion

Personality traits reflecting plasticity, that is, *openness to experience* (Gocłowska et al., 2019; McCrae, 1987; Scratchley & Hakstian, 2001; Williams, 2004) and *extraversion* (Gocłowska et al., 2019; Kaufman et al., 2016), have been identified as the strongest direct predictors of creativity and divergent thinking (see reviews by Feist, 2019, and Puryear et al., 2016; see also Karwowski & Lebuda, 2016; Silvia et al., 2008). Openness to experience, which reflects the tendency to be curious, flexible, and open to novel experiences, has traditionally been creativity's most robust predictor (Batey & Furnham, 2006; Batey et al., 2010; Feist, 2019). Although in a less consistent manner (Furnham & Bachtiar, 2008; Furnham et al., 2008; Zhou & Hoever, 2014), the confidence and excitement-seeking components of extraversion are also positively related to creative thought and achievement (Feist, 2019).

Culturally diversifying experiences involve exposure to new and unfamiliar ideas from different cultures, which may be transformed into intellectual resources for creative expansion (Leung & Chiu, 2008). Individuals high in plasticity should be more curious and receptive of these ideas, and less inclined to cling on to conventional ideas of their own culture (Leung & Chiu, 2008). Moreover, their higher motivation to interact and communicate with dissimilar others would also facilitate the sharing of knowledge and exchange of ideas (Guo et al., 2017). Only a few studies have empirically examined the interaction between diversity and plasticity in predicting creative behavior. Guo et al. (2017) found that extraverted and open individuals performed more creatively when working in groups characterized by high functional and gender diversity. Regarding ethnocultural diversity, Leung and Chiu (2008) found that having extensive multicultural experiences (e.g., living abroad, exposure to different cultures, having friends from different countries) benefited creativity among individuals who were open to experience. Similarly, Cho and Morris (2015) found that the positive relationship between studying abroad and generating unconventional solutions to problem-solving tasks was facilitated by openness to experience. Finally, Chen and colleagues (2016) showed that, when exposed to cultural mixing, open individuals performed better on creative tasks involving cultural threat. Based on the positive (direct and moderated) links between plasticity and creativity found in this previous research, we formulated the following hypotheses, specific to ethnocultural network diversity:

H_1: Openness to experience moderates the effects of ethnocultural network diversity on creativity, with the effects of diversity on creativity being stronger for people who score high on openness to experience.

H_2: Extraversion moderates the effects of ethnocultural network diversity on creativity, with the effects of diversity on creativity being stronger for people who score high on extraversion.

The Role of Stability: Conscientiousness, Agreeableness, and Emotional Stability

The personality dispositions reflecting dispositional stability include: *Agreeableness* (disposition to be warm, compliant and empathetic with others), *conscientiousness* (disposition to control one's impulses, preference for order, structure and detail), and *emotional stability* (the tendency to be even-tempered particularly in challenging situations).[2]

The literature generally finds that the traits capturing stability are negatively related to creative thinking (Feist, 2019; Karwowski & Lebuda, 2016; Silvia et al., 2009), although this relationship is weaker compared to plasticity. Agreeable individuals, for instance, tend to avoid interpersonal conflict, appease others, and generally be more conforming; therefore, they may refrain from proposing or exchanging their ideas and opinions in contexts characterized by diversity. Some studies show that low agreeableness (e.g., arrogance, hostility) is related to greater creativity (Batey et al., 2010; Feist, 1998; Furnham et al., 2009; King et al., 1996; Silvia et al., 2011). Some studies, though, have found an opposite relationship, i.e., a positive link between agreeableness and creativity (Batey & Furnham, 2006; Feist, 1998, 2019; Silvia et al., 2008, 2009). Guo et al. (2017) hypothesized that (functional and gender) group diversity would interact with agreeableness to predict creativity. On the one hand, since agreeable people tend to have a more positive attitude toward diversity (Strauss et al., 2003), and be more flexible and sympathetic (Puryear et al., 2016), they hypothesized that information variety -resulting from functional diversity- would benefit their levels of creativity. On the other hand, agreeable people tend to avoid interpersonal conflict, by not voicing their opinions or exchanging their knowledge -especially if these differ from others'. As pointed by Guo et al. (2017), there are also gender differences in this agreeable conflict-avoidant tendency (i.e., for females it will be more pronounced than for males). Thus, the authors expected gender diversity to negatively moderate the

[2]The latter has usually been studied as its opposite or reversed construct, that is, *neuroticism*, or the disposition to experience negative affect such as anxiety, stress or depression.

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relationship between agreeableness and creativity. However, they did not find evidence for any of those moderating relationships. Therefore, we had no specific hypotheses for the moderating relationship of agreeableness in the link between diversity and creativity, and took an explorative approach.

Conscientiousness has consistently been positively linked to job performance, since this trait entails being reliable, hardworking, and organized. Some authors have shown, though, that conscientiousness hinders creativity, given that its characteristic elements (e.g., willingness to conform to norms, tendency to control one's impulses) are inconsistent with the openness to new ideas and the desire to seek change that motivate creative behavior (Guo et al., 2017). According to Feist's meta-analysis (1998), the direction of the effect seems to also be domain-specific. In the scientific domain, the relationship of conscientiousness with creativity is positive, while in the artistic domain it is negative.[3] Guo et al. (2017) specifically hypothesize that diverse group contexts may harm conscientious individuals' creativity, given these individuals' preference for certainty, their rigid and systematic thinking tendencies, and their dependency on preestablished norms and standards. However, in their exploration they found no significant interactions between diversity and conscientiousness in predicting creative behavior. Again, we had no particular hypotheses regarding the role of conscientiousness. Thus we exploratively tested the interactive relationship between ethnocultural diversity in individuals' social networks and conscientiousness in predicting creativity.

Finally, most studies (including a meta-analysis by Feist, 1998) have found that creative people are generally low in emotional stability (see also Batey et al., 2010; Furnham et al., 2008). The distinctive sensibility and perspective of neurotic (a.k.a., low in emotional stability) individuals, which leads to lower cognition and behavior inhibition, as well as to higher independence and normative challenging behavior, helps them generate creative ideas more fluently (Feist, 1998; Gao et al., 2020; Guo et al., 2017). However, some authors have found a null (King et al., 1996), more complex, or even opposite relationship. For example, Chamorro-Premuzic & Reichenbacher (2008) found that neurotic individuals are less creative -particularly when under threat of evaluation and when they are also introverted. Kirsch et al. (2016) found that emotional stability boosted creativity in artists but hindered it in social scientists. Following an interactionist perspective, Guo et al. (2017) showed that, under high levels of group functional diversity, neuroticism had a negative effect on individual creativity. They argue that the increase of new and diverse information generates a challenging context that requires more complex information processing and integration. Individuals with low emotional stability will find it difficult to remain calm in these challenging circumstances, and thus their abilities to process, integrate, and combine the new information in creative ways will be hindered. This is supported by other studies that find that positive affect, a calm attitude and self-confidence -as components of emotional stability- motivate individuals to seek new and divergent knowledge (Park et al., 2022), and improve their ability to adapt to new situations (Driskell et al., 2006), which ultimately facilitates the creative process (Batey et al., 2010; Gao et al., 2020). In other words, emotionally stable individuals are better equipped to manage and adapt themselves to new, uncertain, unpredictable or challenging environments (Park et al., 2022), such as those potentially created by intercultural interactions. Thus, taking an interactionist perspective -based on Guo et al. (2017)- that considers the role of emotional stability in a context of ethnocultural (network) diversity, we hypothesized that:

> ***H_3:*** Emotional stability moderates the effects of ethnocultural network diversity on creativity, with the effects of diversity on creativity being stronger for people who score high on emotional stability.

Current Research

The current study tests the interaction between ethnocultural diversity within individuals' social networks and personality in predicting creative performance in a domain-general task (Alternate Uses Task, Guilford et al., 1967). We present secondary data analyses from a previous study (Bobowik, Benet-Martínez, & Repke, 2022, see Appendix) in which we examined the differential role of several compositional and structural social network measures in creativity. In the current investigation, we apply the person-environment interactionist framework (Dolgova et al., 2010; Duan et al., 2019; Guo et al., 2017), and consider that neither personal nor environmental factors can independently impact creativity. Rather, creative thinking and behavior can be better understood when personal factors, environmental factors, and their interaction, are contemplated (Duan et al., 2019). Within this approach, we explore the interactive relationship between an objective, meso-level factor (i.e., ethnocultural social network diversity) and subjective, individual-level factors (i.e., personality), in explaining creative behavior.

[3]Moreover, the relationship may be culturally specific. Like Feist (2019) mentions, in western cultures there might be a null or negative relationship between conscientiousness and creativity, whereas for Chinese students, conscientiousness positively relates to creativity (Chen, 2016).

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To capture diversity among immigrants' habitual relationships, we adopt social network analysis, an innovative methodology that maps onto actual contact between individuals (Borgatti et al., 2009).[4] We argue that the objective meso-level contextual conditions (i.e., ethnocultural social network diversity) and psychological individual-level processes (i.e., personality) may jointly define social realities (Bobowik et al., 2021; Robins & Kashima, 2008) and individual outcomes, including one's ability to generate creative solutions. Moreover, we conduct this study with a community sample of immigrants residing in the city of Barcelona, a social group that has been highly underrepresented in research on creativity.

We hypothesize that openness to experience, extraversion, and emotional stability interact with ethnocultural social network diversity to predict creativity. We approach the relationships with agreeableness and conscientiousness in an exploratory manner. Together, we propose that the effects of network diversity on generating creative ideas may be magnified (or reduced) for some individuals, depending on their dispositional nature (i.e., personality traits).

Method

Participants and Procedure

Participants of this study were 122 adults with immigrant background who lived in the metropolitan area of Barcelona (59% female, mean age M = 33.05 years, SD = 10.33). Most of them were foreign-born (92.6%), and 7.4% were second-generation migrants (born in Spain with at least one parent born outside of Spain). Participants were from Ecuador (n = 30, 66.7% females, mean age M = 32, SD = 11.28), Morocco (n = 30, 63.3% females, mean age M = 30, SD = 11.24), Pakistan (n = 31, 38.7% females, mean age M = 29, SD = 8.31) or Romania (n = 31, 67.7% females, mean age M = 38, SD = 8.32).[5]

The data were collected in two stages. During the first stage, a larger number of participants (N = 216) was recruited through relevant cultural, religious, and immigrant-related organizations in Barcelona (see Repke & Benet-Martínez, 2018), and social network, acculturation and identity data were collected. One to two years later, participants were contacted again to participate in a study that included measures of creativity, intergroup attitudes, and multicultural experiences. Participants filled in the questionnaires in individual or small group sessions on the assisting organizations' premises or in the university laboratory. Each participant received monetary compensation (€15) for their participation in each of the study stages. One random participant received the prize of 150 euros that we raffled among them.

Measures

Ethnocultural network diversity. Participants received the following instructions: 'Please, give us the names of 25 persons you know (of any culture or ethnicity), with whom you have had regular contact in the past two years, either face-to-face, by phone, mail or e-mail, and whom you could still contact if you had to.' After providing all names, they were asked to provide information about each contact's ethnicity/culture ('What is the ethnicity/culture of [name]?', choosing between four categories: (a) Moroccan/Pakistani/ Ecuadorian/ Romanian, (b) Catalan, (c) Spanish, and (d) Other), and the place of birth and residence ('Where was [name] born?' and 'Where does [name] live?' with the same four categories). The network diversity index reflects the probability that two randomly selected contacts are from different ethnic/cultural groups, considering three groups (i.e., coethnic, host national, and other-ethnicity contacts; for detailed formula, see Repke & Benet-Martínez, 2018). This variable was constructed based on a commonly used fractionalization measure (e.g., Fearon, 2003).

Creativity. We used the Alternate Uses Task (Guilford et al., 1967), which researchers have widely applied to assess divergent thinking processes and creativity (e.g., Leung & Chiu, 2008; Tadmor, Galinsky, et al., 2012; Tadmor, Satterstrom, et al., 2012). During the creativity task, participants had four minutes to list as many uses for three common household items: a plastic bottle, a brick and a cardboard box. The items were presented to participants in pictorial and word format, and randomized order. A team of two independent raters coded the creativity dimensions of *fluency*, *flexibility*, and *originality*. *Fluency* was operationalized as the number of uses participants generated for each of the three objects (after eliminating repetitive responses). We calculated the mean score for overall fluency across the three objects. We used the number of different categories generated as an indicator of *flexibility*. The various uses for each object were divided into categories via discussion between the raters, and guided by the work of some authors (Gilhooly et al., 2007; Glover & Gary, 1976; Leung & Chiu, 2008; Markman et al., 2007; Tadmor, Galinsky, & Maddux, 2012). Some examples of categories for a plastic bottle were: liquid container,

[4]Social network techniques (e.g., asking participants to nominate people they interact with and whether these people know each other) constitute a less obtrusive and more implicit approach to capture social relationships than traditional self–reports (Molina et al., 2014; Repke & Benet–Martínez, 2018, 2019; Wölfer et al., 2016).

[5]For the detailed socio–demographic information see Bobowik et al. (2021).

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gardening, sound and music, weapons. Again, we calculated the overall mean score of flexibility across the three objects. *Originality* captured the degree of novelty and usefulness of each generated use, following Amabile (1983). Originality was measured on a scale from 1 (*not at all creative*) to 5 (*extremely creative*) (see Tadmor, Galinsky, & Maddux, 2012; Tadmor, Satterstrom, et al., 2012). We calculated the mean degree of originality per use across the three objects. Following some previous authors (Batey & Furnham, 2008; Batey et al., 2010), we used the standardized scores of fluency, flexibility, and originality, to calculate an average composite score that constitutes a more comprehensive measure of creativity than each individual score. The reliability of the three dimensions that composed the creativity score was acceptable (α = .66). When testing together the nine rated coefficients representing every creativity dimension for each object (i.e., fluency for each object, flexibility for each object, originality for each object) we obtained a good level of internal consistency (α = .82).

Responses were coded by a team of two independent raters. The two raters did a practice round of creativity ratings with a subsample of eight individuals (two from each ethnic origin), to feel confident about the ratings and understand each creativity component. A third person helped during this consensus-building phase. Then, they rated another subsample of N = 46 individuals. An average of the ratings of both coders (N = 54 participants) was computed for each dimension. The remaining responses (N = 68) were rated by one of the two coders. A high inter-rater reliability was achieved for all dimensions.[6]

Personality. Personality was measured using the Ten-Item Personality Inventory (TIPI; Gosling et al., 2003). TIPI is a very short instrument that has shown optimized validity, also in the Spanish context (Renau et al., 2013). Two items were used to represent each of the five personality dimensions: openness ("open to new experiences," "complex"), conscientiousness ("dependable," "self-disciplined"), extraversion ("extraverted," "enthusiastic"), agreeableness ("critical," "quarrelsome"), and emotional stability ("calm," "emotionally stable"). Participants were asked to indicate the extent to which the distinct pairs of personality traits applied to them, even if one characteristic applied more strongly than the other, on a 7-point Likert scale ranging from 0 (*strongly disagree*) to 6 (*strongly agree*).

[6]A high inter–rater reliability (intraclass correlation) between two coders was achieved for fluency (ICC = .83), flexibility (ICC = .91), and originality (ICC = .78) in a first subsample of 54 individuals.

Control variables. We included gender and age as control variables in our models because these variables have been shown to be predictive of creativity in previous research (e.g., Abraham, 2016; Aytug et al., 2018). Gender was conceived as a binary variable (1 = *male*, 2 = *female*). Age was measured as a continuous variable.

Results

Descriptive Analyses

We carried out bivariate correlation analyses (see Table 1). The relationship between ethnocultural network diversity and creativity was significantly positive (r = .19, p = .036), as expected from previous literature (Wiruchnipawan & Chua, 2018), and already reported in Bobowik, Benet-Martínez, Repke, & Soler-Pastor (2022). As per the links with personality, the only personality dimensions that were directly correlated with creativity were openness to experience (r = .22, p = .013) and extraversion (r = .22, p = .016). Finally, ethnocultural network diversity was positively and significantly associated only with openness (r = .19, p = .038), but not with other personality traits. These results also reveal that our contextual predictor (i.e., ethnocultural network diversity) and our moderating variables (i.e., personality traits) were largely unrelated and independent.

Ethnocultural Network Diversity, Personality and Creativity: Regression Results

We conducted hierarchical regressions to explore the predicting value of ethnocultural network diversity, personality, and their interaction for creativity. All the models included gender and age as control variables. Network diversity and personality were introduced in Step 1, and their interaction in Step 2. Gender and age were included in both steps. To avoid overfitting, considering the small size of our sample (N = 122), we ran separate models for each personality trait.

Results in Table 2 show that, in Step 1, ethnocultural social network diversity significantly predicted creativity in the models including conscientiousness, agreeableness, and emotional stability. It was only a marginally significant predictor, though, in the models with openness and extraversion. Regarding the main effects of personality traits, only openness and extraversion showed a significant association with creativity.

Results for Step 2 show that only the interactions between network diversity and extraversion, and between network diversity and emotional stability were significant. There were no significant interactions with openness, conscientiousness, or agreeableness. These

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Table 1. *Means, Standard Deviations and Bivariate Correlation Coefficients for all Variables in this Study*

	1	2	3	4	5	6	7	8	9
M	.49	4.25	4.71	3.70	4.46	3.98	1.59	33.05	.00
SD	.16	1.15	1.22	1.43	1.08	1.30	.49	10.33	.77
1. Ethnocultural SN diversity	1								
2. Openness	.19*	1							
3. Conscientiousness	–.08	.19*	1						
4. Extraversion	.11	.28**	.09	1					
5. Agreeableness	–.00	.11	.30**	–.01	1				
6. Emotional Stability	.02	.18*	.21*	–.03	.41**	1			
7. Gender	.02	.20*	.18	.16	.02	–.09	1		
8. Age	–.10	–.05	.24**	.02	–.09	.11	.16	1	
9. Creative Performance	.19*	.22*	.07	.22*	.08	.08	.06	.08	1

Note. Creative Performance = composite average score calculated from the standardized scores of fluency, flexibility, and originality means; SN = Social Network; $N = 122$ (except for Extraversion, $N = 121$).

*$p < .05$.

**$p < .01$.

results thus yield initial support for our hypotheses H_2 and H_3, but not for H_1.[7]

Ethnocultural Network Diversity and Creativity: Moderation by Extraversion and Emotional Stability

We used the SPSS macro PROCESS (Model 1) to visualize the conditional effects of network diversity on creativity, at different levels of extraversion and emotional stability. In all analyses, we controlled for gender and age. Results in Table 3 and slopes visualized in Figures 1 and 2 show that network diversity was associated with more creativity among those participants who scored medium (mean) or high (+1 *SD* above the mean) on extraversion, but not among those with low (–1 *SD* below the mean) scores on this trait. In contrast, network diversity predicted higher creativity among those with low (–1 *SD* below the mean) or medium (mean) levels of emotional stability, but not among those with high (+1 *SD* above the mean) scores on this personality dimension. When visualizing with more detail the regions of significance for these conditional effects, using the Johnson-Neyman technique (see Lin, 2020), we observed that the conditional effects of extraversion appear in individuals that scored 3.50 or above on the 0–6 scale. The effects of emotional stability show in those who scored 3.80 or below.

[7]We ran five additional models (one for each interaction term) in which we controlled for every individual predictor (i.e., network diversity and the Big Five) plus sociodemographics (gender and age). The same two interactions remained significant: the interaction between network diversity and extraversion (B = .68, *SE* = .31, $t = 2.18$, 95% CI [.06, 1.30], $p = .031$), and the interaction between network diversity and emotional stability (B = –.82, *SE* = .35, $t = -2.32$, 95% CI [–1.51, –.12], $p = .022$).

These results support our hypothesis H_2, in which we expected the effects of creativity to be stronger for extraverted individuals. However, they go in the opposite direction to our H_3, which states that emotionally stable individuals are more creative in contexts of diversity. Instead, those lower in emotional stability exhibit higher levels of creativity. As shown in Figure 2, participants high in emotional stability perform more creatively than those lower in emotional stability in contexts of low social network diversity. However, their creativity levels remain equivalent (neither decreasing nor increasing) as social network diversity increases. Individuals with medium or low levels of emotional stability perform less creatively than their emotionally stable counterparts in low social network diversity contexts. However, in contexts of high social network diversity, their levels of creativity increase and reach higher levels than those of highly emotionally stable participants.

Discussion

Research has shown that both ethnocultural diversity (e.g., Aytug et al., 2018; Jang, 2017) and personality (e.g., Feist, 1998; 2019) have the potential to impact creativity. However, lack of consistent and strong evidence in the literature linking personality traits to creativity (i.e., all except openness), suggests that personality may function more as a moderating factor rather than as a direct predictor. Moreover, the person-environment interactionist perspective poses that certain contexts facilitate the expression of personality traits that fit them (Dolgova et al., 2010). Thus, studying the interaction of both situational and individual factors can provide a more comprehensive picture of the mechanisms

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Table 2. *Creativity Predicted by Ethnocultural Social Network Diversity, Personality, and their Interaction*

	B	*SE*	*t*	*p*	95% CI for *B*		R^2
					LL	*UL*	
Model 1. Ethnocultural SN diversity and openness							
Step 1							**.085**
SN diversity	*.79*	*.44*	*1.80*	*.074*	*–.08*	*1.65*	
Openness	**.13**	**.06**	**2.16**	**.033**	**.01**	**.26**	
Step 2							**.098**
SN diversity	*2.59*	*1.46*	*1.78*	*.078*	*–.29*	*5.48*	
Openness	*.37*	*.19*	*1.94*	*.055*	*–.01*	*.74*	
SN diversity x openness	–.47	.37	–1.30	.197	–1.20	.25	
Model 2. Ethnocultural SN diversity and conscientiousness							
Step 1							.051
SN diversity	**.98**	**.44**	**2.22**	**.028**	**.11**	**1.84**	
Conscientiousness	.03	.06	.59	.557	–.08	.15	
Step 2							.052
SN diversity	.38	1.95	.20	.844	–3.49	4.26	
Conscientiousness	–.02	.20	–.12	.904	–.42	.37	
SN diversity x conscientiousness	.12	.39	.31	.757	–.65	.89	
Model 3. Ethnocultural SN diversity and extraversion							
Step 1							**.085**
SN diversity	*.85*	*.43*	*1.97*	*.051*	*–.00*	*1.71*	
Extraversion	**.10**	**.05**	**2.14**	**.034**	**.01**	**.20**	
Step 2							**.121**
SN diversity	–1.39	1.12	–1.24	.216	–3.61	.83	
Extraversion	–.23	.16	–1.42	.157	–.55	.09	
SN diversity x extraversion	**.67**	**.31**	**2.17**	**.032**	**.06**	**1.29**	
Model 4. Ethnocultural SN diversity and agreeableness							
Step 1							.056
SN diversity	**.97**	**.44**	**2.21**	**.029**	**.10**	**1.83**	
Agreeableness	.06	.06	.99	.324	–.06	.19	
Step 2							.064
SN diversity	2.68	1.74	1.54	.125	–.76	6.12	
Agreeableness	.24	.18	1.30	.195	–.12	.60	
SN diversity x agreeableness	–.38	.37	–1.02	.310	–1.11	.35	
Model 5. Ethnocultural SN diversity and emotional stability							
Step 1							.054
SN diversity	**.95**	**.44**	**2.17**	**.032**	**.08**	**1.81**	
Emotional stability	.04	.05	.83	.410	–.06	.15	
Step 2							*.086*
SN diversity	**3.74**	**1.43**	**2.62**	**.010**	**.91**	**6.57**	
Emotional stability	**.39**	**.18**	**2.21**	**.029**	**.04**	**.75**	
SN diversity x emotional stability	**–.71**	**.35**	**–2.05**	**.043**	**–1.39**	**–.02**	

Note. Controlled gender and age. Model 1: Step 1, $F(4, 117) = 2.707$. $p = .034$, and Step 2, $F(5, 116) = 2.515$. $p = .034$; Model 2: Step 1, $F(4, 117) = 1.570$. $p = .187$, and Step 2, $F(5, 116) = 1.266$. $p = .283$; Model 3: Step 1, $F(4, 116) = 2.689$. $p = .035$, and Step 2, $F(5, 115) = 3.162$. $p = .010$; Model 4: Step 1, $F(4, 117) = 1.737$. $p = .146$, and Step 2, $F(5, 116) = 1.598$. $p = .166$; Model 5: Step 1, $F(4, 117) = 1.659$, $p = .164$; and Step 2, $F(5, 116) = 2.204$, $p = .059$. SN = Social Network. $N = 121$ (except model with Extraversion, $N = 120$). **Bold** = statistically significant coefficients; *Italic* = marginally significant coefficients.

underlying creative performance (Park et al., 2022). Little is known, however, about the interaction between contextual ethnocultural diversity and personality (for an exception, see Leung & Chiu, 2008). In addition, the few studies that have explored how ethnocultural social network diversity influences creativity stem from the organizational area (e.g., Jang, 2017) or use W.E.I.R.D. student/professional samples (e.g., Chua, 2018). The impact of immigration-based multicultural experiences on creative performance remains heavily understudied and unclear (for exceptions, see Bobowik, Benet-Martínez, Repke, & Soler-Pastor, 2022; Franzoni et al., 2014).

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Table 3. *Conditional Effects of Ethnocultural Social Network Diversity on Creativity, at Different Levels of Extraversion and Emotional Stability*

	B	*SE*	*t*	*p*	95% CI for *B*	
					LL	*UL*
Conditional effects of SN diversity at levels of extraversion (N = 121)						
Low extraversion	0.13	0.54	0.24	.807	–0.94	1.20
Medium extraversion	**1.09**	**0.44**	**2.48**	**.014**	**0.22**	**1.96**
High extraversion	**2.06**	**0.70**	**2.93**	**.004**	**0.67**	**3.44**
Conditional effects of SN diversity at levels of emotional stability (N = 122)						
Low emotional stability	**1.84**	**0.61**	**3.00**	**.003**	**0.62**	**3.05**
Medium emotional stability	**0.91**	**0.43**	**2.12**	**.035**	**0.06**	**1.77**
High emotional stability	–0.00	0.63	–0.01	.993	–1.26	1.25

Note. Controlled gender, and age. Low levels = –1 *SD* below the mean; Medium levels = mean; High levels = –1SD above the mean. SN = Social Network. **Bold** = statistically significant coefficients; *Italic* = marginally significant coefficients.

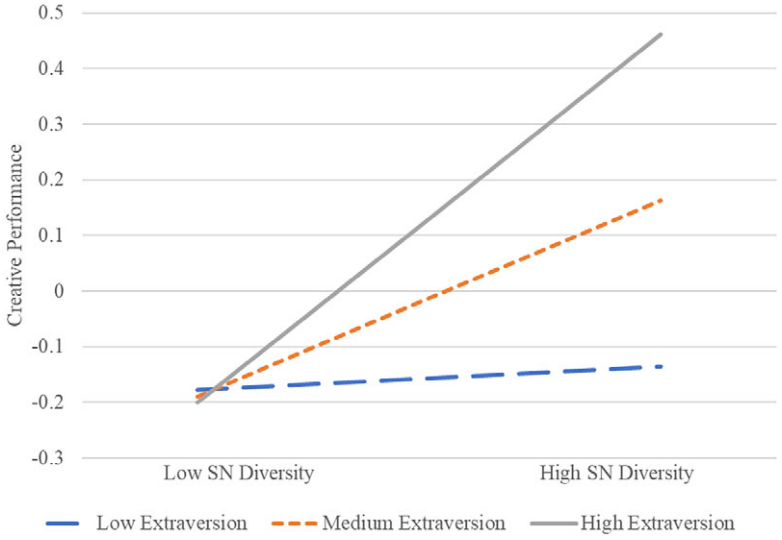

Figure 1. Effects of Ethnocultural Social Network Diversity on Immigrants' Creativity, Moderated by Extraversion.
Note. Creative Performance = composite average score calculated from the standardized scores of fluency, flexibility, and originality means; SN = Social Network; *N* = 121.

To fill these gaps, in the current study we examined how ethnocultural diversity within immigrants' habitual social networks interacts with personality to predict their creative performance in the Unusual Uses Test (Guilford, 1967). We argued that certain personality traits (i.e., openness, extraversion, and emotional stability) would magnify creativity, and we explored the moderating role of agreeableness and conscientiousness.

Our results show that social network ethnocultural diversity exerted significant main effects on creativity -in the models that controlled for the effects of conscientiousness, agreeableness, or emotional stability-, which supports previous research on the direct effects of social network diversity on creativity (Chua, 2018; Wiruchnipawan & Chua, 2018). However, network diversity was only a marginally significant predictor in the models that included either openness or extraversion. These results suggest that certain personality dispositions (e.g., being open-minded) might be more relevant predictors of creativity than contextual diversity, at least in our immigrant sample.

One of the relevant findings in our study is the role of dispositional plasticity, including the traits of openness to experience and extraversion, in predicting creativity among immigrants. These results align well with the research that shows that those two traits are the strongest predictors of creativity (Feist, 2019; Karwowski & Lebuda, 2016; Puryear et al., 2016; Silvia et al., 2008), while personality traits related to stability (i.e., emotional stability, agreeableness, and conscientiousness) are less relevant in motivating creative

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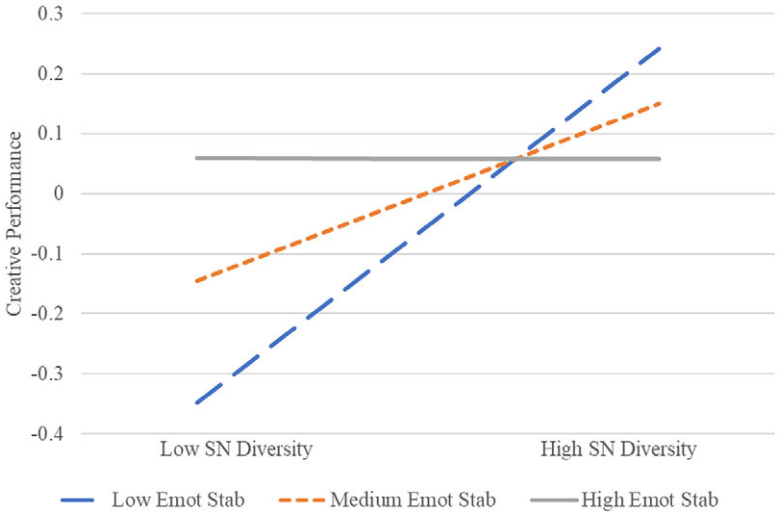

Figure 2. Effects of Ethnocultural Social Network Diversity on Immigrants' Creativity, Moderated by Extraversion
Note. Creative Performance = composite average score calculated from the standardized scores of fluency, flexibility, and originality means; SN = Social Network; Emot Stab. = Emotional Stability; $N = 122$.

thought and behavior. To our knowledge, our study is the first to explore the role of personality in predicting creativity among individuals with immigrant background. More research relying on robust immigrant samples is necessary to replicate our findings.

Regarding the moderating role of personality in the diversity-creativity link, our results indicate that an extraverted and neurotic tendency might have helped migrant participants reap the creative benefits of having an ethnoculturally diverse network of relations. Extraversion may facilitate processes of socializing with culturally diverse others, and thus of being exposed to culturally diverse perspectives and ideas, which is the basis for creativity (Cheng & Tan, 2017; Dunne, 2017). Moreover, as suggested by some authors (Furnham & Bachtiar, 2008; Gao et al., 2020; Sung & Choi, 2019), extraverts' enthusiastic and stimulation-seeking attitude in divergent thinking or problem-solving tasks, may positively impact their creative performance. In line with our results, Turner et al. (2014) found that extraversion (but not openness to experience) predicted the likelihood of forming cross-group friendships in an intergroup contact context (i.e., White vs. Asian-origin British), and that it also moderated the effects of cross-group friendships on positive outgroup attitudes. Their findings suggest that individuals' personality influences the types of relationships they develop (e.g., cross-group friendship) in a culturally diverse intergroup context, which will ultimately impact outcomes such as positive attitudes. In our research, extraversion not only had a direct link with creative performance, but it also magnified the effects of immigrants' culturally diverse interactions on creativity. Extraversion may have particularly facilitated participants to engage with culturally diverse others, to share and exchange ideas, knowledge, or cultural representations, and to listen to different perspectives, in a migration context in which new and culturally diverse individuals are being incorporated in their habitual networks.

Further, our results do not support the suggestion by Guo et al. (2017) that neurotic individuals will find it more challenging to process and integrate the complex information flows that arise in diverse environments. On the contrary, low emotional stability facilitated creativity in immigrant participants with highly diverse social networks. These results align with previous research on the positive effects of neuroticism on creativity (Batey & Furnham, 2006; Feist, 1998, 2019), and again reinforce the person-environment framework in even more nuanced ways: different personality traits interact with different experiences of diversity (e.g., diverse networks), but also with other factors (e.g., type of relationships in the network, type of sample). For example, perhaps meaningful, supportive, high-quality relationships are more relevant for neurotic individuals to generate a safe environment in which they can be more open to new ideas and information flows, and ultimately develop their creativity.

None of the other personality traits emerged as relevant moderators in our results. Openness did show a direct positive association with creativity, but, contrary to our expectations and previous findings (Guo et al., 2017; Leung & Chiu, 2008), it did not arise as a significant moderating predictor of personality in our study. In line with these results, Turner et al. (2014) found that openness did not moderate the effects of cross-group friendships on positive outgroup attitudes, but that the effect of openness on attitudes was direct. Following

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this line of reasoning, while our results show that extraversion interacts with having culturally diverse relationships to predict creativity, the role of openness may not necessarily be tied to this relational dimension. That is, extraversion may have helped people expose themselves to relational diversity and thus become more creative. Openness to experience characterizes intellectually curious people who are not necessarily motivated to seek relationships with others. Thus, open individuals in our sample may have been exposed to cultural diversity via other experiences, such as books, food, music, or travelling abroad (see Multicultural Experience Survey, Leung & Chiu, 2008). This way, they may have been able to reap the creative benefits associated with cultural diversity without necessarily depending on building diverse relationships. Alternatively, it may also be that openness had a mediating (vs. moderating) role in the relationship between social network diversity and creativity. That is, the diverse composition of social networks may have led to personality changes (e.g., increases in openness), as suggested in previous research (Chua, 2018; Repke & Benet-Martínez, 2018; Zimmerman & Neyer, 2013). The significant correlation between openness and social network diversity in our data supports this idea. As Repke and Benet-Martínez (2018) stress, there is a need for more research on the personality processes driving and resulting from network formation. Larger samples are needed to test these possibilities with more complex models (e.g., mediation, moderated mediation).

Finally, it is worth noting that our sample was diverse in terms of ethnocultural origin, age, socioeconomic and educational background. In addition, it was composed by individuals generally underrepresented in previous research (i.e., migrant populations), and whose experiences of cultural diversity might be different from and more challenging than those of more privileged samples (e.g., expatriates, exchange students). The results presented highlight the importance of including diverse and non-W.E.I.R.D. samples in research on the impacts of cultural diversity and personality on creativity.

This study presents several limitations that need to be acknowledged. First, although we highly value our sample's contribution to the field, as well as its cultural and demographic heterogeneity, its small size ($N = 122$) limits the generalizability of our results. Further, different results might be obtained in samples representing only one cultural group, or in different types of migrant samples.

Moreover, we cannot determine causality from our cross-sectional research design. For example, although both personality and social networks have shown to be quite stable over time (Lubbers et al., 2010), it is theoretically possible that highly creative individuals choose to develop diverse social networks. Also, according to some social network research (Repke & Benet-Martínez, 2019), there may be a bidirectional link between micro-individual (e.g., personality) and meso-level (e.g., network) processes. The principles of *selection* (i.e., individuals choosing their network members, based on personal preferences and needs) and *influence* (i.e., network members shaping individuals' behaviors, attitudes, or even personality tendencies) underlie this bidirectional relation. Different design approaches would be able to more confidently establish the direction of relationships proposed in the current study.

Concerning the measures' limitations, previous research (e.g., Chua, 2018) suggests that the relationship between personality and creativity may also depend on the type of creativity assessment (e.g., whether it requires collaboration with others or introspection).[8] Even if we use a general-domain measure of creativity (vs. work creativity, team creativity, or a culture-related task), it is still limited in the sense that it is an instrument developed in a particular Western (United States) cultural context. Therefore, like Shao et al. (2019) points out, participants' cultural background (e.g., language) may have influenced their creative performance in this verbal task. Likewise, coders' cultural background may have biased their rating of creativity. Future studies could incorporate other forms of creativity assessment (e.g., pictorial) and use coders that match the cultural background of the study participants.

Our study also fails to pinpoint which specific aspect of the measured personality traits impacts creativity. For example, the stimulus-seeking and confidence aspects of extraversion seem to be positively related to creative thought (Baas et al., 2008; Batey & Furnham, 2006; Feist, 1998, 2019), whereas the sociability dimension appears to have a negative impact on processes that require introspection and time alone (Feist, 1998, 2019). In our current study, we use the brief version of the Big Five personality inventory (TIPI; Gosling et al., 2003), validated in the Spanish context (Renau et al., 2013). Future studies could incorporate a more nuanced look at personality by using the extended version of the Big Five personality inventory (John & Srivastava, 1999) or by measuring the specific dimensions of each trait (see Feist, 1998).

Finally, the nature of relationships representing ethnocultural social network diversity might be relevant. For example, stronger ties (e.g., family, friends) may imply a deeper engagement with diversity and, therefore, more creative benefits among our extraverted participants. Similarly, neurotic individuals may benefit

[8]Kaspi–Baruch (2017) presents some research that suggests that extraversion may enhance creativity in occupations that require performing in some areas of art, and introversion helps in occupations that require self–work and introspection.

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especially from culturally diverse networks when the relationships are safe, meaningful, and supportive. Future studies could consider the quality of relationships within diverse networks, and explore how they potentially interact with personality profiles differently in predicting creative behavior.

Conclusions

Both experiences of intercultural contact (Wiruchnipawan & Chua, 2018) and personality (Feist, 2019) have been associated with greater creativity. Moreover, many authors have stressed the importance of considering how personality and situational forces combine to bring about psychological outcomes or behavior (Turner et al., 2014). Like Chen et al. (2016) mention, people do not display their dispositional tendencies in a void, but in meaningful situations, such as during contact with culturally diverse others. Recognizing the interplay between trait and context has important implications for understanding intra (e.g., creativity) and interpersonal processes (e.g., intercultural relations). Following this person-environment approach, we explore the interaction between ethnocultural social network diversity and personality in predicting creative performance. Importantly, we examine this relationship in a diverse community sample of immigrants. Aligned with previous literature, we find that network diversity, openness, and extraversion, are all positively associated with creativity. In addition, extraversion and emotional stability moderate the effects of network diversity on creativity. Specifically, participants with extraverted and neurotic tendencies show greater creative benefits from having culturally diverse networks. Our results highlight the importance of considering the interplay between individual-level and meso- or macro-level contextual variables, as well as of including non-W.E.I.R.D. and diverse samples that have traditionally been neglected in creativity research, if we want to understand the mechanisms underlying creative behavior more comprehensively.

Appendix

Data Transparency

The data used in the current paper was part of a larger project on the intra and interpersonal outcomes of multicultural experiences which that included two broad surveys with a sample of immigrants of diverse cultural origins. The data were collected in two different stages at the university's laboratory, as mentioned in the Methods' section of the current manuscript (p. 13). The surveys covered measures of personal social networks, identification, adjustment, acculturation, intergroup attitudes, and creativity. There are five additional papers that derived from this dataset:

Paper 1: On social networks and adjustment
Paper 2: On social network diversity (among close relationships), bicultural identity integration, and global identification.
Paper 3: On social networks, personality, and outgroup attitudes.
Paper 4: On global and host culture identification and creativity.
Paper 5 (unpublished): On close vs. distant social networks' ties and creativity.

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