Ninety Years after Lewin : the Role of Familism and Attachment Style in Social Networks Characteristics across 21 Nations

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Ninety Years after Lewin: The Role of Familism and Attachment Style in Social Networks Characteristics across 21 Nations/Areas

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Abstract

Drawing on the literature on person-culture fit, we investigated how culture (assessed as national-level familism), personality (tapped by attachment styles) and their interactions predicted social network characteristics in 21 nations/areas (N = 2977). Multilevel mixed modeling showed that familism predicted smaller network size but greater density, tie strength, and multiplexity. Attachment avoidance predicted smaller network size, and lower density, tie strength, and multiplexity. Attachment anxiety was related to lower density and tie strength. Familism enhanced avoidance's association with network size and reduced its association with density, tie strength, and multiplexity. Familism also enhanced anxiety's association with network size, tie strength, and multiplexity. These findings contribute to theory building on attachment and culture, highlight the significance of culture by personality interaction for the understanding of social networks, and call attention to the importance of sampling multiple countries.

Keywords: social network, attachment, familism, person-culture fit

Ninety Years after Lewin: The Role of Familism and Attachment Style in Social Networks Characteristics across 21 Nations/Areas[1]

When comparing people's networks and the formation and maintenance of social ties between Germany and the U.S., Kurt Lewin (1936) argued that Americans engage in more distal "peripheral" relationships—being more willing to form new ties but not allowing them to evolve into deeper relationships. Conversely, Germans who value close "private" relationships—are less willing to form new ties. Once ties are formed, they are more likely to evolve into close meaningful relationships. Lewin (1936) theorized that the differences in people's social networking are due, like many other behaviors, to the interaction between people's personality and the environment they are embedded in. Despite almost 90 years passing since Lewin (1936), no research to our knowledge has systematically tested Lewin's proposition. Guided by recent cultural perspectives, to fill this gap, we conducted a large-scale international collaborative investigation across 21 different nations/areas. Specifically, we examined how familism—a cultural construct related to relationships (Campos et al., 2016) and attachment style— a personality trait central to close relationships (Bowlby, 1969) relate to one's social networks.

Social Networks

Social networks are social structures depicting people and their interpersonal connections. A main characteristic of social networks is the number of others or *alters* one has — termed *network size* (Walker et al., 2000). Alters can reside either in the periphery of the network (usually with more superficial and distal relationships) or in the private region of the network (with deeper and closer relationships). Using these regions,

[1] The inclusion of "nations/areas" in our references was driven by the fact that certain regions in this research, such as Hong Kong, can be politically contentious when categorized as independent nations.

ties can be described across a dimension termed *depth* ranging from superficial to deep (less to more intimate). Depth can be directly assessed via network ***density***, the structural closeness among members within a network, or ***tie strength***, the intensity of bondedness between network members (Gillath et al., 2019). Both indexes represent the degree of relationship closeness and are based on people's self-report of felt closeness or how frequently they interact with Alters (Marsden & Campbell, 1984).

Alters can also play different roles for people, share different situations with them, and satisfy different needs. The more roles alters play (e.g., classmate, roommate; Ferriani et al., 2013), the more situations they share, and the more needs/functions they fulfill (e.g., secure base, safe haven; Gillath et al., 2017) the higher the network's ***multiplexity*** is.

Cultural Differences in Social Networks

Previous studies have investigated the dynamics of culture and social networks. Americans have more friends than Ghanaians (Adams & Plaut, 2003) and people in Hong Kong (Wheeler et al., 1989). Potentially, because Americans' friendships are less strongly tied (Li et al., 2015), Americans invest less in each friendship and thus can have more. Work on relational mobility—the ease of establishing new relationships (Yuki & Schug, 2012) demonstrates that Americans tend to be higher on relational mobility than Japanese. Potentially because ties in the U.S. are often weaker or more superficial, relationships are easier to establish and maintain than in Japan (Schug et al., 2010) and are easier to dissolve in the U.S. (Gillath & Keefer, 2016).

Related to multiplexity, when people fulfill fewer functions and roles for each other, there is a smaller chance or opportunity for friction to happen. Indeed, Americans tend to report less relational animosity than Ghanaians (Adams, 2005), and fewer

concerns about negative relational consequences when asking for social support than Asians (Kim et al., 2008).

Most existing studies on the associations between culture and relationships, suffer from a major limitation: they compare only two nations or cultures, and thus cannot discern which of all possible differences between the two cultures contributes to their findings (van de Vijver & Leung, 2000). Furthermore, often the U.S. serves as a comparison target, rather than the hypotheses being directly and systematically tested across multiple cultures. As a result, people may overgeneralize findings based on American samples, and the U.S. patterns of relationships might be treated as the standard (Hegarty & Pratto, 2001). In the present study, we overcame these limitations by assessing relationship patterns in multiple cultures. Specifically, we delved into the impact of familism within diverse cultural contexts.

Familism and Social Networks

Familism is the extent to which family is prioritized among one's social relationships. People who endorse familism are more likely to prioritize family members and their welfare over other relationships and interests (Valenzuela & Dornbusch, 1994). This preference may manifest as strong identifications with family members, and strong interdependence, reciprocity, obligation, loyalty, and solidarity among family members (Triandis et al., 1982). Familism (Villarreal et al., 2003) is viewed as a subtype of collectivism (Realo et al., 1997). Global inequality in technology development and differences in sociodemographic factors determine cultural variations in familism across nations/areas (Greenfield, 2016). Nations that are more technologically developed, with higher income, and more urbanization, tend to be less family-oriented or low on

familism. Researchers have shown that familism is associated with greater psychological health among European Americans, Asian Americans, and Hispanic Americans (Campos et al., 2014; Keeler et al., 2014), and greater self-esteem and life satisfaction among Hispanic Americans (Piña-Watson et al., 2013). Although familism is often assessed as an individual-difference measure, nations and cultures tend to differ on familism (e.g., Mair, 2022), and these nation-level differences are the focus of the present manuscript.

A cultural psychological approach positions familism in broader cultural ecologies of interdependence in which relationality is constructed in overlapping networks of thick connections. Adaptation to such cultural ecology in which relationships are closely intertwined and stable, includes maintaining more social bonding (Greenfield, 2016), maintaining sensitivity to obligations (Steidel & Contreras, 2003), and emphasizing caution in relationships to avoid making enemies and conflicts (Adams, 2005). Although familism emphasizes the nuclear family—kinship as the center of one's social network, the relational mode that familism affords may extend to others beyond the boundaries of one's family (e.g., friends, acquaintances, and colleagues; Restubog & Bordia, 2006), as familism is a culturally shared belief. Indeed, some friends can be called "family friends" due to their strong ties to the whole family.

Social network in familism culture may thus be constructed in a way that reflects embedded relationality—a network including a small number of friends who are very close to each other. The network can help to manage obligations towards close others in overlapping networks of embedded connection. Supporting this, outside the family, familism is associated with less interpersonal trust and civic engagement (Realo et al., 2008), which leads to forming fewer social connections and implies a smaller network

size. Familism prioritizes ingroup needs over one's own and emphasizes group harmony when facing conflicts in close friendships. Familism is positively associated with solution-oriented resolution rather than self-oriented resolution (Thayer et al., 2008), as a means to maintain closeness and bondedness between friends, indicating a deeper level of involvement among connections. Based on these findings, we predicted that national-level familism would be negatively associated with network size, but positively associated with network density, tie strength, and multiplexity.

Although there is little empirical evidence to support the associations between familism and these network characteristics, one may point out that cross-cultural studies assessing closeness and intimacy allude to the possibility that familism will be negatively correlated with relationship depth and multiplexity. For example, Marshall (2008) showed that Chinese Canadians who are likely to be higher on familism than European Canadians, reported lower intimacy in their dating relationships than European Canadians. The current study provides an opportunity to delve deeper into these proposed associations and explore both the individual influence of attachment style and the dynamic interaction between attachment style and familism.

Attachment Theory and Social Networks

Attachment theory (Bowlby, 1969) is a leading theoretical framework often used to study close relationships and affect regulation processes. Attachment style delineates people's cognitive, affective, and behavioral patterns, capturing the way individuals think, feel, and behave in their relationships. Attachment style has been found to be a reliable predictor of relational variables (Wilkinson, 2010), such as relationship satisfaction (Gillath et al., 2016) and network characteristics (Gillath et al., 2019).

Attachment is assessed as two dimensions: anxiety and avoidance. Individuals high on attachment anxiety tend to worry about being abandoned and rejected by close others, whereas individuals high on avoidance are less likely to trust or depend on others or let others depend on them. Individuals low on both attachment anxiety and avoidance are thought to be secure—they find it easy to get close to, trust, and depend on others and let others depend on them.

Existing research shows a negative correlation between attachment avoidance and network size in Americans (Fiori et al., 2011), but there is a lack of evidence on the association between attachment anxiety and network size. Considering the apprehension of losing connections, it is reasonable to predict that individuals high on attachment anxiety are more likely to form larger networks to ease the anxiety associated with losing ties. We predicted that attachment avoidance would be negatively associated, whereas attachment anxiety would be positively associated with network size.

Both attachment styles are negatively associated with the tendency to maintain social ties (Gillath et al., 2011) and with density (Gillath et al., 2017). Attachment avoidance and anxiety also predict a stronger tendency to use exchange norms rather than communal norms (Clark et al., 2010). These findings suggest that attachment avoidance and anxiety would predict lower levels of density and tie strength. With regard to multiplexity, only attachment avoidance was found to be negatively associated with multiplexity online (Karantzas et al., 2012) and offline (Gillath et al., 2017). Based on this literature, we predicted that attachment insecurity, and especially avoidance, would predict lower multiplexity.

Social Networks Characteristics as a Function of the Interaction between Familism and Attachment Style

Environment-level and individual-level factors are seen as mutually contingent and jointly affecting behaviors (Anderson et al., 2008; Erez & Gati, 2004). As Strand (2020) proposed, cultures are group-level reflections of individuals' security-seeking and autonomy-seeking tendencies. Therefore, individuals may reside in a cultural environment characterized by varying degrees of familism that is aligned or not aligned with their personality. Our hypotheses were formulated based on the notion of cultural fit and misfit between familism and attachment style. According to the cultural fit hypothesis, culture constructs, such as familism, can amplify or suppress personality's effects on behaviors depending on the fit or misfit between cultural norms and personality (Leung & Cohen, 2011; Yoo & Miyamoto, 2018).

Individuals high on attachment avoidance tend to hold more negative working models of others (Pietromonaco & Barrett, 2000). They are less likely to resort to social network members to fulfill their need for social connectedness. Thus, they are less likely to seek help from others (Vogel & Wei, 2005) and rely less on social bonds to regulate distress (Wildschut et al., 2010). Their tendency to develop a small network size is congruent with the familistic environments' relational mode of being embedded with a few close others (cultural fit). However, the tendency of individuals high on attachment avoidance to maintain a shallow network connection is incongruent with the deeply intertwined relational model of familistic environments (cultural misfit): they may feel pressured living in such an environment, as it may be difficult to form and maintain the kind of relationships with which they feel comfortable. Therefore, familism may promote

avoidance's effect on network size but suppress avoidance's effect on density, tie strength, and multiplexity.

Individuals high on attachment anxiety have positive working models of others (and negative working models of the self; Pietromonaco & Barrett, 2000). They are hypervigilant to social cues (especially signs of rejection; Fraley et al., 2006), crave intimacy (Mikulincer & Shaver, 2009), and want to merge with close others while simultaneously feeling unloved and rejected. In societies characterized by a higher proportion of attachment anxiety, individuals prioritize security-seeking and engage in strong-tie networks (Yamagishi & Hashimoto, 2016). Therefore, for individuals with high levels of attachment anxiety, their tendency to be anxiously attached to others (although it may inadvertently result in a larger network size and less close relationships), may be more acceptable when they live in an environment that is high on familism that emphasizes closeness among key relationships (cultural fit). Indeed, there is a higher percentage of people with high attachment anxiety in familistic cultures (e.g., DiTommaso et al., 2005). Therefore, familism may promote anxiety's effect on network size, density, tie strength, and multiplexity.

Current Research

We obtained data at the country level for familism. Attachment style and social network were assessed at the individual level. We focused on two types of social network indexes: measures representing the depth of relationships and measures representing multiplexity. Depth was assessed using network size, network density, and tie strength. Multiplexity was assessed via the number and the degree of fulfilled attachment-related

functions (proximity seeking, safe haven, and secure base, which are widely recognized in the literature; e.g., Hazan & Shaver, 1994).

We predicted that (1a) familism will be negatively associated with network size and (1b) positively associated with density, tie strength, and multiplexity. (2a) attachment avoidance will be negatively associated and (2b) attachment anxiety will be positively associated with network size. (3) Both attachment avoidance and anxiety will be negatively related to density, tie strength, and multiplexity (especially avoidance). (4a) Familism will enhance avoidance's effect on network size but (4b) suppress its effect on density, tie strength, and multiplexity. Finally, (5) familism will enhance anxiety's effect on network size, density, tie strength, and multiplexity.

Method

Participants

The final sample size was 2,977 participants from 21 nations/areas (sample sizes ranged from 77 to 273; additional demographic and country details in Table 1). These nations consisted of Australia, Canada, China, France, Greece, Guatemala, Hong Kong, India, Indonesia, Israel, Italy, Japan, Latvia, the Netherlands, New Zealand, Portugal, South Africa, Spain, Switzerland, the UK, and the US. No participants were excluded. This size allowed us to detect effect sizes as small as $f^2 = 0.003$ with 80% power. The selection of nations/areas was based on the availability of collaborators. The 21 nations/areas include about 52.2% of the world's population and are spread geographically across six continents. The nations/areas also vary greatly in terms of economy, politics, and culture. Participants were college students except for the

Australian sample in which 44% of participants were recruited online. The mean sample size for each nation/area was 141 (*SD* = 40.0).

Table 1.

Main demographic information by countries.

Nation/Area	*N*	Female%	Age mean	Language	Married	Heterosexual	Years of Education (since elementary school)	Social Class (1 Upper-5 Lower)
1 Australia	85	77.0	30.5	English	17.65%	78.82%	13.02	3.11
2 Canada	273	78.3	22.4	French	2.88%	84.4%	14.24	3.07
3 China	129	58.5	20.3	Chinese	0.78%	94.5%	14.75	3.26
4 France	113	56.6	21.2	French	0.00%	58.41%	11.13	2.81
5 Greece	175	79.7	24.7	Hellenic	4.57%	96.00%	16.19	3.09
6 Guatemala	179	57.5	20.3	Spanish	2.23%	78.77%	13.15	2.58
7 Hong Kong	128	69.6	20.1	English	1.56%	94.53%	14.37	3.37
8 India	149	49.7	22.9	English	4.03%	99.3%	16.47	2.77
9 Indonesia	77	50.6	20.6	Bahasa	0.00%	92.21%	14.29	2.74
10 Israel	115	79.8	25.0	Hebrew	30.43%	93.5%	14.12	3.12
11 Italy	134	54.5	22.5	Italian	1.49%	97.76%	16.30	3.06
12 Japan	127	52.8	19.9	Japanese	0.00%	NA	15.74	3.49
13 Latvia	120	58.3	19.6	Latvian	3.33%	94.17%	12.58	2.97
14 Netherlands	149	75.7	19.8	Dutch	0.67%	97.32%	13.99	3.00
15 New Zealand	110	74.8	21.0	English	2.73%	87.0%	12.58	2.86
16 Portugal	159	56.7	23.6	Portuguese	11.32%	87.3%	13.28	3.14
17 South Africa	141	78.4	21.7	English	2.84%	93.62%	15.43	2.66
18 Spain	137	56.9	20.8	Spanish	0.00%	94.16%	17.00	3.08
19 Switzerland	148	82.6	22.8	English	5.41%	95.27%	14.10	2.87

20 UK	165	77.8	24.5	English	5.45%	81.5%	15.30	3.18
21 US	164	65.0	19.0	English	0.61%	97.0%	13.50	2.56

Measures and Procedure

Familism

The familism index was derived from the Gelfand et al. (2004) GLOBE project (House et al., 2004). Familism was assessed at the country level, and subsequently, participants were assigned a familism score based on their country. The original familism items, which formed the basis for our index, evaluate the degree of interdependence within families and the degree to which individuals express pride and loyalty to their families. Familism score includes practice scores, which measure how participants perceive the existing cultural practices in their society, and value scores, which assess societal values. The final familism index for each nation was the average of the two scores. Although Gelfand et al. (2004) labelled these scores as in-group collectivism, other researchers have suggested that these items measure familism rather than collectivism (e.g., Realo & Allik, 2009). Familism is thought to be related but different from collectivism—being an orientation toward one's family as opposed to one's larger community (Gaines et al., 1997). Supporting the idea that the scores reflect familism, this measure is highly correlated with the *strength of family ties* scale (r = .48; Gelfand et al., 2004), and levels of respect for family and friends (r = .76; Gelfand et al., 2004).[2]

[2] Out of all the nations, the familism index for Latvia was not reported by Gelfand et al. (2004). To include as many nations as possible in our analyses while acknowledging the relatedness between familism and collectivism, we imputed Latvia's familism using Suh et al.'s (1998) collectivism score (missing three scores of our targeted nations) and Hofstede and Minkov's (2010) collectivism score (missing one score of our targeted nations; correlation between the two indexes was, r = .90).

Name Generators and Interpreters

We collected egocentric network (networks that depict connections of specific respondents rather than all connections in a bounded network; Clifton & Webster, 2017) information from participants. Participants (egos) were asked to list up to 15 names of the most important people (alters) in their life (Marin & Hampton, 2007). We labelled the number of alters as *n1*. Participants were first asked to indicate how close they felt toward each person and how close they thought each alter felt towards them on a 7-point Likert scale, ranging from 1 (*don't feel close at all*) to 7 (*feel very close*). Then, on a 15×15 matrix, participants were asked to list the same 15 alters names and report how close they thought each alter felt toward each of the other alters using the same response scale (21.1% of participants did not list the same number of alters). We, therefore, labelled the number of alters they listed in the second part as *n2*. "n1" and "n2" were significantly correlated, $r = .87$, $p < .001$, and both were used as dependent variables in the following analyses.

Two dependent variables were calculated from the name generator (and the two *n*s): network density and tie strength. Both variables represent the depth of one's relationship that is computed based on the number of alters and the closeness between them (Hanneman & Riddle, 2005), but each one focuses on a different aspect. Network density focuses on the extent to which the network as a whole is dense (Granovetter, 1973). In the current study, it reflects the network's structural characteristics. Tie strength focuses on the overall closeness between network members (Marsden & Campbell, 1984), and in the current study, it emphasizes the network's reciprocal intimacies (see formulas below).

Density. The two density scores were computed based on two different common procedures in the literature. The first, which we denote as D1, was calculated based on the closeness and the number of alters (Zohar & Tenne-Gazit, 2008). In *d1*'s equation, r_{ij} represents the closeness between alter *i* and alter *j*, and *n* denotes the total number of alters. Note that only alter-alter relationships are included in the calculation of the density score. Conceptually r_{ij} is not equal to r_{ji}, because one represents the perception of closeness from one alter to another (e.g., from i to j) whereas the other represents the perception of the opposite direction (from j to i). When $i = j$, $r_{ij} = 0$.

$$d1 = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}}{7(n2)(n2+1)}$$

Density can alternatively be calculated. We denote the second density score as D_2, which reflects the number of connections that exist in the network when they meet a minimal closeness standard. It is calculated using the ratio between all possible connections an actor (ego) or network might have, and how many connections are actually present (Eckles & Stradley, 2012). D*2* was based on the number of connections with at least a minimal closeness in the network. In *d2's equation*, the function of K is counting the number of elements that are not equal to 1 (1 = "*don't feel close at all*") in the r_{ij} matrix. As we can see from the formula, D*2*'s calculation is focused less on closeness, and more on the existence of connections.

$$d2 = \frac{\mathrm{K}(r_{ij} \neq 1)}{(n2)(n2+1)}$$

Tie Strength. The following formula shows how we computed perceived tie strength. W_i denotes each ego's perceived closeness to each alter. X_i denotes each ego's perceptions of each alter's closeness to the ego.

$$t = \frac{\sum_{i=1}^{n}(Wi+Xi)}{n1}$$

Multiplexity. We used a modified version of the WHOTO scale (Fraley & Davis, 1997) to assess the level of attachment functions that each alter fulfils. The modified scale includes three attachment functions: proximity seeking (e.g., "I like to spend time with this person."), safe heaven (e.g., "I turn to this person when I am feeling down."), and secure base (e.g., "I want to share my successes with this person."). Each function was measured using two items, and participants were asked to indicate the extent to which each alter (out of the list of 15) fulfilled each function on a 1 (*strongly disagree*) to 7 (*strongly agree*) Likert scale. Scores on each function are calculated by averaging the two items.[3]

We calculated the first multiplexity score (m1) by computing the average number of attachment functions fulfilled by each alter in a participant's social network (Gerich & Lehner, 2006). Specifically, if the score for one function was above 4 (the middle point of the scale), we counted it as "1", which meant that the alter fulfilled this function. The resulting possible multiplexity scores for each alter ranged from 0 (fulfilled no functions) to 3 (fulfilled all three functions); with higher scores indicating a greater number of functions fulfilled by the alter. This multiplexity index was computed by adding multiplexity scores for each alter and divided by the network size (see the formula below). In the equation, H_i represents the number of attachment functions fulfilled by

[3] Results related to each function of WHOTO are presented in the Supplementary Materials. To summarize, the interpretation of the results of the WHOTO's subscales is generally consistent with the aggregated findings. We ran the correlations between the two items of each function under WHOTO based on the ratings on the first alter. Correlations are 0.59 (proximity seeking), 0.81 (safe haven), and 0.72 (secure base).

each alter. This dichotomous index has been commonly computed in the literature (Felsher & Koku, 2018; Gillath, Karantzas, & Selcuk, 2017).

$$m1 = \frac{\sum_{i=1}^{N}(Hi)}{n1}, \quad 0 \leq \mathrm{H_i} \leq 3$$

In addition to assessing the quantity of multiplexity, we also computed the mean of the WHOTO scale for each participant to capture the degree of multiplexity. We labelled this continuous variable as *m*2. Therefore, *m*2 serves as a complementary index to *m*1.

Attachment Style

Adult attachment style was assessed using the short version of the Experiences in Close Relationship inventory (ECR-S; Wei et al., 2007). The measure included 12 items; six assessing attachment-related avoidance (e.g., "I want to get close to others, but I keep pulling back"), and six assessing attachment-related anxiety (e.g., "I worry that others won't care about me as much as I care about them"). For the Indonesian participants, five items of the ECR were missing due to a clerical error. Hence, scores on attachment avoidance and anxiety for Indonesia were computed by using only seven items.[4] Participants responded on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's αs for both dimensions without the responses from the Indonesian participants were adequate: $\alpha_{avoidance}$ = .71 and $\alpha_{anxiety}$ = .72.

[4] Cronbach's αs for Indonesian participants' responses on ECR were: $\alpha_{avoidance}$ = .68 and $\alpha_{anxiety}$ = .66. Both of which were close to the Cronbach's αs as reported in the text when the data excluded Indonesian participants' responses. Additionally, the Cronbach's αs for U.S. participant's responses ($\alpha_{avoidance}$ = .78 and $\alpha_{anxiety}$ = .76) were similar to what Wei et al. (2007) reports ($\alpha_{avoidance}$ ranged from .78 to .88, and $\alpha_{anxiety}$ ranged from .77 to .86).

Demographic Questions

Participants reported their gender, age, and levels of social class. Social class was measured on a 1 (*upper*) to 5 (*lower*) scale.

Data Analytic Plan

Data were initially examined through descriptive and correlational analyses. Subsequently, we employed multilevel modeling for further analysis to test the familism × attachment interactions. As an exploratory analysis, response surface analyses were conducted, which assessed the mismatch between attachment style and familism in a three-dimensional space, and results are present in the supplementary materials (Table 3S, Figure 1S, and Figure 2S).

Results

Descriptive Results

Table 2 shows the means and SDs for key variables across nations/areas. Table 3 shows the grand means, standard deviations, and correlations between variables for all participants. Overall consistent with our hypotheses, familism was negatively correlated with network sizes (n1, n2; supporting H1a) and positively correlated with network density (d1, but not d2), tie strength, and multiplexities (m1, m2; supporting H1b). Attachment avoidance was negatively correlated with all dependent variables (supporting H2a & H3), and attachment anxiety was negatively correlated with all dependent variables (supporting H3) except for network size (n1, n2; not supporting H2b) and one measure of multiplexity (m2, but not m1). [5]

[5] Tests of intraclass correlations (Table 1S) and construct equivalence (Table 2S) are present in the supplementary materials.

Table 2.

Means (standard deviations) of the key variables in this study across nations/areas.

Nation/Areas	Familism	Avoidance	Anxiety	n1	n2	*d*1	*d*2	t	*m*1	*m*2
1 Australia	4.96	2.56(1.18)	3.37(1.10)	12.07(3.58)	10.61(4.76)	0.42(0.10)	0.51(0.23)	11.16(1.36)	2.30(0.79)	5.27(0.72)
2 Canada	5.12	2.67(0.94)	3.54(1.11)	7.27(3.30)	6.80(3.51)	0.36(0.11)	0.48(0.21)	11.47(1.31)	2.58(0.66)	5.53(0.75)
3 China	5.45	3.12(0.96)	3.92(1.02)	10.78(3.68)	10.43(3.92)	0.34(0.09)	0.44(0.17)	10.99(1.32)	2.35(0.65)	5.00(0.86)
4 France	4.90	2.95(0.96)	3.73(1.34)	11.27(3.15)	11.11(3.33)	0.35(0.09)	0.47(0.17)	11.06(1.18)	2.40(0.50)	5.04(0.76)
5 Greece	5.37	2.76(0.99)	3.59(1.13)	9.78(3.54)	8.94(4.24)	0.39(0.12)	0.54(0.42)	11.35(1.45)	2.55(0.54)	5.41(0.73)
6 Guatemala	5.89	3.07(0.92)	3.44(1.09)	8.45(3.68)	7.23(3.94)	0.45(0.12)	0.48(0.23)	12.10(1.27)	2.61(0.56)	5.74(0.79)
7 Hong Kong	5.22	3.05(0.83)	3.97(1.01)	11.11(3.62)	10.92(3.83)	0.31(0.08)	0.42(0.16)	10.61(1.25)	2.60(0.48)	5.27(0.63)
8 India	5.62	3.15(0.98)	3.83(.66)	6.58(3.40)	6.52(3.27)	0.43(0.13)	0.60(0.49)	12.37(1.51)	2.83(0.33)	5.94(0.77)
9 Indonesia	5.68	2.61(1.00)	4.29(1.02)	10.25(4.13)	10.32(4.33)	0.39(0.13)	0.55(0.33)	11.07(1.55)	2.65(0.54)	5.29(0.94)
10 Israel	5.23	2.76(0.94)	3.05(1.13)	10.36(3.47)	9.80(3.88)	0.43(0.12)	0.52(0.21)	11.89(1.21)	2.39(0.59)	5.18(0.83)
11 Italy	5.33	2.52(1.00)	3.41(1.09)	8.24(3.44)	7.78(3.68)	0.42(0.10)	0.55(0.18)	11.99(1.34)	2.59(0.61)	5.47(0.92)
12 Japan	4.95	3.28(0.96)	3.54(1.09)	10.45(3.85)	10.36(4.03)	0.33(0.10)	0.39(0.18)	11.55(1.59)	2.15(0.78)	4.17(0.78)
13 Latvia	5.28	2.94(1.04)	3.81(1.00)	8.17(3.33)	8.09(3.29)	0.39(0.12)	0.55(0.16)	11.16(1.58)	2.52(0.54)	5.21(0.86)
14 Netherlands	4.44	2.38(0.80)	3.61(1.05)	10.40(3.30)	10.35(3.30)	0.42(0.10)	0.59(0.15)	11.55(1.22)	2.47(0.56)	5.18(0.72)
15 New Zealand	4.96	2.78(1.05)	3.34(1.17)	11.19(3.14)	11.09(3.31)	0.40(0.10)	0.54(0.18)	11.22(1.42)	2.52(0.52)	5.30(0.74)
16 Portugal	5.73	2.61(0.91)	3.67(1.16)	9.78(3.76)	9.71(3.75)	0.42(0.12)	0.59(0.17)	11.55(1.39)	2.54(0.49)	5.39(0.80)
17 South Africa	5.21	2.75(1.04)	3.45(1.18)	10.26(3.08)	10.26(3.12)	0.41(0.10)	0.56(0.16)	11.34(1.43)	2.53(0.51)	5.33(0.82)
18 Spain	5.62	3.09(0.84)	3.94(1.00)	9.12(2.91)	9.11(2.91)	0.44(0.10)	0.60(0.12)	11.77(1.05)	2.68(0.43)	5.62(0.75)
19 Switzerland	4.60	2.35(0.91)	3.33(.97)	11.21(3.29)	10.91(3.52)	0.35(0.09)	0.51(0.22)	10.76(1.45)	2.45(0.54)	5.19(0.62)
20 UK	4.82	2.92(1.08)	3.71(1.29)	9.96(3.74)	9.95(3.57)	0.38(0.11)	0.56(0.30)	11.29(1.53)	2.29(0.61)	4.88(0.80)
21 US	5.01	2.63(1.05)	3.18(1.11)	11.15(2.66)	10.89(3.01)	0.43(0.11)	0.55(0.17)	11.37(1.31)	2.53(0.47)	5.40(0.79)

Note: n1 and n2 are network size indexes, d1 and d2 are density indexes, t represents tie strength, and m1 and m2 are multiplexity indexes.

Table 3.

Means, standard deviations, and simple correlations of variables.

	1	2	3	4	5	6	7	8	9	10
Mean	5.20	2.80	3.59	9.69	9.36	0.39	0.52	11.44	2.51	5.30
(SD)	(0.38)	(1.00)	(1.12)	(3.71)	(3.93)	(0.11)	(0.25)	(1.43)	(0.58)	(0.85)
1 Familism	1									
2 Avoidance	.12**	1								
3 Anxiety	.08**	.26**	1							
4 n1	-.18**	-.07**	-.02	1						
5 n2	-.19**	-.08**	-.01	.89**	1					
6 d1	.14**	-.15**	-.09**	-.004	.003	1				
7 d2	.02	-.11**	-.04*	-.07**	.18**	.60**	1			
8 t	.14**	-.21**	-.15**	-.26**	-.24*	.38**	.17**	1		
9 m1	.14**	-.23**	-.01	-.10**	-.04*	.18**	.16**	.35**	1	
10 m2	.22**	-.31**	-.06**	-.19**	-.19**	.29**	.15**	.51**	.84**	1

Note. *$p < .05$, **$p < .01$. Familism is a level-2 variable while the rest of them are level-1 variables. n1 and n2 are network size indexes, d1 and d2 are density indexes, t represents tie strength, and m1 and m2 are multiplexity indexes.

Results of Multilevel Analyses

Multilevel analyses based on linear mixed modeling were conducted to test the effects of familism, attachment style, and the interaction between the two factors on social networks outcomes. Familism, attachment avoidance, and attachment anxiety were centered using the grand mean. Nation/area was treated as the second level unit. We

defined the intercept of the mean as a random effect. The effects of familism, attachment style, and their interactions were all modeled as fixed effects. As no three-way interaction was significant we excluded them, and rebuilt the models with only the three two-way interactions. Table 4 shows the results of the multilevel analyses. [6]

Table 4.

The effect of familism, attachment style, and their interaction on network outcomes

	Intercept	Familism	Avoidance	Anxiety	Familism × Avoidance	Familism × Anxiety	Avoidance × Anxiety	VIFs	Effect Size of the Model (R^2)
n1	9.96***	-0.68*	-0.23***	0.05	-0.16*	0.16*	0.03	⩽1.08	0.16
	[9.42, 10.50]	[-1.22, -0.13]	[-0.37, -0.10]	[-0.09, 0.18]	[-0.30, -0.01]	[0.02, 0.30]	[-0.10, 0.16]		
n2	9.73***	-0.77*	-0.26***	0.05	-0.19*	0.13	-0.01	⩽1.08	0.16
	[9.17, 10.29]	[-1.33, -0.20]	[-0.41, -0.12]	[-0.09, 0.19]	[-0.34, -0.04]	[-0.01, 0.28]	[-0.14, 0.12]		
d1	0.39***	0.02*	-0.02***	-0.01*	0.01*	-0.001	0.001	⩽1.08	0.15
	[0.38, 0.41]	[0.002, 0.03]	[-0.02, -0.01]	[-0.01, -0.001]	[0.01, 0.011]	[-0.01, 0.004]	[-0.004, 0.01]		
d2	0.53***	0.01	-0.02***	-0.01	0.01*	-0.01	-0.001	⩽1.08	0.06
	[0.50, 0.55]	[-0.02, 0.04]	[-0.03 -0.01]	[-0.02, 0.004]	[0.0002, 0.02]	[-0.02, 0.004]	[-0.01, 0.01]		
t	11.41***	0.24*	-0.29***	-0.15***	0.07*	-0.07**	0.03	⩽1.08	0.15
	[11.24, 11.59]	[0.06, 0.41]	[-0.34, -0.24]	[-0.20-, -0.09]	[0.01, 0.12]	[-0.13, -0.02]	[-0.02, 0.08]		
m1	2.51***	0.10***	-0.14***	0.02	0.02	-0.01	-0.01	⩽1.08	0.12
	[2.46, 2.56]	[0.05, 0.15]	[-0.16, -0.12]	[-0.003, 0.04]	[-0.01, 0.04]	[-0.04, 0.01]	[-0.03, 0.01]		
m2	5.28***	0.22**	-0.27***	0.01	-0.01	-0.02	0.02	⩽1.08	0.27
	[5.15, 5.40]	[0.09, 0.35]	[-0.30, -0.24]	[-0.02, 0.04]	[-0.04, 0.02]	[-0.05, 0.01]	[-0.01, 0.05]		

Note. n1 and n2 are network size indexes, d1 and d2 are density indexes, t represents tie strength, and m1 and m2 are multiplexity indexes.

Effects of Familism

The effects of familism on network size, density (d1 but not d2), tie strength, and multiplexity were all significant (supporting H1a & H1b). A higher level of familism

[6] We also considered the geographical relations among nations. However, the p-values of Moran's I on all outcomes were not significant or close to 0.05. Therefore, spatial analysis that takes account of geographical correlations was not conducted.

predicted a smaller sized, denser, and more tied network. A higher level of familism also predicted higher multiplexity. This indicates that on average, network members fulfilled more attachment roles for participants when they were embedded in a culture higher on familism.

Effects of Attachment Style

Attachment avoidance significantly predicted all dependent variables (supporting H2a and 3). The higher one's attachment avoidance was, the smaller, less dense, and less mutually tied network people had. Higher avoidance also predicted lower multiplexity. That is, the higher one's scores on avoidance, the fewer attachment roles that network members fulfilled. Attachment anxiety significantly predicted density (d1 but not d2) and tie strength, but not multiplexity (partially supporting H3). Participants with higher attachment anxiety tended to perceive their networks as less dense, and the people in their networks as tied less strongly to each other. Although we did not witness a main effect of anxiety on network size (not supporting H2a), anxiety's predicting effect was moderated by familism as presented below.

The Interaction between Familism and Attachment Style

The analysis revealed five significant two-way interactions between familism and attachment avoidance—two for network size, two for density, and one for tie strength. Simple slope tests (Table 5; Figure 1) revealed that attachment avoidance was negatively associated with network size, which was more pronounced when familism levels were high (one SD above the mean; supporting H4a). Attachment avoidance was also negatively associated with both density and tie strength, with this negative association

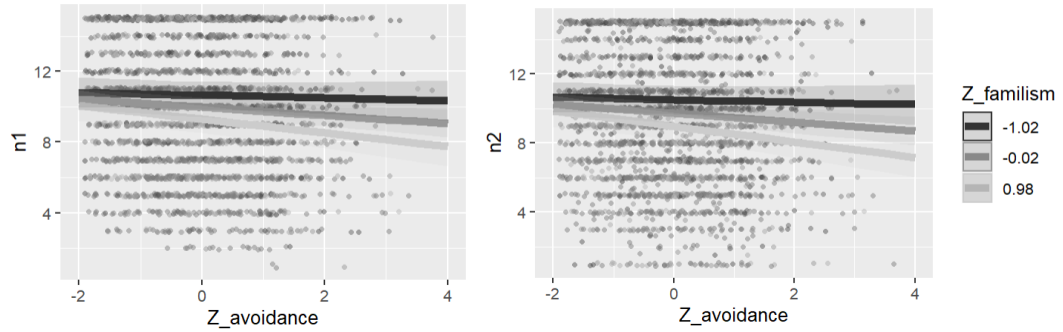
being more pronounced when familism was lower (one SD below the mean; supporting H4b).

Table 5.

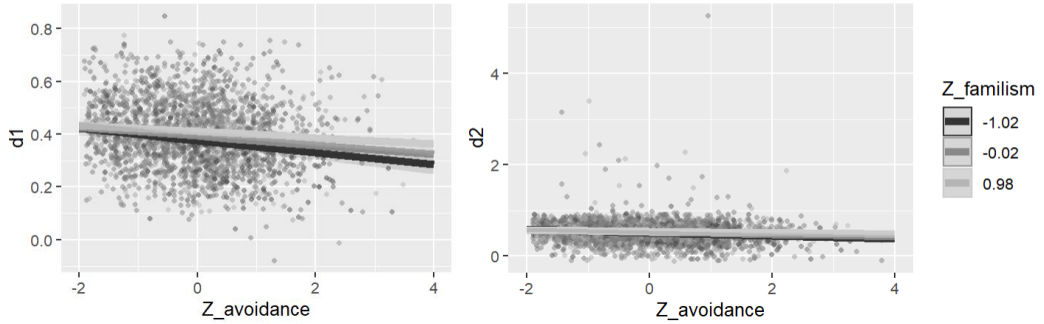
Coefficients of simple slope tests for the interactions between familism and attachment.

The effect of attachment avoidance	Levels of familism		
	-1	0	+1
n1	-0.08	-0.23***	-0.39***
n2	-0.07	-0.26***	-0.45***
d1	-0.02***	-0.02***	-0.01***
d2	-0.03***	-0.02***	-0.01
t	-0.36***	-0.29***	-0.22***
The effect of attachment anxiety	**Levels of familism**		
	-1	0	+1
n1	-0.12	0.04	0.21*
t	-0.07	-0.15***	-0.22***

Note. n1 and n2 are network size indexes, d1 and d2 are density indexes, t represents tie strength, and m1 and m2 are multiplexity indexes.



410



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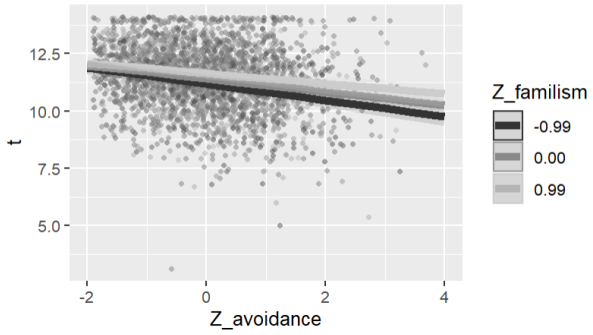
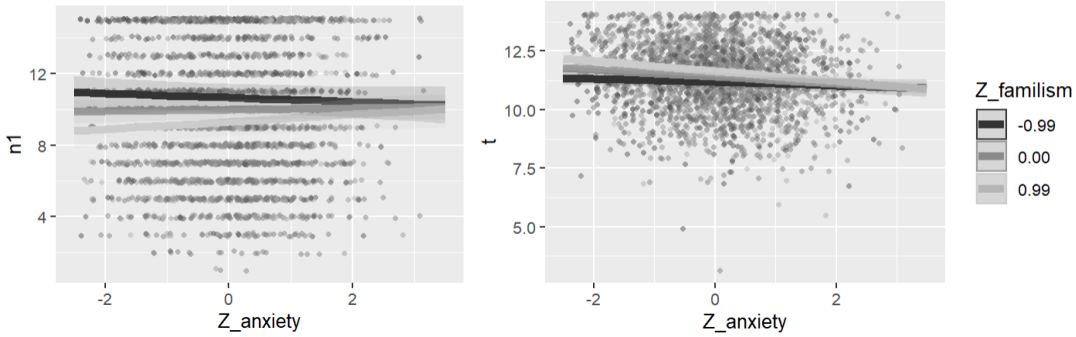


412

413 (A)



414

415 (B)

Figure 1. Simple slope tests for the interactions between attachment styles and familism on social network outcomes.

The analysis also revealed two significant two-way interactions between familism and attachment anxiety. Attachment anxiety was positively associated with network size but only when familism was high (one SD above the mean; supporting H5). Attachment anxiety was also negatively associated with tie strength when familism was at high and intermediate levels (one SD above and at the mean; supporting H5). These results suggest that familism enhanced the role of anxiety on network size and tie strength.

Discussion

In this study, we examined the influence of familism at the national level, attachment anxiety and avoidance at the individual level, and their interactions, on various network outcomes, to understand how culture and personality impact friendship processes.

Familism and Social Network

As predicted, individuals from cultures higher on familism reported a smaller network size and higher levels of tie strength. We found limited evidence that familism is associated with density and multiplexity. This research ruled out the competing hypothesis that familism negatively predicts intimacy/closeness (Marshall, 2008). We had the ability to test these associations by adopting a broader approach and using 21 countries/regions simultaneously. When all 21 nations were included, familism was found to positively correlate with intimacy. When focusing on only two nations to draw conclusions regarding a cultural pattern, the conclusions were largely dependent on- and limited by- selection choices (van de Vijver & Leung, 2000). For example, a brief review

of the means in Table 2 shows that Dutch participants exhibited more intimacy than Japanese participants on all four dependent measures and similarly American participants displayed more intimacy than Japanese participants on density, tie strength, and multiplexity. These patterns suggest that lower levels of familism may be associated with greater intimacy. However, these results were different when all 21 nations/areas were considered. The multi-site sampling of countries differing in a continuum of familism has helped overcome that limitation. The discrepancy between our findings and previous research also highlights the need to avoid essentializing culture into two presumably extreme poles on cultural dimensions.

Attachment Styles and Social Networks

Regarding personality pertaining to relational propensities, our hypotheses were supported. Attachment avoidance was associated with smaller network size, lower levels of density, tie strength, and multiplexity (seven significant associations; Table 4). Attachment anxiety was related to lower levels of density and tie strength (two significant associations). These results are consistent with the literature showing attachment avoidance is more likely to predict social network-related outcomes than attachment anxiety (e.g., Gillath et al., 2011).

The Interaction between Familism and Attachment Style

The personality-environment fit perspective helped us shed light on the way in which culture (e.g., familism) interacted with personality (e.g., attachment style) in predicting network characteristics. We found that culture (familism) modifies the association between personality traits (attachment style) and social network outcomes.

We further found that the effects of avoidance on network size were more salient when familism was high (cultural fit). The effects of avoidance on density and tie strength were more salient when familism was low (cultural misfit). For anxiety, familism promoted its effects on network size and tie strength (cultural fit). These findings indicate that the influence of familism on the connections between attachment style and social network outcomes are contingent upon the particular index of social network under consideration. This insight deepens our comprehension of the complex interplay between personality and environment, highlighting how interaction patterns can vary based on specific outcome nuances.

Our findings also help us integrate and bridge the cultural (mis)fit literature. Culture (mis)fit effect posits that the mismatch between personality and environment predicts negative outcomes (e.g., lower levels of performance or satisfaction) in organizations (e.g., withdrawal behaviors; Kristof-Brown et al., 2005), relationships (e.g., relationship problems; Friedman et al., 2010), and reactions to COVID-19 (e.g., death rate; Kafetsios, 2022). One distinction between the current study and previous studies examining culture fit is that here, we had no a-priori predictions about potential negative outcomes due to misfit. Different networks represent the different ways individuals manage their relationships—and no one way is better than others.

In future studies, social networks, which acted as dependent variables here, could serve as mediators in the prediction of other outcomes with pre-defined positivity. For example, the discrepancy between personality and environment may affect one's satisfaction from their social network. The counterforces from the environment may lower one's friendship satisfaction when the inner tendency to build one's preferred type

of network is blocked by the culture they are immersed in. If this is indeed the case, this may help explain the inconsistencies in the correlations between individualism and life satisfaction (a null correlation; e.g., Spector et al., 2001; a positive correlation; Yetim, 2003). The discrepancy between personality and culture could be a stronger predictor of life satisfaction than either personality or culture.

Limitations

Methodologically, familism and our other variables were not assessed at the same time or using the same samples. Although a limitation, this is also a benefit, as obtaining variables from different sources may help rule out the possibility that the results were inflated by common method variance (Podsakoff et al., 2003). For multiplexity, we only assessed attachment-related functions, but there are numerous other functions and roles that relationships can fulfill. The sample sizes of some nations (e.g., Australia and Indonesia) was relatively small and there are many nations (e.g., Germany) that are not included, both of these issues could be resolved in future studies. Random sampling was not used here, limiting the possibility of generalizing conclusions directly to the general population (but see Straus, 2009, for a defense of this sampling strategy). The study involved university students, who may function psychologically in a more analogous manner worldwide because of their higher exposition to the globalization effect (Fernandez et al., 2014). Nevertheless, it is important to consider that the age of our participants could potentially restrict the generalization of our findings, given that age is inversely related to network size, closeness, and the number of non-primary-group ties. (Cornwell, Laumann, & Schumm, 2008).

Future Directions

Although the current research illuminates the moderating role of familism in the relationship between attachment style and social network outcomes, the broader impact on individuals' daily lives remains a subject of inquiry. For instance, in cases where individuals experience a cultural mismatch (high familism coupled with high attachment avoidance), questions arise regarding the extent to which this might lead to reduced happiness. Furthermore, what coping strategies might individuals employ to adapt to such environments? Could such a situation prompt people to reside in environments high on relational or residential mobility (Oishi, 2010; Yuki & Schug, 2020) where individuals actively seek more culturally compatible socioecology? Future research can delve deeper into the downstream consequences of the social network effects uncovered in the current study. In our research, we concentrated on familism at the national level to align with our focus on cultural fit. However, it is conceivable that an individual's perception of familism embedded in surrounding or immediate environments could interact with their attachment style in a manner akin to our findings. Such interaction might be more pronounced at the individual level, capturing a broader range of personal variance compared to the national level. Further exploration into the potential three-way interactions among national-level familism (macro-level), individual-level familism (micro-level), and attachment style could also be valuable.

Conclusion

This paper investigated how culture and personality are jointly associated with social networks. Grounded in Lewin’s seminal observation and theories of person-culture fit, we broadened those ideas into a more systematic cross-sectional work, merged it with

attachment theory, and tested it in different cultural contexts. The results reveal unique predicting effects of familism, attachment, and their interactions on social network characteristics and illuminate the importance and value of endorsing the approach of culture × personality to studying social processes.

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Contents

Results of Intraclass Correlations (ICC)

The intraclass correlations (ICC) and design effect (the ratio of the actual variance in a cluster sample to the variance expected with simple random sampling) were computed for each dependent variable to assess the necessity of doing multilevel analysis. Results are shown in Table 2. When the design effect (computed based on ICC) is larger than 2, it indicates that a multilevel analysis approach should be used (Satorra & Muthen, 1995). As shown in the table, all dependent variables on design effect were over the thresholds. Therefore, we used a multilevel approach to conduct the following data analyses.

Table 1S. Results of intraclass correlations.

	ICC	Design effect
n1	0.14	21.19
n2	0.14	19.95
d1	0.11	16.96
d2	0.05	8.00
t	0.09	13.08
m1	0.06	9.43
m2	0.16	24.02

Tests of Construct Equivalence

We followed Van de Vijver and Leung's (1997) approach to construct equivalence of psychological meaning across nations. We computed a Tucker's phi coefficient (Table 3), a congruence coefficient measure, to compare the factorial structure in each nation with the structure in the pooled data. Values lower than .90 are usually seen as an indication of differences in underlying factors. The coefficients showed that the avoidance and anxiety components were relatively equivalent across nations/areas with two of the 42 coefficients lower than .90. Similar patterns were observed for the WHOTO scale. Six of the 63 coefficients were lower than .90. Therefore, all nations/areas' data were used for the following analyses.

Table 2S. Tucker's phi coefficients for ECR and WHOTO scale.

Nation/Area	Avoidance	Anxiety	Proximity seeking	Safe haven	Secure base
1 Australia	1.00	1.00	1.00	.70	.96
2 Canada	1.00	1.00	1.00	.99	.99
3 China	.99	.96	1.00	.96	.91
4 France	.96	.97	1.00	.99	.98
5 Greece	.98	.98	1.00	.95	.99
6 Guatemala	.94	.93	1.00	.95	.99
7 Hong Kong	.99	.95	1.00	.98	.96
8 India	.89	.73	1.00	.86	.89
9 Indonesia[1]			1.00	.96	.90
10 Israel	.98	.97	1.00	.98	.90

[1] Because we did not have all the items to compute attachment avoidance and anxiety for the Indonesian participants, Tucker's phi coefficients were not available for Indonesia.

11 Italy	.99	.98	1.00	.96	.91
12 Japan	.98	.89	1.00	.98	.95
13 Latvia	.96	.98	1.00	.96	.53
14 Netherlands	.99	.99	1.00	.99	.93
15 New Zealand	1.00	.98	1.00	1.00	1.00
16 Portugal	.99	.97	.99	.91	.81
17 South Africa	.99	.97	1.00	.96	.99
18 Spain	.96	.89	1.00	.93	.91
19 Switzerland	.99	.98	.99	.84	.95
20 UK	.99	.98	1.00	.99	.95
21 US	.99	.97	1.00	.99	.99

Results of Response Surface Analyses

Based on a polynomial regression, response surface analyses (RSA) regress an outcome variable onto the linear terms of two predictors, their quadratic terms, and their interaction (Barranti et al., 2017; Humberg et al., 2019). It answers the question how the changes of two predictors jointly predict the outcome. One advantage of this analysis is plotting the interaction effects in three-dimensional space. Following Barranti et al. (2017) and Humberg et al. (2019), we modelled the effects of familism, attachment avoidance (or attachment anxiety), their quadratic terms, and interactions to test their effects on network outcomes with the R package RSA. All level-1 (individual level) predictors including attachment avoidance and attachment anxiety were centered using the group mean. All level-2 (nation/area level) predictors including familism were centered using their grand means. Because familism and attachment style were measured on different scales, they were standardized to be placed on a common metric and results are interpreted based on the relative position of each variable (for a similar procedure of standardizing predictors, see Fleenor et al., 1996; Harris et al., 2008). Detailed results of the polynomial regressions are presented in the following Supplementary Materials.

Five coefficients (α1- α5) are generated by RSA. When examining the effects of the congruence of two predictors (e.g., when both familism and attachment avoidance are high), α1 indicates if the effect of the congruence on the outcome differs at higher as compared with lower levels, and α2 indicates whether the effect of the congruence at extreme values have different outcomes than the congruence at non-extreme values. When examining the effects of incongruence of two predictors, α3 indicates if one type of incongruence (e.g., familism is high and attachment avoidance is low) produces a different level of the outcome than the other incongruence (e.g., familism is low and attachment avoidance is high). Finally, α4 indicates

whether the incongruence of the two predictors produces a different level of the outcome than the congruence of two predictors. The α5 is one of the criteria (α5 = 0) to evaluate whether there is a congruent effect that whether social network indexes are higher when the values of familism and attachment are closer to one another (Nestler et al., 2019). Results of α1- α5 coefficients are presented in Table 6. Three-dimensional plots are presented in Figure 1.

Table 3S. Results of RSA results for the effect of familism, attachment style, and their interaction on network outcomes.

	α1	α2	α3	α4	a5
n1~ Familism × Avoidance	-0.92**	-0.21	-0.43	0.02	-0.16
n2~ Familism × Avoidance	-1.03***	-0.29	-0.51	0.02	-0.14
d1~ Familism × Avoidance	0.01	0.02	0.04***	0.01	0.01
d2~ Familism × Avoidance	-0.01	0.02	0.03*	0.0001	0.02
t~ Familism × Avoidance	-0.06	0.02	0.53***	0.02	0.05
m1~ Familism × Avoidance	-0.02	-0.01	0.22***	-0.04	0.04
m2~ Familism × Avoidance	-0.05	0.04	0.49***	0.07	0.05
n1~ Familism × Anxiety	-0.64*	0.002	-0.72*	-0.25	-0.17
n2~ Familism × Anxiety	-0.72*	-0.05	-0.80**	-0.22	-0.19
d1~ Familism × Anxiety	0.01	0.01	0.02**	0.01	0.01
d2~ Familism × Anxiety	0.01	0.01	0.02	0.01	0.02
t~ Familism × Anxiety	0.09	0.03	0.38***	0.15	0.05

m1~ Familism × Anxiety	0.12***	-0.02	0.08**	0.002	0.04
m2~ Familism × Anxiety	0.23***	0.01	0.21**	0.05	0.07

Note. In the first column, the first variable represents the outcome and the variables multiplied represent the interaction terms.

It is important to exercise caution when interpreting the coefficients in isolation. Drawing from Nester et al. (2019), establishing a strict congruence effect necessitates meeting several criteria ($\alpha1 = 0$, $\alpha2 = 0$, $\alpha3 = 0$, $\alpha4 < 0$, and $\alpha5 = 0$). The findings in the table do not align with a strict congruence effect. Nevertheless, in the following sections, we can still characterize a broader congruence effect based on the indexes.

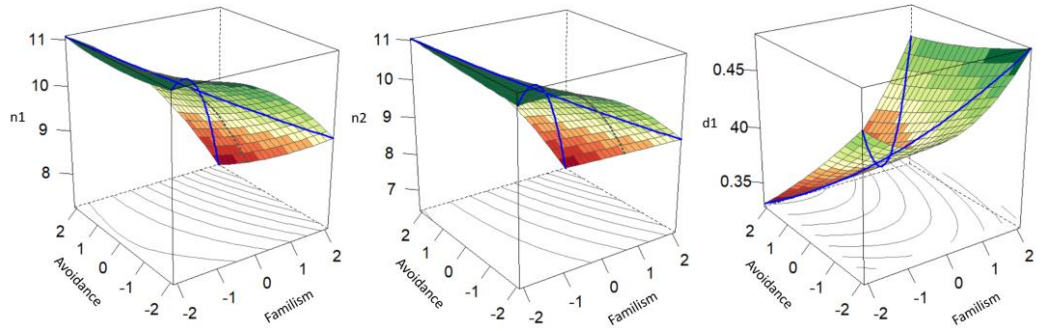
The main effects and interactions between familism and attachment avoidance. The α coefficients indicate that all main effects and all interactions between familism and attachment avoidance on all network outcomes—network size (n1, n2), density (d1, d2), tie strength (t), and multiplexity (m1, m2) are significant.

For both n1 and n2 (Figures 1-a and b), as suggested by the significant α1, network size was greater when both familism and avoidance were at lower levels (both low) than at higher levels (both high). This pattern is consistent with the predicted main effects of familism and avoidance as higher levels of familism and avoidance are both predicted to be associated with a smaller network size (supporting H1a & 2a).

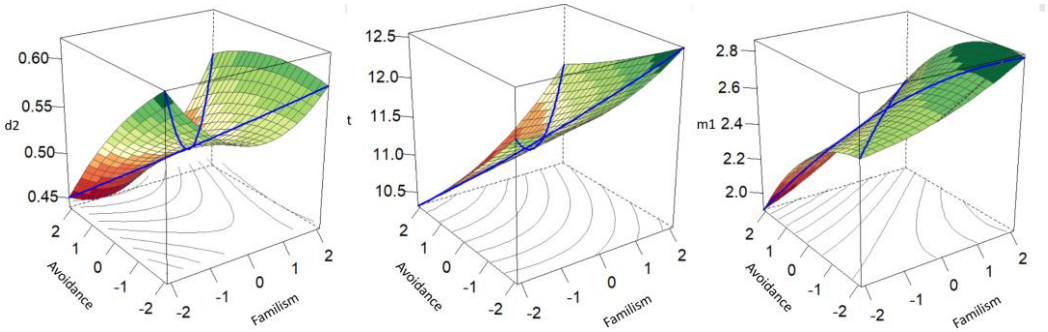
For both d1 and d2 (Figures 1-c and d), α3s reveals that density was greater when familism was higher than avoidance, as compared with when avoidance was higher than

familism. This is consistent with our predicted pattern that the main effects of familism and avoidance on density will be incongruent (supporting H1b & 3).

For t (Figure 1-e), α3 suggests that tie strength was greater when familism was higher than avoidance as compared with when avoidance was higher than familism. This is consistent with our predicted effect of each predictor: network was more strongly tied as familism was higher and avoidance was lower (supporting H1b & 3). Similarly, for both m1 and m2 (Figure 1-f and g), α3 also supports the predicted main effects of familism and avoidance: More attachment functions were fulfilled by important others when familism was higher than avoidance as compared with when avoidance was higher than familism (supporting H1b & 3).



a b c



d e f

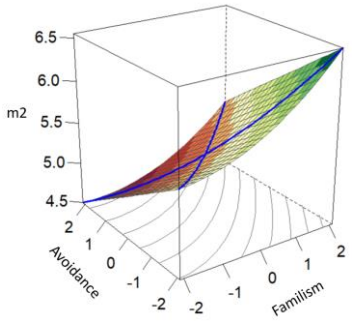


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Figure 1S. Three-dimensional plots of the interactions between familism and attachment style on network outcomes.

The main effects and interactions between familism and attachment anxiety. For n1 and n2 (Figure 2-a and b), the negative α3s suggest that network size was higher when anxiety was higher than familism, as compared to when familism was greater than anxiety (blue line from the top left corner to the bottom right corner). This is consistent with the predicted positive effect of anxiety and negative effect of familism on network sizes (supporting H2b & 1a). Moreover, significant α1s reveal that network size was larger when familism and anxiety were both at lower as compared to higher levels. This effect indicates that familism may exert a greater effect on network size than anxiety as the congruence between them matches with the predicted effect of familism (blue line from the top near corner to the bottom far corner).

For d1 (Figure 2-c), α3 suggests that tie strength was higher when familism was higher than anxiety as compared to when anxiety was higher than familism. This is in line with the hypothesized main effects of familism, which predicts greater tie strength (supporting H1b), and the hypothesized main effect of anxiety, which predicts smaller tie strength (supporting H3).

For t (Figure 2-d), α3 suggests that tie strength was higher when familism was higher than anxiety as compared to when anxiety was higher than familism. This is in line with the

hypothesized main effects of familism, which predicts greater tie strength (supporting H1b), and the hypothesized main effect of anxiety, which predicts smaller tie strength (supporting H3).

For m1 and m2 (Figure 2-e and f), positive α3s suggest that multiplexity was higher when anxiety was lower than familism, as compared to when familism was lower than anxiety (blue line from the bottom left corner to the top right corner). This is consistent with the predicted positive effect of familism (supporting H1b) and negative effect of anxiety on multiplexity (supporting H3). α1 was positive, revealing that multiplexity was higher when the values of familism and anxiety matched at higher levels (both high) than at lower levels (both low). This supports our prediction regarding the effects of the congruence between familism and anxiety on multiplexity (supporting H1b and H3).

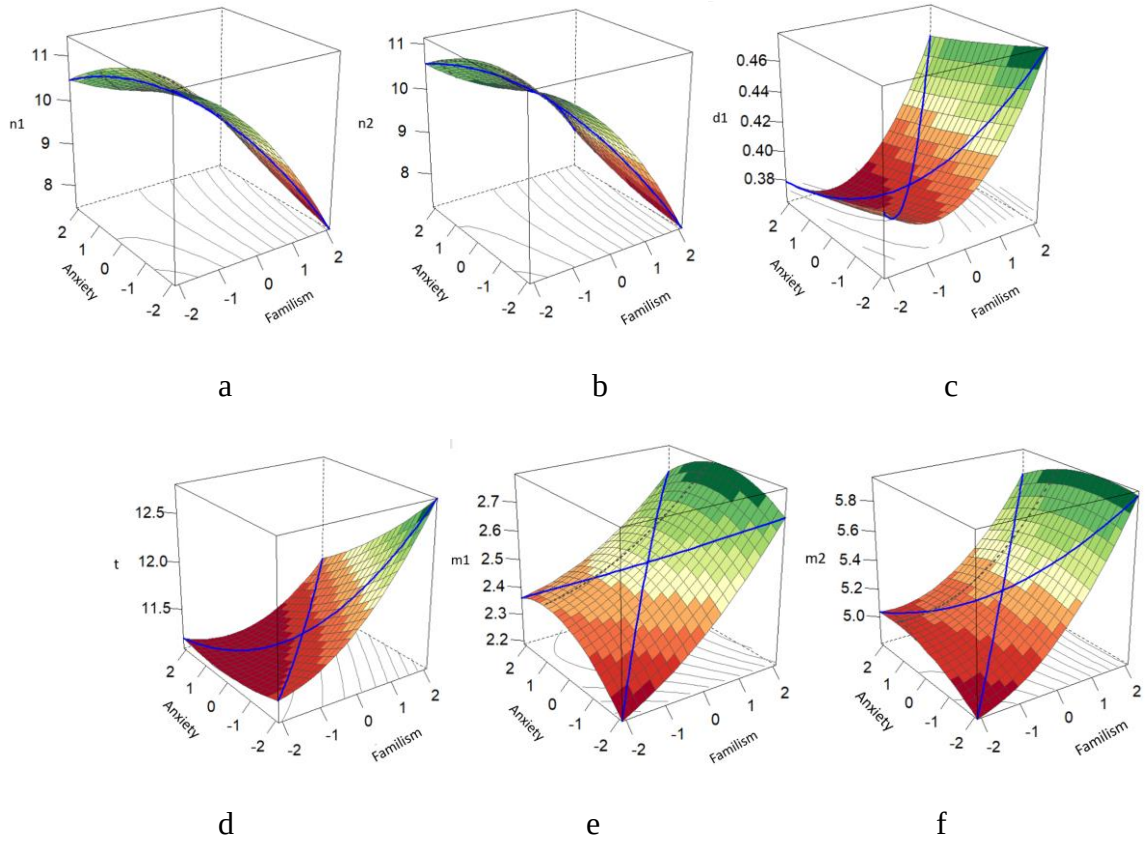

Figure 2S. Three-dimensional plots of the interactions between familism and attachment style on network outcomes.

Full results of the response surface models.

Predictor1 = familism, Predictor 2 = avoidance, outcome = n1					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	10.07633	0.382314	2717	26.35618	<.00001
centered.predictor1	-0.67802	0.288244	17	-2.35225	0.030969
centered.predictor2	-0.24337	0.072824	2717	-3.34191	0.000843
squared.predictor1	-0.12656	0.254398	17	-0.49748	0.625223
interaction	-0.1156	0.071317	2717	-1.62087	0.105161
squared.predictor2	0.029241	0.050402	2717	0.580155	0.561858
Z_anxiety	0.036367	0.069453	2717	0.523618	0.600587

Predictor1 = familism, Predictor 2 = avoidance, outcome = n2					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	9.869739	0.39835	2717	24.77657	<.00001
centered.predictor1	-0.7704	0.300312	17	-2.56534	0.020066
centered.predictor2	-0.2618	0.076176	2717	-3.43677	0.000598
squared.predictor1	-0.13548	0.265047	17	-0.51115	0.615821
interaction	-0.15805	0.0746	2717	-2.11859	0.034215
squared.predictor2	0.001315	0.052722	2717	0.024944	0.980102
Z_anxiety	0.037725	0.072649	2717	0.519278	0.603609

Predictor1 = familism, Predictor 2 = avoidance, outcome = d1

	Value	Std.Error	DF	t-value	p-value
(Intercept)	0.383274	0.010524	2224	36.41767	<.00001
centered.predictor1	0.018192	0.007888	17	2.306227	0.033962
centered.predictor2	-0.01767	0.002506	2224	-7.05005	2.38E-12
squared.predictor1	0.009335	0.006953	17	1.342601	0.197055
interaction	0.005173	0.002466	2224	2.09777	0.036038
squared.predictor2	0.000911	0.001759	2224	0.517793	0.604654
Z_anxiety	-0.00561	0.002384	2224	-2.3526	0.01873

Predictor1 = familism, Predictor 2 = avoidance, outcome = d2

	Value	Std.Error	DF	t-value	p-value
(Intercept)	0.517542	0.017332	2717	29.86058	<.00001
centered.predictor1	0.010592	0.012896	17	0.821357	0.422813
centered.predictor2	-0.0223	0.00509	2717	-4.38191	1.22E-05
squared.predictor1	0.01251	0.011364	17	1.100799	0.286327
interaction	0.008725	0.004985	2717	1.750229	0.080192
squared.predictor2	-0.00331	0.003528	2717	-0.93822	0.348217
Z_anxiety	-0.00589	0.004855	2717	-1.21217	0.225553

Predictor1 = familism, Predictor 2 = avoidance, outcome = t					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	11.34537	0.124379	2589	91.21581	<.00001
centered.predictor1	0.235779	0.093378	17	2.525003	0.021802
centered.predictor2	-0.29706	0.028808	2589	-10.3114	1.85E-24
squared.predictor1	0.058565	0.082369	17	0.711007	0.486721
interaction	0.049323	0.028485	2589	1.731547	0.083473
squared.predictor2	0.009895	0.020104	2589	0.492186	0.622629
Z_anxiety	-0.13919	0.027465	2589	-5.06784	4.31E-07

Predictor1 = familism, Predictor 2 = avoidance, outcome = m1					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	2.532419	0.035421	2717	71.49425	<.00001
centered.predictor1	0.100585	0.026265	17	3.829594	0.001342
centered.predictor2	-0.12408	0.011143	2717	-11.1347	3.43E-28
squared.predictor1	0.011733	0.023137	17	0.507101	0.618598
interaction	0.014965	0.010915	2717	1.371061	0.170469
squared.predictor2	-0.033	0.007728	2717	-4.27018	2.02E-05
Z_anxiety	0.014495	0.010631	2717	1.363532	0.172828

Predictor1 = familism, Predictor 2 = avoidance, outcome = m2					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	5.229272	0.0871	2695	60.03766	<.00001
centered.predictor1	0.222216	0.065736	17	3.380418	0.003555
centered.predictor2	-0.26734	0.015634	2695	-17.1005	2.54E-62
squared.predictor1	0.052892	0.058031	17	0.911451	0.374802
interaction	-0.01298	0.01531	2695	-0.84806	0.39648
squared.predictor2	0.000843	0.010844	2695	0.0777	0.938073
Z_anxiety	0.009507	0.014895	2695	0.63828	0.523346

Predictor1 = familism, Predictor 2 = anxiety, outcome = n1					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	10.08013	0.381736	2717	26.40603	<.00001
centered.predictor1	-0.67718	0.28767	17	-2.35402	0.03086
centered.predictor2	0.040785	0.069651	2717	0.585564	0.558217
squared.predictor1	-0.14797	0.253611	17	-0.58344	0.567257
interaction	0.127692	0.069146	2717	1.846703	0.064899
squared.predictor2	0.02256	0.050332	2717	0.448227	0.654025
Z_avoidance	-0.22836	0.069779	2717	-3.27263	0.001079

Predictor1 = familism, Predictor 2 = anxiety, outcome = n2

	Value	Std.Error	DF	t-value	p-value
(Intercept)	9.846082	0.398621	2717	24.70035	<.00001
centered.predictor1	-0.76285	0.300381	17	-2.53962	0.021157
centered.predictor2	0.041377	0.072905	2717	0.56754	0.570394
squared.predictor1	-0.1631	0.264814	17	-0.61589	0.546126
interaction	0.085192	0.072377	2717	1.177063	0.239274
squared.predictor2	0.027462	0.052684	2717	0.521258	0.60223
Z_avoidance	-0.25578	0.073039	2717	-3.50195	0.000469

Predictor1 = familism, Predictor 2 = anxiety, outcome = d1

	Value	Std.Error	DF	t-value	p-value
(Intercept)	0.383513	0.010628	2224	36.08375	<.00001
centered.predictor1	0.017778	0.007966	17	2.231748	0.03938
centered.predictor2	-0.00578	0.002394	2224	-2.41379	0.015868
squared.predictor1	0.0102	0.00701	17	1.454973	0.163893
interaction	0.000311	0.002372	2224	0.130931	0.895842
squared.predictor2	0.00028	0.001741	2224	0.161098	0.872031
Z_avoidance	-0.01726	0.002427	2224	-7.11286	1.53E-12

Predictor1 = familism, Predictor 2 = anxiety, outcome = d2

	Value	Std.Error	DF	t-value	p-value
(Intercept)	0.519835	0.017361	2717	29.94247	<.00001
centered.predictor1	0.010106	0.012904	17	0.783219	0.444273
centered.predictor2	-0.00501	0.004869	2717	-1.02831	0.303895
squared.predictor1	0.013829	0.01134	17	1.219477	0.239313
interaction	-0.00302	0.004835	2717	-0.62504	0.532
squared.predictor2	-0.00569	0.003523	2717	-1.61596	0.106219
Z_avoidance	-0.02431	0.004879	2717	-4.9831	6.65E-07

Predictor1 = familism, Predictor 2 = anxiety, outcome = t

	Value	Std.Error	DF	t-value	p-value
(Intercept)	11.33636	0.123465	2589	91.81826	<.00001
centered.predictor1	0.235569	0.092636	17	2.542958	0.021012
centered.predictor2	-0.14717	0.027532	2589	-5.34551	9.80E-08
squared.predictor1	0.06874	0.081568	17	0.842736	0.411077
interaction	-0.05823	0.02738	2589	-2.12675	0.033535
squared.predictor2	0.019497	0.019906	2589	0.979449	0.32745
Z_avoidance	-0.2909	0.027658	2589	-10.5178	2.30E-25

Predictor1 = familism, Predictor 2 = anxiety, outcome = m1

	Value	Std.Error	DF	t-value	p-value
(Intercept)	2.521264	0.035432	2717	71.15808	<.00001
centered.predictor1	0.101187	0.026236	17	3.856856	0.001265
centered.predictor2	0.020718	0.010679	2717	1.940075	0.052474
squared.predictor1	0.0138	0.023038	17	0.599031	0.557051
interaction	-0.00987	0.010605	2717	-0.93047	0.35221
squared.predictor2	-0.02154	0.00773	2717	-2.7863	0.005368
Z_avoidance	-0.13957	0.010702	2717	-13.0415	9.43E-38

Predictor1 = familism, Predictor 2 = anxiety, outcome = m2

	Value	Std.Error	DF	t-value	p-value
(Intercept)	5.253586	0.085977	2695	61.10477	<.00001
centered.predictor1	0.222944	0.064853	17	3.437671	0.003141
centered.predictor2	0.009812	0.014932	2695	0.657088	0.51118
squared.predictor1	0.049857	0.057191	17	0.871757	0.395486
interaction	-0.02143	0.014819	2695	-1.44615	0.148253
squared.predictor2	-0.01963	0.010784	2695	-1.82037	0.068814
Z_avoidance	-0.26779	0.01499	2695	-17.8648	1.50E-67

Results related to each function of WHOTO.

Predictor1 = familism, Predictor 2 = avoidance, outcome = proximity seeking					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	5.287986	0.097069	2717	54.47632	<.00001
centered.predictor1	0.227353	0.072747	17	3.125237	0.006162
centered.predictor2	-0.21937	0.023601	2717	-9.29497	2.93E-20
squared.predictor1	0.03872	0.06416	17	0.603496	0.554146
interaction	0.000386	0.023115	2717	0.016708	0.986671
squared.predictor2	0.011454	0.016347	2717	0.700684	0.48356
Z_anxiety	-0.00057	0.022511	2717	-0.02527	0.97984

Predictor1 = familism, Predictor 2 = avoidance, outcome = safe heaven					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	4.682852	0.100534	2717	46.57995	<.00001
centered.predictor1	0.220251	0.075483	17	2.917877	0.009592
centered.predictor2	-0.35171	0.022946	2717	-15.3279	6.33E-51
squared.predictor1	0.034568	0.066587	17	0.519143	0.610354
interaction	-0.02809	0.022472	2717	-1.2501	0.211371
squared.predictor2	-0.04234	0.015889	2717	-2.66475	0.00775
Z_anxiety	0.08545	0.021885	2717	3.904499	9.67E-05

Predictor1 = familism, Predictor 2 = avoidance, outcome = secure base					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	5.655508	0.098183	2717	57.60157	<.00001
centered.predictor1	0.234225	0.073788	17	3.174285	0.005546
centered.predictor2	-0.24521	0.021624	2717	-11.3394	3.74E-29
squared.predictor1	0.074761	0.065099	17	1.148416	0.2667
interaction	0.029951	0.021178	2717	1.414246	0.157404
squared.predictor2	-0.01512	0.014972	2717	-1.01004	0.312564
Z_anxiety	-0.03351	0.020624	2717	-1.625	0.104279

Predictor1 = familism, Predictor 2 = anxiety, outcome = proximity seeking					
	Value	Std.Error	DF	t-value	p-value
(Intercept)	5.322739	0.097164	2717	54.78108	<.00001
centered.predictor1	0.225936	0.072766	17	3.10497	0.006436
centered.predictor2	-0.00069	0.02257	2717	-0.03039	0.975759
squared.predictor1	0.037634	0.064059	17	0.587485	0.564601
interaction	-0.01063	0.02241	2717	-0.47431	0.635314
squared.predictor2	-0.02087	0.01632	2717	-1.27907	0.20098
Z_avoidance	-0.21602	0.022615	2717	-9.55214	2.73E-21

Predictor1 = familism, Predictor 2 = anxiety, outcome = safe heaven

	Value	Std.Error	DF	t-value	p-value
(Intercept)	4.700202	0.097619	2717	48.14866	<.00001
centered.predictor1	0.223682	0.073184	17	3.05645	0.00714
centered.predictor2	0.094184	0.021931	2717	4.294526	1.81E-05
squared.predictor1	0.027767	0.064443	17	0.430877	0.671971
interaction	-0.03431	0.021774	2717	-1.57563	0.115227
squared.predictor2	-0.05252	0.015856	2717	-3.31251	0.000937
Z_avoidance	-0.37159	0.021974	2717	-16.9106	4.49E-61

Predictor1 = familism, Predictor 2 = anxiety, outcome = secure base

	Value	Std.Error	DF	t-value	p-value
(Intercept)	5.658395	0.099436	2717	56.90464	<.00001
centered.predictor1	0.232263	0.074709	17	3.108915	0.006381
centered.predictor2	-0.0289	0.020689	2717	-1.39692	0.16255
squared.predictor1	0.079171	0.065818	17	1.20287	0.245512
interaction	0.001432	0.02054	2717	0.069722	0.94442
squared.predictor2	-0.01941	0.014955	2717	-1.2979	0.194431
Z_avoidance	-0.25387	0.020728	2717	-12.2473	1.31E-33

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