**Individual uniqueness in trust profiles and well-being:
Understanding the role of cultural tightness-looseness from a representation
similarity perspective**

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Abstract

This paper provides a unique perspective for understanding cultural differences: representation similarity - a computational technique that uses pairwise comparisons of units to reveal their representation in higher-order space. By combining individual-level measures of trust across domains and well-being from 13,823 participants across 15 nations with a measure of society-level tightness-looseness, we found that any two countries with more similar tightness-looseness tendencies exhibit higher degrees of representation similarity in national interpersonal trust profiles. Although each individual's trust profile is generally similar to their nation's trust profile, the greater similarity between an individual's and their society's trust profile predicted a higher

level of individual life satisfaction only in loose cultures, but not in tight cultures.

Using the framework of representation similarity to explore cross-cultural differences from a multidimensional, multi-national perspective can provide a new and fuller understanding of culture and its influence on human well-being.

Introduction

A fundamental focus in social and cultural psychology is the interconnectedness between cultural contexts and human behavior (Greenfield, 2000). Recent reviews of cross-cultural research have called for innovative multi-cultural studies to explore the full range of influence by cultural context on individual functioning (Smith & Bond, 2019). Additionally, previous studies mostly examined the role of culture by considering different psychological or behavioral tendencies separately (e.g., Branzei, Vertinsky, & Camp, 2007; Liu, Milojev, Gil de Zúñiga, & Zhang, 2018). This dominant, unitary-construct perspective may hinder the development of a more comprehensive understanding of the interconnectedness between cultural contexts and human psychological and behavioral tendencies.

Some perspectives proposed in personality psychology posit that variability across situations or domains can be meaningful for capturing individual differences (e.g., Furr, 2009). Given that culture involves a comprehensive representation of human social customs, norms, and lifestyles as revealed in different situations, culture's influence on individuals should be more fully revealed when individuals' personal profiles (i.e., variability in an individual's responses across contexts) are considered. Therefore, in addition to investigating differences in the levels of distinct variables across individuals and cultures, attention should also be dedicated to exploring the variability in an individual's pattern profile across response domains.

To demonstrate the importance of examining the relationship between culture and the variability in pattern profiles at both the individual and national level, the present study focused on cultural tightness-looseness and variability in trustor-trustee profiles across domains. There were three major goals in the present study: 1)

exploring whether cultural tightness-looseness would be correlated with variability in national-level trust profiles ; 2) exploring whether cultural tightness-looseness would be associated with the degree of congruence (or similarity) in trust profiles between individuals and their societies; and 3) exploring whether cultural tightness-looseness would moderate the strength of the association of congruence in trust profiles between individuals and their societies with those individuals' life satisfaction.

Cultural Tightness-Looseness

The construct of cultural tightness-looseness refers to the strength of social norms and the level of tolerance for a given degree of deviance from social norms within a given society (Gelfand, Nishii, & Raver, 2006). Greater socio-ecological challenges, such as population density and environmental threats, are found to promote a higher degree of tightness within societies (Gelfand et al., 2011). There are stronger social norms in tight cultures, and thus different social norms toward different targets (e.g., ethnic groups, religious groups, and fellow citizens) are set in tight cultures. Additionally, compared with individuals from loose cultures, individuals from tight cultures demonstrate higher scores in prevention focus and self-monitoring (Gelfand et al., 2006), personality dispositions that promote greater conformity to social norms.

Trust

As a core component of social relations, trust is defined as the expectation of an individual, the trustor, that another party, the trustee, will fulfill his/her responsibilities and obligations regardless of uncertainty and opportunities for defection and self-serving behavior (Gambetta, 1988; Creed & Miles, 1996). Trust is conceptualized as a multi-faceted construct according to the Global Trust Inventory used to measure trust in the current research (Liu et al., 2018; Zhang et al., 2019). However, in general the

following two types of trust are clearly distinguished in the literature:

social/interpersonal trust and political/institutional trust (Newton, Stolle, & Zmelli, 2018; Paxton, 1999; Zhang, Liu, Brown, & Gil de Zúñiga, 2020).

The trust experience is closely related to a given cultural context (Zhang et al., 2019). Social/interpersonal trust relies heavily on personal relationships and interpersonal interaction processes (Zucker, 1986), while political/institutional trust is mainly based on people's expectations regarding the quality of service delivery from their institutional system (Levi, 1998; Rothstein & Stolle, 2001). While various types of trust are regarded by some as conceptually distinct and affected by different socio-ecological factors (e.g., Branzei et al., 2007; Cole & Cohn, 2016; Jovanović, 2016; Navarro-Carrillo, Valor-Segura, Lozano, & Moya, 2018; Wang & Li, 2020), they are also interconnected (Zhang et al., 2020). Previous research has shown that trust levels vary across trust domains and across different societies (Liu et al., 2018; Zhang et al., 2019). However, the question of how culture may shape the similarity in trust profiles across different domains in different social-ecological contexts remains unclear.

Cultural Tightness-Looseness and Trust Profiles across Domains

The present study explored this question by considering the role of cultural tightness-looseness in shaping the trust profile of individual members embedded within their cultural systems. Given that norms are an important predictor for individuals' behaviors in tight cultures, we expect that more specific norms and expectations guide how people respond to each specific trust target in tight cultures compared to loose cultures (Gelfand et al., 2011). When we consider trust profiles across situations in tight cultures, we expect that people may show greater variation across different trust targets, leading to lesser similarity of individual trust profiles in tight cultures. In contrast, for individuals from loose cultures with weaker social

norms, an individuals' trust profiles would rely more upon their personal experiences and values. In other words, their personal values or experiences can be regarded as guiding principles across different domains of trusting, a dynamic which may result in greater similarity of individual trust profiles in loose cultures.

Some studies have provided indirect evidence for our argument. For instance, Eom, Kim, Sherman, and Ishii (2016) find that people's behavior was predicted by the perception of societal norms in Japan, a relatively tight culture, whereas their behavior was predicted by their personal attitude in the United States, a relatively loose culture. Similarly, Tam et al. (2017) found that personal value was a stronger predictor of pro-environmental behavior in loose cultures than in tight cultures.

Cultural Tightness-Looseness and Congruence in the Trust Profile

The level of cultural tightness-looseness in a society may predict the level of similarity in trust across domains between individuals' and their societal trust profiles. According to Gelfand et al. (2001), the stronger social regulation in tight cultures is reinforced not only by macro-level practices, which are related to institutional trust, but also by micro-level interpersonal practices, which are related to interpersonal trust. Following this rationale, we expected that the similarity in the trust profile of political/institutional and social/interpersonal domains would be higher in tight cultures than in loose cultures. We also expected that the similarity of individual trust profiles would be higher in tight cultures than in loose cultures.

Cultural Tightness-Looseness, Congruence in the Trust Profiles across Domains, and Life Satisfaction

Previous work adopting the cultural fit perspective suggests that if one's psychological characteristics are consistent with those of one's nation, one will face fewer conflicts and is thus better able to adapt to one's environment (Ward & Chang,

1997). The positive influence of cultural fit in diverse domains, such as personality dimensions and values, can be observed across different levels of contexts, ranging from micro-level contexts, like organizations (for a review, Kristof, 1996) to macro-level cultural contexts, like societies (e.g., Li & Hamamura, 2010; Ward, Leong, & Low, 2004). For instance, De Leersnyder, Mesquita, Kim, and Choi (2014) examined the relationship of similarity in the level of emotional states across situations between individuals and their average cultural profile with relational well-being in three different cultures (Belgium, South Korea, and the United States). They found that greater similarity in the emotional patterns of individuals with their average cultural profile predicted stronger relational well-being in all three cultures, especially in relationship-focused situations. Following such previous findings, we expect that higher congruence in trust profiles between individuals and their societies would be associated with higher individual life satisfaction.

Previous work suggests that cultural contexts may moderate the strength of the association between cultural fit and well-being. For instance, some studies found that the positive association of congruence between individuals and their societies with well-being is stronger in behavioral domains that are highly encouraged in a society (e.g., Li & Hamamura, 2010). For instance, Peltokorpi and Froese (2014) examined the importance of cultural empathy and social initiative on job satisfaction among expatriates in Japan and Brazil. They found that stronger cultural empathy, which was more important in Japan, predicted greater job satisfaction in Japan, while stronger social initiative, which was more important in Brazil, predicted greater job satisfaction in Brazil.

In the present study, we explored whether cultural-level tightness-looseness would moderate the strength of the cultural fit hypothesis as applied to trust profiles.

Since tight societies show limited tolerance with deviance from social norms (Gelfand et al., 2006, 2011), people in tight societies experience strong demands to follow social norms and practices. Thus, it is likely that stronger evidence for cultural fit would be obtained in tight cultures than in loose cultures. In other words, a stronger positive relation between the congruence in trust profiles between individuals and their societies would predict life satisfaction in tight cultures.

The Perspective of Representation Similarity

To bring new perspectives into cross-cultural research, the present study used a quantitative method from systems neuroscience, i.e., representational similarity analysis (RSA), to examine trust profiles. RSA is a computational technique that uses pairwise comparisons of units to reveal their representation in higher-order space (Haxby, Connolly, & Guntupalli, 2014; Kriegeskorte, Mur, & Bandettini, 2008). Although RSA is over a decade old, this approach has rarely been adopted in studies of cross-cultural psychology. As shown in [Figure 1A](#), traditional linear correlations focus on the correlation between values of two dimensions. In contrast, RSA analysis could further reflect the association between each pair of data points on the defined dimension and the overall pattern features of all data points ([Figure 1B](#)), thereby revealing more information about the global pattern constructed by each item and each link between two items, rather than the linear projection on single dimensions. Moreover, these pattern features do not necessarily coincide with the results of correlation analyses, as shown in [Figure 1C](#). Hence, this method is helpful for cross-cultural researchers attempting to reveal more information about the pattern of variables and the relationship of the pattern of specific variables with other psychological phenomena, such as well-being.

Another advantage of applying the RSA method in cross-cultural psychology is

that direct comparisons across data levels become feasible and more plausible. As shown in [Figure 1D](#), by using the RSA method, we can analyze the pattern of different targets at the same level, and perform direct comparisons across levels. In other words, we can assess the similarity between individuals and countries, between individuals and theoretical models, and between nations and theoretical models.

This unique affordance of enabling direct comparisons on the patterns among variables at different levels of data (individual patterns vs. group patterns) enables the RSA approach to bring new perspectives as compared with other methods of pattern analysis, such as network analysis. We are not able to compare each node (i.e., an individual) in a social network to the whole network using network analysis, but we can use RSA to construct a higher-order, space similarity matrix, and then compare patterns between different levels directly. There are some other methods used for analyzing the multilevel data, like hierarchical linear models. However, as we mentioned before, what hierarchical linear model analyzes is the relation between variables after linear mapping, which cannot capture the relationship among all data points for the overall pattern of variables.

Thus, RSA is particularly beneficial in cross-cultural psychology, especially to explore hypotheses concerning representations of multilevel data (e.g., data including variables from both the individual and society levels). For example, RSA can be applied to determine how representations can predict culture-specific and culture-consistent behavior, how representations differ across cultural groups, and how these representations can be compared to inform and verify emerging theories in cross-cultural psychology (Thornton et al., 2020; Peng & Luo, 2021; Bond, 2019).

The Current Study

The current study tested the following three major hypotheses: 1) whether

cultural tightness-looseness would be related to the similarity in trust profiles of political/institutional trust and social/interpersonal trust; 2) whether cultural tightness-looseness would be related to the degree of congruence between individuals' trust profiles and their society's trust profiles; and 3) whether cultural tightness-looseness could moderate the role of the individual-societal congruence of trust profiles in predicting individuals' life satisfaction.

Figure 1. The representation similarity perspective: A) Different research approaches used over the past five decades in cross-cultural psychology; B) Representative similarity analysis in cross-cultural psychology; C) Different interpretations of linear associations and representation similarities. Four data points show a high correlation ($r > 0.7$) on the X and Y axes; however, using the RSA method to analyze their pattern features, there is no similarity between their pattern on the X axis and their pattern on the Y axis ($r = 0$); D) Three levels of representation similarity analyses in cross-cultural psychology; one small dot represents an individual, and the large circle represents a nation; Level 1 (light green): Representation similarity within dimension I in a single

target; Level 2 (Green): Representation similarity between target j and target k in the same dimension, i ; Level 3 (dark green): Representation similarity between target j in dimension i and target k in dimension m .

Methods

The data re-analyzed here are a part of the Digital Influence project, where nationally representative samples were collected online from 21 countries in 2015-2016 (for details on methods and samples, see Gil de Zúñiga & Liu, 2017). Although the trust data referenced have previously been analysed by Liu and colleagues (2018), the previous work did not consider the role at the culture-level looseness-tightness and the benefit of RSA for well-being.

Participants

The data used in the current study were derived from the Digital Influence Survey I, which included 22,033 participants from 21 nations. After excluding missing data associated with the target variables, we had the data of 13,823 participants from 15 nations, including Brazil, China, Estonia, Germany, India, Italy, Japan, Korea, New Zealand, Poland, Spain, Turkey, the UK, Ukraine, and the USA (Table S10), for the data analysis.

Measures

Trust across different contexts: Interpersonal trust and institutional trust.

Instead of using all items, 14 items were selected to measure individuals' trust in different targets for the current research. The participants rated their trust of a target on a 7-point Likert scale (1=do not trust at all to 7=trust completely). Among the 14 items, seven items measured interpersonal trust, including trust in immediate family, extended family, friends, people in the neighborhood, own ethnic group, own religious group, and other citizens in the country. The other seven items measured institutional trust, including trust in the national government, local government, country president, police, judiciary (courts), government surveillance agencies, and

military in the country. The average Cronbach's α values of these two dimensions were 0.798 (range: 0.707-0.861) for interpersonal trust and 0.904 (range: 0.836-0.935) for institutional trust.

Life satisfaction. Life satisfaction was measured by averaging six items that measured the participants' satisfaction with their life, health, standard of living, safety, security, and relationships. The participants rated their satisfaction on a 7-point Likert scale (1=completely dissatisfied to 7=completely satisfied). The average Cronbach's α value was 0.861 (range: 0.801-0.897).

Society-level values. We collected existing society-level data from public sources to obtain the national scores on cultural tightness-looseness (Gelfand et al., 2011), Hofstede's cultural dimensions (Hofstede, 2011), herding, the historical prevalence of pathogens, the environmental sustainability index (ESI), GDP per capita, population density, national land area (NLA), and GNI per capita based on purchasing power parity (GNI PPP) (see details in supplementary materials).

Data Analysis

Representation similarity analysis

Variability in pattern profile can be represented as a 'similarity matrix', i.e., a matrix of all pair-wise similarities (e.g., mean similarity, Euclidean distance, and correlations) between trust items (or nations) (e.g., normalized mean similarity of trust across all target-pairs; see Fig 2a; correlation of trust patterns across all nation-pairs; see Fig 2b). Then, each matrix can be flattened into a vector of unique pair-wise trust similarities by selecting values above the diagonal (thereby removing duplicate values on the opposing side of the diagonal given that the similarity matrix is symmetrical and removing self-similar values along the diagonal). This similarity vector holds all unique information in its respective trust profile similarity matrices.

The representation of each trust profile matrix as a one-dimensional vector allows traditional univariate statistical methods to test the correspondence between the trust profile matrices. In the current research, we measured the correspondence of the trust profile matrices using the Spearman correlation and applied the Mantel test to examine the correspondence between two matrix vectors.

Representation similarities in trust (trust profiles, national level). We first calculated the representation similarities between 14 trust items in each nation. The similarities between each pair of items (each cell of the matrix in [Figure 2](#)) were calculated using Pearson correlation coefficients across all participants from this nation. The representation similarity matrix of the 14 trust items in each nation was constructed using the Pearson correlation coefficients of 91 item pairs.

Then, we applied the Fisher r to z transformation to the similarity matrices of trust for each country to ensure a normal distribution of the correlation coefficients. We then calculated the representation similarities in trust among 15 nations, and the similarity between each pair of nations was calculated using the Pearson correlation coefficients of 91 item pairs in nations A and B (each cell of the matrix in [Figure 3A](#) trust). The national representation similarity matrix of trust among 15 nations was constructed using the Pearson correlation coefficients of 105 nation pairs.

Representation similarities in tightness-looseness (national level). Regarding the score of tightness-looseness, the similarity between each pair of nations was calculated based on the absolute difference scores between nations A and B (each cell of the matrix in [Figure 3A](#) tightness-looseness). The national representation similarity matrix of tightness-looseness of 15 nations was constructed based on the difference scores of 105 nation pairs. These difference scores were transformed into similarity values between 0 and 1 to match the scale of the representation similarity matrix of

trust ($S_{ijtrans} = 1 - D_{ijraw} / \text{Max}(D_{ijraw})$), $S_{ijtrans}$ refers to the representation similarity between country i and country j ; D_{ijraw} refers to the distance of score between country i and country j). The same calculation methods were also used to construct a national representation similarity matrix of the 6 dimensions of Hofstede's cultural values and other ecological and economic variables.

Representation similarities between trust profiles and tightness-looseness (national level). Since the elements of the similarity matrix were interrelated, a nonparametric method of correlation analysis, the Mantel test was employed to generate a null distribution of Spearman correlation coefficients between the trust matrix and the tightness-looseness matrix, by shuffling the columns and rows of one of the matrices randomly 10,000 times. A significantly larger correlation coefficient than the mean of the null distribution indicated a substantial association between the trust matrix and the tightness-looseness matrix among the 15 nations.

Representation similarities between the national trust profile and the theoretical model profile (RSNT). The representation similarities between the national profile and the theoretical model (RSNT) of 15 nations were calculated using the Pearson correlation coefficient between the Pearson correlation coefficient of 91 item pairs in each nation and the theoretical similarity scores of 91 item pairs. The theoretical similarity scores of the items within interpersonal trust was set to 1, and that of the items within institutional trust or between interpersonal and institutional trust were set to 0. The similarity reflected by theoretical theory exists only within interpersonal trust but not within institutional trust or between interpersonal and institutional trust.

Representation similarities in trust (trust profiles, individual level).

Regarding the representation similarities in trust per individual, the similarity between

each pair of items was calculated using the difference scores between items A and B (normalized). These difference scores were further transformed into [0,1] intervals ($S_{ijtrans}=1- D_{ijraw}/\text{Max}(D_{ijraw})$) as the similarity scores to match the scale of the representation similarity matrix of trust at the nation level.

Representation similarities in trust between individual profiles and national profiles (RSIN). The similarities between the individual profiles and the national profile (RSIN) were calculated using the Spearman correlation coefficients of the difference scores of 91 item pairs per individual and those of 91 item pairs per nation. Lower RSIN scores represent higher individual uniqueness compared with the national profile.

Multilevel analyses. Hierarchical Linear Modeling analyses incorporating both random intercepts and random slopes were conducted using Mplus (Byrne, 2013) to examine the effect of congruence between the representation similarity in trust of each individual and that of his or her nation (RSIN) in predicting life satisfaction across nations with different degrees of tightness-looseness.

Results

Societal Tightness-looseness and Representation Similarity between Trust

Domains

The similarity analysis of the representation similarity matrices of trust and tightness-looseness (Gelfand et al., 2011) among 15 nations did not show significant results for the similarity between these two matrices ($r=0.146$, $p=0.159$, [Figure 2 & Figure 3A](#)).

To explore whether the variability in patterns may differ for different domains of trust, we further divided the representation matrix of trust into three submatrices:

representation similarity within interpersonal trust ($RSIN_{inter}$), representation similarity within institutional trust ($RSIN_{inst}$), and representation similarity between interpersonal and institutional trust ($RSIN_{bet}$). The results revealed significant similarity between the representation similarity in tightness-looseness and that in interpersonal trust ($r=0.282, p=0.028$), but not between the representation similarity in tightness-looseness and that in institutional trust or that between interpersonal and institutional trust (institutional trust, $r=0.104, p=0.217$; between interpersonal and institutional trust, $r=0.175, p=0.113$) among 15 nations (Figure 3A). These results suggest that the similarity pattern in interpersonal trust is the key component related to tightness-looseness.

We then compared each nation's trust pattern with an ideal theory model matrix. In the theory model, the similarity within institutional trust, and that between interpersonal and institutional trust was set to 0, and the similarity in interpersonal trust was set to 1, which means that the pattern within interpersonal trust is completely similar, and the pattern within institutional trust and that between interpersonal and institutional trust is completely different. We compared the representation similarity in trust in each nation with the theoretical representation similarity model (Representation Similarity between National level and Theoretical model, RSNT) to investigate whether nations with higher tightness scores show lower similarity within interpersonal trust. If nations with lower tightness scores show higher similarity in interpersonal trust, we should find a negative correlation between the RSNT and tightness-looseness scores. Indeed, the similarity in representation similarity in trust and the theoretical representation similarity model were negatively correlated among the 15 nations (Spearman's $r=-0.568, p=0.027$, Figure 3B). This finding confirms that nations with lower tightness scores show greater similarity in

interpersonal trust (see the **supplementary material** for comparisons with alternative theoretical models).

Figure 2. Representation similarity in trust across 15 nations. I1=Immediate family; I2=Extended family; I3=Friends; I4=Neighbors; I5=Ethnic group; I6=Religious group; I7=Own country citizens; I8=National government; I9=Local government; I10=President; I11=Police; I12=Judiciary (courts); I13=Government surveillance agencies; I14=Military.

Figure 3. A) Representation similarity within and between interpersonal trust and institutional trust and tightness-looseness. B) Association between tightness-looseness and RSNT (representation similarity between the national profile and theoretical model). I1=Immediate family; I2=Extended family; I3=Friends; I4=Religious group; I5=Neighbors; I6=Ethnic group; I7=Own country citizens; I8=National government; I9=Local government; I10=President; I11=Police; I12=Judiciary (courts); I13=Government surveillance agencies; I14=Military; A=India; B=Turkey; C=Japan; D=Korea; E=China; F=Italy; G=Poland; H=Germany; I=Spain; J=UK; K=USA; L=New Zealand; M=Estonia; N=Ukraine; O=Brazil.

* $p < 0.05$.

Trust, Individual Profile Uniqueness, and Well-being

Generally, we found significant similarity between the representation similarity in trust of each individual profile and their national profile (Representation Similarity between Individual level and National level, RSIN) among all 15 nations (mean $r=0.19\sim0.24$, $t=14.87\sim33.81$, $ps<0.001$, Table S1 and [Figure 4A](#)). We conducted a latent variable multilevel model (Croon & van Veldhoven, 2007) to examine the relationship between the group average RSIN and tightness-looseness. With age, gender as the individual level control variables, and ESI, population density, GDP and GNI PPP as the group level control variables, a median effect of RSIN on tightness-looseness was found, although its size did not reach significance ($B=-0.593$, $SE=0.64$, $t(7)=-1.01$, $p=0.34$, effect size $r=0.36$, Table S3).

Next, we tested whether the RSIN was associated with individuals' life satisfaction and whether this association was moderated by tightness-looseness. The main effect of RSIN on life satisfaction was not found by the Hierarchical Linear Model, with sex, age, individual level of trust, GDP per capita (2018), population density, NLA, GNI PPP and ESI as control variables (HLM; $B=0.025$, $SE=0.047$, $p=0.588$, 95% CI: $[-0.066, 0.117]$, Table S4). However, the interaction effect between RSIN and tightness-looseness on life satisfaction was significant (RSIN*tightness-looseness: $B=-0.034$, $SE=0.013$, $p=0.007$, 95% CI: $[-0.059, -0.009]$, [Table S4](#)), with the effect of RSIN revealed in nations with a lower level of tightness (nations with a tightness score 1 *SD* above the mean: $B=-.065$, $SE=0.069$, $p=0.352$, 95% CI: $[-0.200, 0.071]$; nations with a tightness score 1 *SD* below the mean: $B=0.115$, $SE=0.042$, $p=0.006$, 95% CI: $[0.033, 0.198]$). The results obtained after controlling for sex, age, individual level of trust, GDP per capita (2018), population density, herding land percentage (Korea missing), historical prevalence of pathogens (UK missing), NLA,

GNI PPP and ESI among 13 nations are presented in the supplementary materials (Table S8-S12). These results indicate that among individuals in loose cultures, cultural fit with their national pattern regarding representation similarity in trust is more important for their life satisfaction than it is for individuals from tight cultures.

To further determine the part of the representation matrix of trust that contributes to the moderation effects of tightness-looseness on the relationship between RSIN and life satisfaction, we divided the representation matrix of trust into three submatrices to test the similarity between the individual and national profiles ($RSIN_{inter}$, $RSIN_{inst}$ and $RSIN_{bet}$), with sex, age, individual level of trust, GDP per capita (2018), population density, NLA, GNI PPP and ESI as control variables. We found a marginally significant moderating effect of tightness-looseness on the relationship between $RSIN_{inter}$ and life satisfaction ($B=0.024$, $S.E.=0.013$, $p=0.071$, 95% CI: [-0.05, 0.002]). Regarding the relationships between $RSIN_{inst}$ or $RSIN_{bet}$ and life satisfaction, the moderating effect of tightness-looseness was not found ($ps>0.69$, Table S5-S7).

Figure 4. A) Representation similarity between individuals and national profiles (RSIN) in 15 nations (center line, median; box limits, upper and lower quartiles; whiskers, 1.5x interquartile range; circle points, mild outliers; star points, extreme outliers). B) Association between RSIN and life satisfaction was moderated by Tightness-Looseness across 15 nations.

Discussion

In the current research, we first examined whether cultural tightness-looseness was related to the similarity of the trust profiles in institutional and interpersonal domains. Based on data from 15 countries/regions, we found that the more two societies exhibited a similar level of tightness-looseness, the higher the level of similarity that these two countries showed in their profiles of interpersonal trust. Specifically, the higher level of cultural tightness only predicted lesser similarity in the profile in interpersonal trust. This result is consistent with previous studies showing that cultural characteristics affect people's experience in a wide range of environments (Gelfand, Erez, & Aycan, 2007). The current research found that the similarity of the trust profile for the interpersonal domain in tight cultures was lesser than that in loose cultures. Gelfand et al. (2001) demonstrated the influence of cultural tightness-looseness on social regulation for both macro-level and individual-level experiences. By differentiating trust targets, the current research suggests that rather than trust experiences for macro-level targets (e.g., institutions and systems), trust experiences for personal-level targets (e.g., friendships) may be less uniform in tight cultures, where social norms may be more strongly reinforced across different trust domains.

We did not find any significant results for the relationship between cultural tightness-looseness and the degree of individual-societal congruence in trust profiles. In contrast, we found unexpected results for how cultural tightness-looseness moderated the relationship between individual-societal congruence of trust profiles and individuals' life satisfaction. Specifically, we found the positive influence of cultural fit in trust profiles only in loose cultures but not in tight cultures. By

extending previous work, the current research revealed a boundary condition for the positive influence of cultural fit. Tight cultures set more specific norms and regulations on individuals' behaviors in each situation within a domain (Gelfand et al., 2011). Thus, the cultural fit index may reflect both the pressure of complying to strong social norms and the actual individual-societal congruence, thereby weakening the positive influence of the cultural fit index on individual life satisfaction in tight cultures. These results may suggest the importance of cultural autonomy, which is found to promote higher levels of well-being (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Thompson & Prottas, 2006), for facilitating the positive influence of cultural fit.

Recommendations

In contrast to analyses using a unitary construct perspective, the current research demonstrated that the use of a representation similarity perspective can further advance cross-cultural research. This method has been widely applied in the field of neuroimaging in recent years and has yielded meaningful and important findings, extending previous understanding (e.g., Stolier & Freeman, 2016; Brooks & Freeman, 2018). This type of analysis helps reveal comprehensive representation information across different individuals, stimuli or measurements.

A representation similarity analysis can introduce new perspectives for investigating different cross-cultural research questions. While multilevel analyses enable us to examine how societal-level characteristics moderate the process of psychological functioning at the individual level, RSA enables a direct cross-level comparison. As shown in the current study, we directly compared the association between individuals' and national trust profiles. In future cross-cultural comparisons, we can further explore individual-society relations with other psychological characteristics or states, like personality, emotions, values, or beliefs.

Furthermore, by combining the RSA method with HLM, we can examine how the association between individuals' and national profiles is moderated by cultural factors. In the future, we could not only determine how one or two psychological traits are influenced by culture but also examine how the whole psychological structure composed of multiple psychological variables is shaped by culture. Furthermore, this method provides direct access to associations not only among individuals and groups but also between individuals or groups and theoretical models; hence, this method could also be used to test theoretical models in cultural psychology.

The current research uses institutional trust and interpersonal trust as examples to explore the relationships among cultural tightness-looseness, congruence in trust profiles, and well-being. In addition to trust, many other topics have been explored and discussed in cross-cultural psychology over the past decades, including cognition, affect, and behavior (Markus & Kitayama, 1991; Peng & Nisbett, 1999; Han & Northoff, 2008; Luo et al., 2015; Luo, Yu, & Han, 2017; Luo et al., 2020). Future research can use the RSA method to further explore cross-cultural differences while considering the relationship among multiple psychological characteristics or behavior tendencies. Consistent with recent work (Na et al., 2019), a pattern profile across different tasks/domains can provide further evidence regarding the nuanced influence of culture on individual variations in different psychological tendencies. Therefore, using a multi-dimensional perspective to examine the similarities and differences in different cultural representations enables us to better understand the concept of culture and how it influences the responses of its members.

References

- Bond, M. H. (2019). Traveling from the past into the future of cross-cultural psychology: A personal-scientific journey. In D. Matsumoto & H. C. Hwang (Eds.), *Oxford handbook of culture and psychology*, 2nd ed. (pp. 45-67). New York, NY: Oxford University Press.
- <https://doi.org/10.1093/oso/9780190679743.003.0002>
- Braithwaite, V., & Levi, M. (Eds.). (1998). *Trust and governance*. Russell Sage Foundation.
- Branzei, O., Vertinsky, I., & Camp, R. D. II. (2007). Culture-contingent signs of trust in emergent relationships. *Organizational Behavior and Human Decision Processes*, 104(1), 61-82. <https://doi.org/10.1016/j.obhdp.2006.11.002>
- Brooks, J. A., & Freeman, J. B. (2018). Conceptual knowledge predicts the representational structure of facial emotion perception. *Nature Human Behaviour*, 2(8), 581-591. <https://doi.org/10.1038/s41562-018-0376-6>
- Byrne, B. M. (2013). *Structural equation modeling with Mplus: Basic concepts, applications, and programming*. Routledge.
- Creed, W. E. D., & Miles, R. E. (1996). Trust in organizations: A conceptual framework linking organizational forms, managerial philosophies, and the opportunity costs of controls. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations: Frontiers of Theory and Research*. (p.16-38). Sage.
- <https://doi.org/10.4135/9781452243610.n2>
- Eom, K., Kim, H., Sherman, D. K., & Ishii, K. (2016). Cultural variability in the link between environmental concern and support for environmental action. *Psychological Science*, 27, 1331-1339. doi:10.1177/0956797616660078
- De Leersnyder, J., Mesquita, B., Kim, H., Eom, K., & Choi, H. (2014). Emotional fit

- with culture: A predictor of individual differences in relational well-being. *Emotion*, 14(2), 241-245. <https://doi.org/10.1037/a0035296>
- Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska Symposium on Motivation: Vol. 38. Perspectives on motivation* (pp. 237-288). University of Nebraska Press. <https://doi.org/10.1590/S0370-44672008000200019>
- Devereux, B. J., Clarke, A., Marouchos, A., & Tyler, L. K. (2013). Representational similarity analysis reveals commonalities and differences in the semantic processing of words and objects. *Journal of Neuroscience*, 33(48), 18906-18916. <https://doi.org/10.1523/JNEUROSCI.3809-13.2013>
- Furr, R. M. (2009). Personality psychology as a truly behavioural science. *European Journal of Personality*, 23(5), 369-401. <https://doi.org/10.1002%2Fper.724>
- Gambetta, D. (Ed.). (1988). *Trust: Making and breaking cooperative relations*. B. Blackwell. <https://doi.org/10.2307/591021>
- Gelfand, M. J., Nishii, L. H., Holcombe, K. M., Dyer, N., Ohbuchi, K.-I., & Fukuno, M. (2001). Cultural influences on cognitive representations of conflict: Interpretations of conflict episodes in the United States and Japan. *Journal of Applied Psychology*, 86(6), 1059-1074. <https://doi.org/10.1037/0021-9010.86.6.1059>
- Gelfand, M. J., Erez, M., & Aycan, Z. (2007). Cross-cultural organizational behavior. *Annual Review of Psychology*, 58, 479-514. <https://doi.org/10.1146/annurev.psych.58.110405.085559>
- Gelfand, M. J., Nishii, L. H., & Raver, J. L. (2006). On the nature and importance of cultural tightness-looseness. *Journal of Applied Psychology*, 91(6), 1225. <https://doi.org/10.1037/0021-9010.91.6.1225>

- Gelfand, M. J., Raver, J. L., Nishii, L., Leslie, L. M., Lun, J., Lim, B. C., ... & Aycan, Z. (2011). Differences between tight and loose cultures: A 33-nation study. *Science*, 332(6033), 1100-1104. <https://doi.org/10.1126/science.1197754>
- Gil de Zúñiga, H., & Liu, J. H. (2017). Second screening politics in the social media sphere: Advancing research on dual screen use in political communication with evidence from 20 countries. *Journal of Broadcasting & Electronic Media*, 61(2), 193-219. <https://doi.org/10.1080/08838151.2017.1309420>
- Greenfield, P. M. (2000). Three approaches to the psychology of culture: Where do they come from? Where can they go? *Asian Journal of Social Psychology*, 3(3), 223-240. <https://doi.org/10.1111/1467-839X.00066>
- Grob, A., Little, T. D., Wanner, B., & Wearing, A. J. (1996). Adolescents' well-being and perceived control across 14 sociocultural contexts. *Journal of Personality and Social Psychology*, 71(4), 785. <https://doi.org/10.1037//0022-3514.71.4.785>
- Han, S., & Northoff, G. (2008). Culture-sensitive neural substrates of human cognition: A transcultural neuroimaging approach. *Nature Reviews Neuroscience*, 9(8), 646. <https://doi.org/10.1038/nrn2456>
- Haxby, J. V., Connolly, A. C., & Guntupalli, J. S. (2014). Decoding neural representational spaces using multivariate pattern analysis. *Annual Review of Neuroscience*, 37, 435– 456. <http://dx.doi.org/10.1146/annurevneuro-062012-170325>
- Hofstede, G. (1980). *Cultures consequences*. Sage.
- Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online Readings in Psychology and Culture*, 2(1), 1-26. <https://doi.org/10.9707/2307-0919.1014>.
- Kong, D. T. (2013). Examining a climatoeconomic contextualization of generalized

- social trust mediated by uncertainty avoidance. *Journal of Cross-Cultural Psychology*, 44(4), 574-588. <https://doi.org/10.1177/0022022112466700>
- Kong, D. T. (2016). A gene-dependent climatoeconomic model of generalized trust. *Journal of World Business*, 51(2), 226-236. <https://doi.org/10.1016/j.jwb.2015.08.018>
- Kriegeskorte, N., Mur, M., & Bandettini, P. A. (2008). Representational similarity analysis-connecting the branches of systems neuroscience. *Frontiers in Systems Neuroscience*, 2(4), 4. <https://doi.org/10.3389/neuro.06.004.2008>
- Kristof, A. L. (1996). Person-organization fit: An integrative review of its conceptualizations, measurement, and implications. *Personnel Psychology*, 49, 1–49. <https://doi.org/10.1111/j.1744-6570.1996.tb01790.x>
- Lane, C. (1998). Introduction: Theories and issues in the study of trust. In C. Lane & R. Bachmann (Eds.), *Trust within and between organizations* (pp. 1–30). Oxford.
- Levi, M. (1998). A state of trust. In V. Braithwaite, & M. Levi (Eds.), *Trust and governance* (pp. 77-101). Sage.
- Li, L. M. W., & Hamamura, T. (2010). Cultural fit and life satisfaction: Endorsement of cultural values predicts life satisfaction only in collectivistic societies. *Journal of Psychology in Chinese Societies*, 11(2), 109-122. <http://hdl.handle.net/20.500.11937/26300>
- Li, L. M. W., & Bond, M. H. (2010). Does secularism promote happiness? The moderating role of societal development. *Social Indicators Research*, 99, 443–453. <https://doi.org/10.1007/s11205-010-9591-x>
- Liu, J. H., Milojev, P., Gil de Zúñiga, H., & Zhang, R.J. (2018). The Global Trust Inventory as a “proxy measure” for social capital: Measurement and impact in 11 democratic societies. *Journal of Cross-Cultural Psychology*, 49(5), 789-810.

<https://doi.org/10.1177/0022022118766619>

Luo, S., Ma, Y., Liu, Y., Li, B., Wang, C., Shi, Z., ... & Han, S. (2015). Interaction between oxytocin receptor polymorphism and interdependent culture values on human empathy. *Social Cognitive and Affective Neuroscience*, 10(9), 1273-1281. <https://doi.org/10.1093/scan/nsv019>

Luo, S., Yu, D., & Han, S. (2017). 5-HTTLPR moderates the association between interdependence and brain responses to mortality threats. *Human brain mapping*, 38(12), 6157-6171. <https://doi.org/10.1002/hbm.23819>

Luo, S., Zhu, Y., Fan, L., Gao, D., & Han, S. (2020). Resting-state brain network properties mediate the association between the oxytocin receptor gene and interdependence. *Social neuroscience*, 15(3), 296-310. <https://doi.org/10.1080/17470919.2020.1714718>

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98(2), 224-253. <https://doi.org/10.1037/0033-295X.98.2.224>

Minkov, M., Bond, M. H., Dutt, P., Schachner, M., Morales, O., Sanchez, C., ... & Mudd, B. (2018). A reconsideration of Hofstede's fifth dimension: New flexibility versus monumentalism data from 54 countries. *Cross-Cultural Research*, 52(3), 309–333. <https://doi.org/10.1177/1069397117727488>

Murray, D. R., & Schaller, M. (2010). Historical prevalence of infectious diseases within 230 geopolitical regions: A tool for investigating origins of culture. *Journal of Cross-Cultural Psychology*, 41(1), 99-108. <https://doi.org/10.1177/0022022109349510>

Na, J., Grossmann, I., Varnum, M. E., Kitayama, S., Gonzalez, R., & Nisbett, R. E. (2010). Cultural differences are not always reducible to individual differences.

Proceedings of the National Academy of Sciences, 107(14), 6192-6197.

<https://doi.org/10.1073/pnas.1001911107>

Navarro-Carrillo, G., Valor-Segura, I., Lozano, L. M., & Moya, M. (2018). Do economic crises always undermine trust in others? The case of generalized, interpersonal, and in-group trust. *Frontiers in Psychology*, 9, 1955.

<https://doi.org/10.3389/fpsyg.2018.01955>.

Newton, K., Stolle, D., & Zmerli, S. (2018). Social and political trust. In E. M. Uslaner (Ed.), *The Oxford handbook of social and political Trust*. Oxford.

<https://doi.org/10.1093/oxfordhb/9780190274801.001.0001>

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: holistic versus analytic cognition. *Psychological Review*, 108(2), 291-310. <https://doi.org/10.1037/0033-295x.108.2.291>

Paxton, P. (1999). Is social capital declining in the United States? A multiple indicator assessment. *American Journal of Sociology*, 105(1), 88-127.

<http://www.jstor.org/stable/10.1086/210268>

Peng, K., & Nisbett, R. E. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist*, 54(9), 741-754.

<https://doi.org/10.1037/0003-066X.54.9.741>

Peng, L., & Luo, S. (2021). Impact of social economic development on personality traits among Chinese college students: A cross-temporal meta-analysis, 2001–2016. *Personality and Individual Differences*, 171, 110461.

<https://doi.org/10.1016/j.paid.2020.110461>

Peltokorpi, V., & Froese, F. (2014). Expatriate personality and cultural fit: The moderating role of host country context on job satisfaction. *International Business Review*, 23, 293-302. <http://dx.doi.org/10.1016/j.ibusrev.2013.05.004>

- Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, 26, 419–435.
- Rothstein, B., & Stolle, D. (2001, September). Social capital and street-level bureaucracy: An institutional theory of generalized trust. In *ESF Conference Social Capital: Interdisciplinary Perspectives*, Exeter, UK September 15-20.
- Rutter, H., Savona, N., Glonti, K., Bibby, J., Cummins, S., Finegood, D. T., ... & White, M. (2017). The need for a complex systems model of evidence for public health. *The Lancet*, 390, 2602-2604. [https://doi.org/10.1016/S0140-6736\(17\)31267-9](https://doi.org/10.1016/S0140-6736(17)31267-9)
- Smith, P. B., & Bond, M. H. (2019). Cultures and persons: characterizing national and other types of cultural difference can also aid our understanding and prediction of individual variability. *Frontiers in Psychology*, 10, 2689. <https://doi.org/10.3389/fpsyg.2019.02689>
- Stolier, R. M., & Freeman, J. B. (2016). Neural pattern similarity reveals the inherent intersection of social categories. *Nature Neuroscience*, 19(6), 795-797. <https://doi.org/10.1038/nn.4296>
- Tam, K.-P., & Chan, H.-W. (2017). Environmental concern has a weaker association with pro-environmental behavior in some societies than others: A cross-cultural psychology perspective. *Journal of Environmental Psychology*, 53, 213-223. <https://doi.org/10.1016/j.jenvp.2017.09.001>
- Thompson, C. A., & Prottas, D. J. (2006). Relationships among organizational family support, job autonomy, perceived control, and employee well-being. *Journal of Occupational Health Psychology*, 11(1), 100-118. <https://doi.org/10.1037/1076-8998.10.4.100>

- Thornton, M. A., Wolf, S., Reilly, B. J., Slingerland, E., & Tamir, D. (2020). The 3d Mind Model characterizes how people understand mental states across modern and historical cultures. PsyArXiv.
- Triandis H. C. 1994. *Culture and social behavior*. McGraw-Hill.
<https://doi.org/10.1016/j.cobeha.2015.02.001>
- Triandis, H. C. (2004). The many dimensions of culture. *Academy of Management Perspectives*, 18(1), 88-93. <https://doi.org/10.2307/4166039>
- Ward, C., Leong, C.-H., & Low, M. (2004). Personality and sojourner adjustment: An exploration of the Big Five and the cultural fit proposition. *Journal of Cross-Cultural Psychology*, 35, 137–151. <https://doi.org/10.1177/0022022103260719>
- Yu, M., Huang, L., Mao, J., Luo, S. (2020) Childhood maltreatment, automatic negative thoughts and resilience: the protective roles of culture and genes. *Journal of Interpersonal Violence*. 0886260520912582.
<https://doi.org/10.1177/0886260520912582>
- Zhang, R. J., Liu, J. H., Milojev, P., Jung, J., Wang, S. F., Xie, T., ... & Morio, H. (2019). The structure of trust as a reflection of culture and institutional power structure: Evidence from 4 East Asian societies. *Asian Journal of Social Psychology*, 22(1), 59-73. <https://doi.org/10.1111/ajsp.12350>
- Zhang, R. J., Liu, J. H., Brown, G., Gil de Zúñiga, H. (2020). A network analysis of global trust across 11 democratic countries. *International Journal of Public Opinion Research*. <https://doi.org/10.1093/ijpor/edaa002>
- Zucker, L. G. (1986). Production of trust: Institutional sources of economic structure, 1840-1920. *Research in Organizational Behavior*, 8, 53-111. PsycINFO.