# The Role of Cultural Heterogeneity in Strengthening the Link Between Family Relationships and Life Satisfaction in 50 Societies

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RESEARCH PAPER

# The Role of Cultural Heterogeneity in Strengthening the Link Between Family Relationships and Life Satisfaction in 50 Societies

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**Abstract**
We argue that the importance of family relationships for individual well-being varies across societies as a function of a society's degree of cultural heterogeneity. To examine the role of family relationships, we analyzed the responses from 13,009 participants in 50 societies on their life satisfaction across societies varying in their levels of historical and contemporary cultural heterogeneity. Such heterogeneity creates differences in the frequency of interacting with unfamiliar groups, which leads families to become more central to their members' satisfaction with life. Multi-level analyses showed that historical and contemporary cultural heterogeneity moderated the pattern such that greater historical or contemporary cultural heterogeneity of society promoted a stronger positive relation between family relationship satisfaction and individual life satisfaction. Our results also revealed that the moderating role of historical cultural heterogeneity was more reliable than that of contemporary cultural heterogeneity. These findings demonstrate the importance of societal demography in shaping people's psychological processes in different historical periods, suggesting a universal, trans-historical cultural process.

**Keywords** Life satisfaction · Family relationships · Cultural heterogeneity · Socio-ecological approach · Multi-level analysis

## 1 Introduction

The need to belong is one of the fundamental human motives (Baumeister & Leary, 1995). Thus, having satisfying social relationships, including romantic relationships (Love & Holder, 2016), family relationships, and friendships (Diener & Biswas-Diener, 2008; Kagitcibasi, 2013), is an important contributor to individual well-being (Diener & Ryan, 2009). This positive effect of social relationships has been observed in many societies. For instance, Tay and Diener (2011) found that fulfilling social needs predicted better subjective well-being, characterized by frequent positive emotions, infrequent negative emotions, and overall life satisfaction (Myers & Diener, 1995) among individuals across 123 countries.

Among different types of social relationships, the present study focused on family relationships, which have received relatively less attention compared with other relationships,

such as romantic relationships (Ko et al., 2020). It has been found that the positive effect of family relationships is enduring and consequential for well-being across the life course (Thomas et al., 2017). Although some studies suggested universal patterns for family relationships across cultures in other domains, such as trust (Bomhoff & Yean, 2013), other studies have suggested that the effect of family relationships on well-being may vary across cultures (Hamdan-Mansour & Marmash, 2007). However, little work has systematically explored how the effect of family relationships on well-being can be moderated by sociocultural contexts using multiple cultural samples. To further enhance our understanding of the role of family relationships across cultures, the present study explored whether the relation between family relationship satisfaction and life satisfaction across persons from 50 societies would be moderated by the degree of cultural heterogeneity in a given society, defined as the number of countries of origin contributing to a society's population profile (Niedenthal et al., 2018; Putterman & Weil, 2010).

## 2 Family Relationships and Well-Being Across Cultures

A positive relation between family relationship quality and different indicators of well-being is well-supported (e.g., Brannan et al., 2013; Diener & Biswas-Diener, 2008). People who form secure relationships with their caregivers, most typically their family members, were found to have a stronger sense of security and communion (Carnelley & Rowe, 2010), stronger positive self-views and more positive relationship expectations (Carnelley & Rowe, 2007), better stress management (Mikulincer & Florian, 2001), and a higher level of cognitive openness and exploration of new ideas (Feeney, 2007; Mikulincer et al., 2011). In addition, family relationships are an important source of social support, including both instrumental and emotional support (Li & Cheng, 2015), especially during difficult times (Adams & Blieszner, 1995; Holt-Lunstad et al., 2003). So, family relationships are regarded as an important and effective source for satisfying the basic human need for security (Simons, 1984), thereby promoting higher levels of well-being among individuals.

Although social relationships are fundamental for the fulfilment of basic human needs, the experience in social relationships can be substantially shaped by individuals' social and cultural contexts (Smith & Bond, 2019). Consistent with findings for other types of social relationships, such as friendships and enemyships (Li et al., 2015, 2018), family relationships have been shown to demonstrate cultural variations in well-being (e.g., Hamdan-Mansour & Marmash, 2007; Lansford et al., 2005; Lykes & Kemmelmeier, 2014; Stavrova et al., 2012). However, inconsistent patterns of the moderation effect of culture on the relation between family relationships and one's well-being have been observed. Lykes and Kemmelmeier (2014) found a stronger negative association between interaction with family and loneliness in collectivistic societies than in individualistic societies across Europe. In contrast, the quality of mother–child family relationships was positively associated with positive self-regard in the United States, a more individualistic society, but not in Japan, a more collectivistic society (Lansford et al., 2005).

Despite some attempts to unpack the cultural variation in the effect of family relationships on well-being, most previous cross-cultural studies have compared a limited number of cultures, thereby preventing a systematic exploration of what factors can explain the observed cultural variations (Bond, 2018; Vignoles et al., 2016). A related concern was that previous studies have mainly focused on East Asian—Westerner comparisons, while the patterns for populations in other regions have been understudied (Brannan et al., 2013;

Georgas et al., 2006), thus limiting the scientific generalizability of the obtained results to other cultures (Glazer, 2006).

To further explore how social ecology can moderate the role of family relationships on individuals' well-being across cultures, the present study focused on the moderating role of cultural heterogeneity in a given society on the relation between family relationship satisfaction, one important aspect of family relationship quality, and life satisfaction.

## 3 The Socioecological Approach: Cultural Heterogeneity

Different socioecological characteristics set specific demands or challenges that require people to develop different adaptive strategies, which, in turn, substantially affect how people think, feel, and behave (Sng et al., 2018). In line with this argument, previous work supports the role of a wide range of socioecological factors, including residential mobility (Li et al., 2019), pathogen threats (Fincher et al., 2008), and types of agricultural systems (Alesina et al., 2013), in shaping different psychological processes.

In the present study, we explored the moderating role of cultural heterogeneity across time on the relation between family relationship satisfaction and life satisfaction across individuals. Here, cultural heterogeneity refers to the number of countries of origin contributing to the society's present population profile (Niedenthal et al., 2018; Putterman & Weil, 2010).

In culturally homogeneous societies, which have few countries of origin among their present populations, language, norms, and practices are more widely shared among people (Niedenthal et al., 2017). In these social environments, people can better predict how to interact with others, given that those others probably are ingroup members. By contrast, in culturally heterogeneous societies, characterized by many countries of origin for their present populations, people are surrounded by different and unfamiliar groups of people who do not share the same language, norms, and practices. People living in such diverse societies must depend on interacting with strangers and need to learn how to do so harmoniously for better survival (Niedenthal et al., 2017).

Therefore, the traits or behavioral strategies that facilitate better interaction with strangers and unfamiliar outgroups are believed to be more adaptive in societies with high cultural heterogeneity. Supporting this rationale, cultural heterogeneity has been demonstrated to be important in explaining contemporary cross-cultural differences in the personality trait of openness to experience (Shrira et al., 2018), risk-taking preference (Becker et al., 2014), greater frequency of smiling (Niedenthal et al., 2018), and greater emotional expressivity (Wood et al., 2016).

How can we relate the level of cultural heterogeneity in a given society to the relation between family relationship satisfaction and well-being across individuals? According to Bowlby (1973), the relationships that individuals form with their primary caregivers, usually their family members, provide an internal working model that guides not only individuals' interactions with significant others but also their exploratory behaviors in unfamiliar environments. Supporting this notion, previous work has found that family is an important source of security (Carnelley & Rowe, 2010), constituting a secure base from which to explore new relationships in uncertain situations (Elliot & Reis, 2003; Mikulincer et al., 2002), thereby promoting a greater sense of openness in its members (Feeney, 2007). These qualities associated with satisfying family relationships can facilitate better interactions with strangers, as they encourage tolerance of intergroup differences and facilitate

trust of outgroup members and intergroup cooperation (Brandt et al., 2015; Jackson & Poulsen, 2005). Thus, the family that provides greater security for its members would be especially adaptive in culturally heterogeneous environments where people need to interact harmoniously with different and unfamiliar groups of people.

Following the above theorizing, we expect that cultural heterogeneity will moderate the relation between family relationships and members' life satisfaction, such that there will be a stronger positive relation between family relationship satisfaction and life satisfaction in societies with greater cultural heterogeneity than in societies with lesser cultural heterogeneity.

### 3.1 Historical Versus Contemporary Cultural Heterogeneity

Regarding the effects of socioecological factors, both contemporary and historical indicators can meaningfully explain people's psychological and behavioral tendencies (e.g., Fincher et al., 2008). Compared with the present, the past provides important information about how initial ecological conditions may create long-term pressure for the development of people's psychological and behavioral tendencies across a society's history (Kitayama, 2002). These variations lead to notable cultural variations at present (Cohen, 2007), even when the original ecological characteristic becomes absent (Talhelm et al., 2014). This temporal distinction suggests the independent effects of historical indicators from those of contemporary indicators. Examining both historical and contemporary cultural heterogeneity allows comparison between the long-term versus more immediate effects of sociodemographic factors on well-being.

Following previous works (Niedenthal et al., 2018; Rychlowska et al., 2015), we examined whether historical and contemporary cultural heterogeneity would exert a significant moderating role. Historical cultural heterogeneity is a demographic construct that refers to the degree of diversity of cultural origins of a population in a society's history, which reflects the likelihood of encountering outgroups with diverse cultural heritages across history (Niedenthal et al., 2018; Rychlowska et al., 2015). Specifically, the present study adopted the indicator developed by Putterman and Weil (2010), which quantified the number of countries of origin of the ancestors of a society's current population over the last 500 years using genetic and historical records. In contrast, contemporary cultural heterogeneity refers to the diversity in the cultural origins of a society's current population. Following the calculation of previous studies (Rychlowska et al., 2015), we quantified the number of countries of origin of the population at present (i.e., in 2017 for the present study) for each society.

Prior research indicates that historical cultural heterogeneity, but not contemporary cultural heterogeneity, predicted some present-day cross-cultural variations in social norms (Niedenthal et al., 2018; Rychlowska et al., 2015). Additionally, some studies suggest that family relationships are more critical for long-term threats or challenges (Adams & Blieszner, 1995; Antonucci, 1990), further suggesting a stronger relation between family relationships and individual well-being while facing long-term challenges. We thus suggest that family relationships may be more important during long-term adaptions to socioecological challenges. Therefore, it might be possible that, compared with contemporary cultural heterogeneity, historical cultural heterogeneity would have a stronger moderating

effect on the relation between family relationship satisfaction and life satisfaction among individuals across cultures as compared to contemporary cultural heterogeneity.

## 4 Method

### 4.1 Participants

The Principal Investigator of this research project invited researchers worldwide with a target of 40 societies. Our collaborators aimed to recruit at least 200 participants in each participating society. Some collaborators managed to recruit more than 200 participants, while some recruited fewer. Finally, there were a total of 13,353 participants (38.8% male participants, 59.6% female participants; $M_{age} = 25.24$, $SD = 9.55$) from 50 societies. We mainly targeted post-secondary students as our participants; some collaborators managed to recruit community participants in addition to student participants.

After excluding incomplete and invalid responses (2.6% of the total responses, such as by failing the attention check questions or providing no-variance answers on the variables), 13,009 participants remained (39.1% male participants, 59.7% female participants; $M_{age} = 25.22$, $SD = 9.51$; the range of n per society: 106–831). The participants were mainly university students (83%). Table 1 shows the descriptive statistics of the demographic information and the key variables used in the present study for each society. Following the recommendation of Snijders (2005), about 4,000 participants in total from 50 societies would be sufficient to obtain a power of 0.80 with a small-to-medium effect size ($\omega^2 = 0.04$; Cohen, 1977) with $\alpha = 0.05$. So, the current sample size was sufficient to obtain satisfactory statistical power.

### 4.2 Measures

#### 4.2.1 Individual-Level Variables

**4.2.1.1 Family Relationship Satisfaction** We asked each participant to rate their family relationship satisfaction. A single item, "You are satisfied with your relationship with your family", was used. Participants answered on a 9-point scale ranging from 1 (doesn't describe me at all) to 9 (describes me exactly). The degree of skewness and kurtosis was acceptable (overall sample: skewness = −0.31, kurtosis = −0.52; the range of skewness across societies: −0.86–0.27; the range of kurtosis: −0.87–0.37).

**4.2.1.2 Life Satisfaction** To measure participants' life satisfaction, the five-item satisfaction with life scale (SWLS; Diener et al., 1985) was used. A sample item includes, "The conditions of your life are excellent". All items were rated on a 9-point scale, ranging from 1 (doesn't describe me at all) to 9 (describes me exactly). The average scale reliability was satisfactory ($\alpha = 0.852$; range across societies: 0.714–0.905).

**4.2.1.3 Individual-Level Control Variables** Participants' age and gender were entered as control variables.

**Table 1** The descriptive statistics of different variables in each society

| Society | Sample size | GDP per capita (US$; raw data) | Historical CH (raw data) | Contemporary CH (raw data) | Male ratio (%) | Age (*Mean*) | Age (SD) | FRS (Mean) | FRS (SD) | Life satisfaction (Mean) | Life satisfaction (SD) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 175 | 14591.86 | 37 | 122 | 26 | 32.43 | 11.35 | 6.70 | 1.68 | 5.75 | 1.32 |
| Australia | 340 | 54093.60 | 46 | 206 | 42 | 37.85 | 16.86 | 5.43 | 2.34 | 4.82 | 1.87 |
| Austria | 320 | 47380.83 | 7 | 187 | 19 | 28.59 | 10.14 | 7.03 | 1.99 | 6.47 | 1.55 |
| Brazil | 606 | 9880.95 | 25 | 160 | 45 | 27.43 | 10.13 | 6.26 | 2.18 | 5.19 | 1.67 |
| Bulgaria | 121 | 8228.01 | 10 | 169 | 21 | 30.00 | 8.62 | 7.62 | 1.89 | 5.98 | 1.55 |
| Bhutan | 119 | 3390.71 | 2 | 24 | 39 | 22.62 | 2.43 | 7.24 | 2.12 | 4.78 | 1.46 |
| Canada | 240 | 45069.93 | 63 | 197 | 28 | 21.89 | 4.77 | 6.44 | 2.01 | 5.47 | 1.55 |
| Chile | 221 | 15037.35 | 35 | 210 | 42 | 21.55 | 3.11 | 6.54 | 1.92 | 5.85 | 1.65 |
| China | 199 | 8759.04 | 1 | 20 | 28 | 20.58 | 4.70 | 6.77 | 1.92 | 5.23 | 1.51 |
| Colombia | 466 | 6375.93 | 23 | 91 | 48 | 32.96 | 12.36 | 6.79 | 1.97 | 5.82 | 1.54 |
| Croatia | 140 | 13383.68 | 12 | 71 | 16 | 30.69 | 11.12 | 6.91 | 1.88 | 5.94 | 1.47 |
| Czech Republic | 201 | 20379.90 | 4 | 164 | 48 | 22.23 | 3.48 | 6.37 | 2.25 | 5.73 | 1.60 |
| Estonia | 200 | 20200.38 | 5 | 97 | 29 | 28.80 | 10.53 | 6.39 | 2.12 | 5.96 | 1.39 |
| France | 216 | 38679.13 | 11 | 205 | 17 | 31.75 | 10.45 | 6.23 | 1.98 | 5.65 | 1.46 |
| Georgia | 234 | 4045.42 | 4 | 46 | 47 | 20.05 | 2.56 | 6.79 | 2.05 | 5.13 | 1.51 |
| Germany | 106 | 44681.08 | 7 | 134 | 18 | 22.43 | 3.40 | 6.72 | 2.11 | 6.05 | 1.40 |
| Ghana | 266 | 2025.89 | 3 | 43 | 46 | 22.21 | 2.36 | 6.79 | 2.04 | 5.02 | 1.61 |
| Greece | 427 | 18883.46 | 1 | 182 | 40 | 24.69 | 5.75 | 6.73 | 1.97 | 5.48 | 1.52 |
| Guatemala | 111 | 4470.61 | 24 | 49 | 28 | 20.51 | 2.37 | 6.72 | 1.87 | 6.07 | 1.49 |
| Hong Kong | 291 | 46220.50 | 3 | 29 | 63 | 21.16 | 2.23 | 5.70 | 1.98 | 4.57 | 1.55 |
| Hungary | 831 | 14278.87 | 12 | 158 | 27 | 20.89 | 2.39 | 6.62 | 2.02 | 6.29 | 1.51 |
| Iceland | 353 | 71314.77 | 1 | 143 | 19 | 30.88 | 11.58 | 6.87 | 1.87 | 6.10 | 1.58 |
| Indonesia | 198 | 3836.91 | 2 | 19 | 44 | 26.70 | 11.89 | 6.24 | 2.67 | 5.56 | 1.58 |

**Table 1** (continued)

| Society | Sample size | GDP per capita (US$; raw data) | Historical CH (raw data) | Contemporary CH (raw data) | Male ratio (%) | Age (*Mean*) | Age (SD) | FRS (Mean) | FRS (SD) | Life satisfaction (Mean) | Life satisfaction (SD) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iran | 199 | 5627.75 | 3 | 7 | 50 | 34.42 | 9.44 | 6.33 | 2.07 | 5.01 | 1.67 |
| Ireland | 244 | 68941.81 | 12 | 183 | 39 | 20.96 | 3.18 | 7.07 | 1.84 | 5.85 | 1.49 |
| Italy | 288 | 32155.21 | 5 | 193 | 46 | 25.14 | 4.52 | 6.74 | 1.86 | 5.56 | 1.50 |
| Japan | 198 | 38331.98 | 1 | 42 | 61 | 19.56 | 1.23 | 6.53 | 2.09 | 4.07 | 1.48 |
| Korea | 208 | 29742.84 | 1 | 20 | 52 | 22.43 | 3.52 | 6.49 | 1.97 | 4.82 | 1.50 |
| Lithuania | 296 | 16809.65 | 5 | 57 | 26 | 25.65 | 10.92 | 6.85 | 1.78 | 5.99 | 1.53 |
| Luxembourg | 220 | 104498.74 | 9 | 77 | 30 | 25.77 | 9.30 | 6.77 | 2.03 | 5.95 | 1.51 |
| Malaysia | 190 | 10117.57 | 5 | 22 | 32 | 20.82 | 1.62 | 7.46 | 1.63 | 5.54 | 1.36 |
| Mexico | 175 | 9281.10 | 25 | 90 | 42 | 20.80 | 3.91 | 6.77 | 1.93 | 6.25 | 1.65 |
| Netherlands | 194 | 48482.77 | 28 | 180 | 90 | 19.41 | 1.85 | 6.96 | 1.82 | 5.97 | 1.34 |
| Nigeria | 137 | 1968.56 | 3 | 9 | 17 | 19.82 | 1.51 | 6.15 | 2.23 | 4.38 | 1.67 |
| Norway | 250 | 75704.25 | 1 | 168 | 21 | 22.66 | 4.83 | 6.98 | 1.96 | 5.82 | 1.69 |
| Pakistan | 240 | 1466.84 | 3 | 8 | 53 | 21.78 | 3.46 | 6.66 | 2.10 | 5.16 | 1.57 |
| Poland | 472 | 13861.05 | 3 | 117 | 31 | 32.51 | 14.77 | 5.41 | 2.05 | 4.28 | 1.47 |
| Portugal | 260 | 21291.43 | 15 | 128 | 33 | 28.61 | 12.61 | 6.70 | 1.93 | 5.85 | 1.47 |
| Romania | 290 | 10792.96 | 10 | 60 | 50 | 22.30 | 6.12 | 6.87 | 1.91 | 6.00 | 1.48 |
| Russia | 270 | 10750.59 | 5 | 148 | 37 | 19.76 | 1.55 | 6.63 | 2.05 | 4.56 | 1.42 |
| Salvador | 240 | 3902.24 | 2 | 48 | 41 | 26.90 | 8.72 | 6.96 | 1.92 | 5.99 | 1.61 |
| Saudi Arabia | 178 | 20803.74 | 18 | 17 | 19 | 39.37 | 13.43 | 6.99 | 2.22 | 5.72 | 1.68 |
| Serbia | 210 | 6284.19 | 11 | 76 | 50 | 20.11 | 1.58 | 7.20 | 1.76 | 6.18 | 1.44 |
| Slovakia | 311 | 17579.26 | 10 | 93 | 47 | 21.55 | 1.95 | 6.68 | 2.16 | 5.49 | 1.52 |
| Switzerland | 344 | 80333.44 | 12 | 178 | 77 | 25.93 | 6.00 | 6.79 | 1.89 | 6.20 | 1.33 |
| Taiwan | 210 | 25080.00 | 2 | 112 | 36 | 19.99 | 1.41 | 6.03 | 2.13 | 4.63 | 1.54 |
| Turkey | 202 | 10499.75 | 6 | 109 | 47 | 31.99 | 11.68 | 6.91 | 1.81 | 5.57 | 1.45 |

**Table 1** (continued)

| Society | Sample size | GDP per capita (US$; raw data) | Historical CH (raw data) | Contemporary CH (raw data) | Male ratio (%) | Age (*Mean*) | Age (SD) | FRS (Mean) | FRS (SD) | Life satisfaction (Mean) | Life satisfaction (SD) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UK | 146 | 39932.06 | 25 | 205 | 66 | 20.71 | 3.04 | 6.59 | 2.17 | 5.40 | 1.65 |
| Ukraine | 210 | 2640.68 | 4 | 30 | 43 | 19.02 | 2.26 | 6.34 | 2.14 | 4.69 | 1.49 |
| USA | 446 | 59927.93 | 83 | 150 | 29 | 21.37 | 5.81 | 6.33 | 2.37 | 5.38 | 1.80 |

*Historical CH* historical cultural heterogeneity, *Contemporary CH* contemporary cultural heterogeneity, *FRS* family relationship satisfaction

### 4.2.2 Societal-Level Variables

**4.2.2.1 Cultural Heterogeneity** The indicator of historical cultural heterogeneity was based on the calculation developed byPutterman and Weil (2010).[1] Using genetic and historical records, they estimated the number of countries of origin for the ancestors of a given society's present-day population since A.D. 1500. A greater number indicates a higher likelihood of encountering outgroups with diverse cultural heritages across the history of a given society (Rychlowska et al., 2015; Wood et al., 2016) (range: 1 for China—83 for the USA).

Following previous work (Rychlowska et al., 2015), we used the number of countries of origin in the present-day population for the year 2017, which is provided by the Department of Economic and Social Affairs of the United Nations (https://www.un.org/en/development/desa/population/migration/data/estimates2/estimates17.asp), as the indicator of contemporary cultural heterogeneity.[2] A greater number indicates a higher likelihood of encountering outgroups of diverse cultural heritages at present (range: 7 for Iran—210 for Chile).

Historical cultural heterogeneity and contemporary cultural heterogeneity among 50 societies in this dataset were moderately correlated, $r = 0.419$, $p = 0.002$.

The statistics indicated that the skewness and kurtosis were acceptable for contemporary cultural heterogeneity (skewness = 0.04, kurtosis = − 1.45), but not for historical cultural heterogeneity (skewness = 2.50, kurtosis = 7.28). However, the results of the final analyses reported below remained similar when we used the log10-transformed values of these variables, which provided acceptable skewness and kurtosis. To simplify the interpretation of results reported in this research, we only reported the results using untransformed data.

**4.2.2.2 Societal-Level Control Variable** To better test the moderating role of historical and contemporary cultural heterogeneity, we entered the GDP per capita of each society as a control variable,[3] as it is found to be highly correlated with well-being (e.g., Diener, Diener, & Diener, 1995). We obtained the GDP per capita in 2017 provided by the World Bank (https://data.worldbank.org/indicator/NY.GDP.PCAP.CD) (range: US$1,467 for Pakistan—US$104,499 for Luxembourg).

The statistics indicated that the skewness and kurtosis were not highly acceptable for GDP per capita (skewness = 1.33, kurtosis = 1.27). However, the results of the final analyses reported below remained similar when we used the log10-transformed values of this variable, which provided acceptable skewness and kurtosis. To simplify the interpretation of results reported in this research, we only reported the results using untransformed data.

To provide an easier interpretation of the results, we divided the value of GDP per capita by 1000, and the value of historical cultural heterogeneity and contemporary cultural heterogeneity by 100 for further analyses.

[1] The value for Iceland was estimated based on the value of Norway, two societies that have shared great similarities in their histories.

[2] The statistics of the present source of migrations for Taiwan were based on the record in January 2017 provided by the Ministry of the Interior National Immigration Agency of Taiwan (https://www.immigration.gov.tw).

[3] The GDP per capita for Taiwan was obtained from the National Statistics of Taiwan (https://eng.stat.gov.tw/point.asp?index=1).

### 4.3 Analytic Plan

Because the participants were nested within their society, multi-level analyses using mixed linear models in SPSS were conducted. The individual-level continuous factors were centered by their group means, and the societal-level continuous factors were centered by the grand mean following the suggestion of Enders and Tofighi (2007). We conducted analyses with and without control variables (i.e., participants' age and gender at the individual level and GDP per capita at the societal level) to evaluate the robustness of the results. We specified the intercepts and individual-level factors (i.e., participants' age, gender, and family relationship satisfaction) as a random effect. We first conducted separate analyses for historical and contemporary cultural heterogeneity. To evaluate the independent moderating role of these two factors, we also conducted an analysis with both historical and contemporary cultural heterogeneity entered in the same model. The dataset and codes for the analyses are available upon request.

## 5 Results

### 5.1 Measurement Invariance

Metric measurement invariance is required for comparing correlations across cultures (van de Vijver & Leung, 1997). We used *R* package [*lavaan*] (Rosseel, 2012) to conduct a multiple-group Confirmatory Factor Analysis (CFA) on the 5-item SWLS to check whether the requirement of metric measurement invariance was satisfied.

Following the recommendation for CFA on many groups (10 + groups) (Jang et al., 2017; Rutkowski & Svetina, 2014), the threshold for evaluating the model fit is set to be RMSEA $\leq$ 0.15 and CFI $\geq$ 0.95. To evaluate the change in the model fit, the cut-off is $\Delta$RMSEA $\leq$ 0.030 and $\Delta$CFI $\leq$ 0.020 for evaluating metric invariance from configural invariance.

In general, the outcome variable restricted with metric invariance showed acceptable model fit (RMSEA = 0.090; CFI = 0.967). More importantly, when we compared $\Delta$RMSEA and $\Delta$CFI between the model with configural invariance and the model with metric invariance, the change was also within the acceptable range ($\Delta$ RMSEA = 0.004; $\Delta$ CFI = 0.016). Thus, the metric invariance of the SWLS held across 50 societies in the present study, as in previous cross-cultural research on satisfaction with life (Jang et al., 2017). This outcome allows us to compare the correlation between family relationship satisfaction and life satisfaction across societies.

### 5.2 Family Relationship Satisfaction and Life Satisfaction Across Societies

Before conducting multi-level analyses, we examined the relation between family relationship satisfaction and life satisfaction, controlling for participants' age and gender in each society. Table 2 presents the summary of the regression analyses. The results showed that the positive relation between family relationship satisfaction and life satisfaction was significant, indicating that a higher level of family relationship satisfaction predicted higher life satisfaction for all societies.

**Table 2** The regression coefficients of family relationship satisfaction in predicting life satisfaction controlling for the effect of age and gender among individuals in each society

| Society | *b* | SE | Beta | Society | *b* | SE | Beta |
|---|---|---|---|---|---|---|---|
| Argentina | 0.22*** | 0.06 | 0.29 | Italy | 0.38*** | 0.04 | 0.48 |
| Australia | 0.41*** | 0.04 | 0.52 | Japan | 0.21*** | 0.05 | 0.29 |
| Austria | 0.31*** | 0.04 | 0.40 | Korea | 0.25*** | 0.05 | 0.33 |
| Brazil | 0.32*** | 0.03 | 0.42 | Lithuania | 0.32*** | 0.05 | 0.38 |
| Bulgaria | 0.17* | 0.08 | 0.19 | Luxembourg | 0.29*** | 0.05 | 0.38 |
| Bhutan | 0.21*** | 0.06 | 0.30 | Malaysia | 0.32*** | 0.06 | 0.38 |
| Canada | 0.37*** | 0.04 | 0.48 | Mexico | 0.43*** | 0.06 | 0.52 |
| Chile | 0.42*** | 0.05 | 0.49 | Netherlands | 0.30*** | 0.05 | 0.41 |
| China | 0.23*** | 0.05 | 0.29 | Nigeria | 0.39*** | 0.06 | 0.52 |
| Colombia | 0.33*** | 0.034 | 0.43 | Norway | 0.41*** | 0.05 | 0.48 |
| Croatia | 0.47*** | 0.05 | 0.60 | Pakistan | 0.25*** | 0.05 | 0.34 |
| Czech Republic | 0.27*** | 0.05 | 0.38 | Poland | 0.27*** | 0.03 | 0.38 |
| Estonia | 0.28*** | 0.04 | 0.42 | Portugal | 0.33*** | 0.04 | 0.44 |
| France | 0.31*** | 0.05 | 0.42 | Romania | 0.38*** | 0.04 | 0.48 |
| Georgia | 0.21*** | 0.05 | 0.28 | Russia | 0.23*** | 0.04 | 0.33 |
| Germany | 0.21** | 0.07 | 0.31 | Salvador | 0.38*** | 0.05 | 0.45 |
| Ghana | 0.29*** | 0.05 | 0.37 | Saudi Arabia | 0.30*** | 0.05 | 0.40 |
| Greece | 0.35*** | 0.03 | 0.44 | Serbia | 0.33*** | 0.05 | 0.40 |
| Guatemala | 0.43*** | 0.06 | 0.52 | Slovakia | 0.30*** | 0.04 | 0.42 |
| Hong Kong | 0.35*** | 0.04 | 0.44 | Switzerland | 0.34*** | 0.03 | 0.49 |
| Hungary | 0.36*** | 0.02 | 0.48 | Taiwan | 0.33*** | 0.05 | 0.47 |
| Iceland | 0.37*** | 0.04 | 0.44 | Turkey | 0.26*** | 0.05 | 0.32 |
| Indonesia | 0.25*** | 0.04 | 0.42 | UK | 0.37*** | 0.06 | 0.48 |
| Iran | 0.44*** | 0.05 | 0.55 | Ukraine | 0.27*** | 0.05 | 0.39 |
| Ireland | 0.35*** | 0.05 | 0.42 | USA | 0.44*** | 0.03 | 0.58 |

*b* refers to unstandardized coefficients, *SE* refers to standard error, and *Beta* refers to standardized coefficients. $^{*}p<.05$; $^{**}p<.01$; $^{***}p<.001$

### 5.3 The Role of Historical and Contemporary Cultural Heterogeneity

We conducted multi-level analyses to examine whether cultural heterogeneity would moderate the relationship between family relationship satisfaction and life satisfaction across societies. Table 3 summarizes the results of multi-level analyses with and without control variables in the analyses. Both analyses yielded similar patterns. We report the effect of the key variables in the models with control variables in the main text.

When we examined the moderating role of historical cultural heterogeneity (Model 2), the main effect of family relationship satisfaction was significant, $b=0.32$, $SE=0.01$, $p<0.001$, 95% Confidence Interval (CI) = [0.31, 0.34], showing that individuals with more satisfying family relationships reported higher life satisfaction. The main effect of historical cultural heterogeneity was not significant, $b=0.37$, $SE=0.52$, $p=0.483$, 95%CI = [−0.68, 1.42]. Importantly, the interaction between historical cultural heterogeneity and family relationship satisfaction was significant, $b=0.17$, $SE=0.05$, $p=0.002$, 95%CI = [0.07, 0.26]. Simple slope analyses showed that the positive relation

**Table 3** The summary of multi-level analyses

| | Moderator: Historical CH | | | | Moderator: Contemporary CH | | | | Moderators: Historical CH and Contemporary CH | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | | Model 6 | |
| | *b* | SE | *b* | SE | *b* | SE | *b* | SE | *b* | SE | *b* | SE |
| *Societal-level factor* | | | | | | | | | | | | |
| GDP per capita | | | .004 | .004 | | | .001 | .004 | | | .001 | .004 |
| Historical CH | .51 | .51 | .37 | .52 | | | | | .01 | .54 | .01 | .55 |
| Contemporary CH | | | | | .29* | .12 | .27 | .14 | .29* | .13 | .27 | .15 |
| *Individual-level factor* | | | | | | | | | | | | |
| Age | | | .01** | .003 | | | .01** | .003 | | | .01** | .003 |
| Gender | | | − .02 | .03 | | | − .02 | .03 | | | − .02 | .03 |
| FRS | .32*** | .01 | .32*** | .01 | .32*** | .01 | .32*** | .01 | .32*** | .01 | .32*** | .01 |
| *Cross-level interaction* | | | | | | | | | | | | |
| Historical CH x FRS | .18** | .05 | .17** | .05 | | | | | .15** | .05 | .15** | .05 |
| Contemporary CH x FRS | | | | | .03* | .01 | .03 | .01 | .01 | .01 | .01 | .01 |

*Historical CH* historical cultural heterogeneity, *Contemporary CH* contemporary cultural heterogeneity, *FRS* family relationship satisfaction. Model 1 and Model 2 tested the moderating effect of historical cultural heterogeneity without and with control variables, respectively. Model 3 and Model 4 tested the moderating effect of contemporary cultural heterogeneity without and with control variables, respectively. Model 5 and Model 6 tested the moderating effect of two indicators of cultural heterogeneity without and with control variables, respectively. The control variables were participants' age and gender at the individual level and GDP per capita at the societal level. *b* refers to unstandardized coefficients, *SE* refers to standard error. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

between family relationship satisfaction and life satisfaction was stronger in societies with greater historical cultural heterogeneity (1*SD* above the mean), $b = 0.35$, $SE = 0.01$, $p < 0.001$, 95%CI = [0.33, 0.37], than in societies with less historical cultural heterogeneity (1*SD* below the mean), $b = 0.30$, $SE = 0.01$, $p < 0.001$, 95%CI = [0.27, 0.32] (see Fig. 1). In other words, family relationship satisfaction was a stronger predictor of life satisfaction for individuals in societies with greater historical cultural heterogeneity.

When we examined the moderating role of contemporary cultural heterogeneity (Model 4), the main effect of family relationship satisfaction was significant, $b = 0.32$, $SE = 0.01$, $p < 0.001$, 95%CI = [0.30, 0.34]. The main effect of contemporary cultural heterogeneity was marginally significant, $b = 0.27$, $SE = 0.14$, $p = 0.055$, 95%CI = [− 0.01, 0.55]. The interaction between contemporary cultural heterogeneity and family relationship satisfaction was also marginally significant, $b = 0.03$, $SE = 0.01$, $p = 0.056$, 95%CI = [− 0.001, 0.06]. Simple slope analyses showed that the positive relation between family relationship satisfaction and life satisfaction was stronger in societies with greater contemporary cultural heterogeneity (1*SD* above the mean), $b = 0.34$, $SE = 0.01$, $p < 0.001$, 95%CI = [0.32, 0.37], than in societies with lower contemporary cultural heterogeneity (1*SD* below the mean), $b = 0.30$, $SE = 0.01$, $p < 0.001$, 95%CI = [0.28, 0.33] (see Fig. 2). In other words, family relationship satisfaction was a stronger predictor of life satisfaction for individuals in societies with greater contemporary cultural heterogeneity.

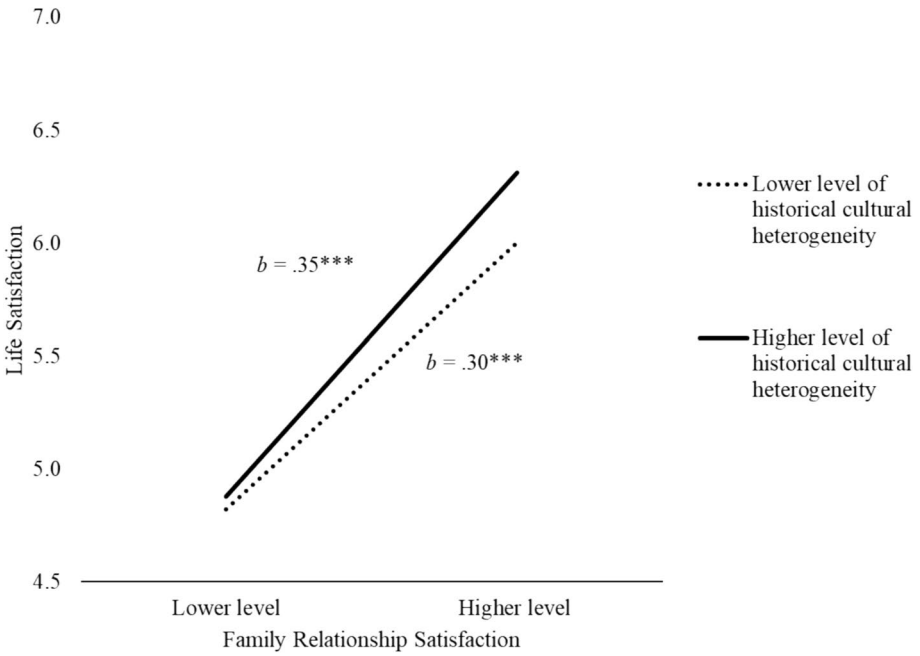


**Fig. 1** An interaction effect of historical cultural heterogeneity and family relationship satisfaction in predicting individuals' life satisfaction. *Note*: The value for lower and higher levels of family relationship satisfaction and historical cultural heterogeneity refers to 1*SD* below and above their mean in the sample. *b* refers to unstandardized coefficients. *** $p < .001$

In light of the moderate correlation between the two indicators of cultural heterogeneity, we included both contemporary cultural heterogeneity and historical cultural heterogeneity in the same model to compare their moderating effects (Model 6). The results showed that the moderating role of historical cultural heterogeneity remained significant, $b = 0.15$, $SE = 0.05$, $p = 0.009$, 95%CI = [0.04, 0.25], while the moderating role of contemporary cultural heterogeneity became non-significant, $b = 0.01$, $SE = 0.01$, $p = 0.393$, 95%CI = [− 0.02, 0.04].[4]

## 6 Discussion

The present study supported the positive association between satisfying family relationships and life satisfaction across individuals in 50 societies. However, with participants' gender and age controlled, the strength of their association varied across societies (as shown in Table 2), with the strongest correlation being found in the United States ($r = 0.44$)

[4] We also controlled for the interaction between family relationship satisfaction and age in the model. The significant interaction between cultural heterogeneity and family relationship satisfaction remained. A significant interaction between age and family relationship was also found, $b = .002$, $p = .050$, revealing a slightly stronger positive effect of family relationship satisfaction among older participants ($b = .34$, $p < .001$) than among younger participants ($b = .31$, $p < .001$).

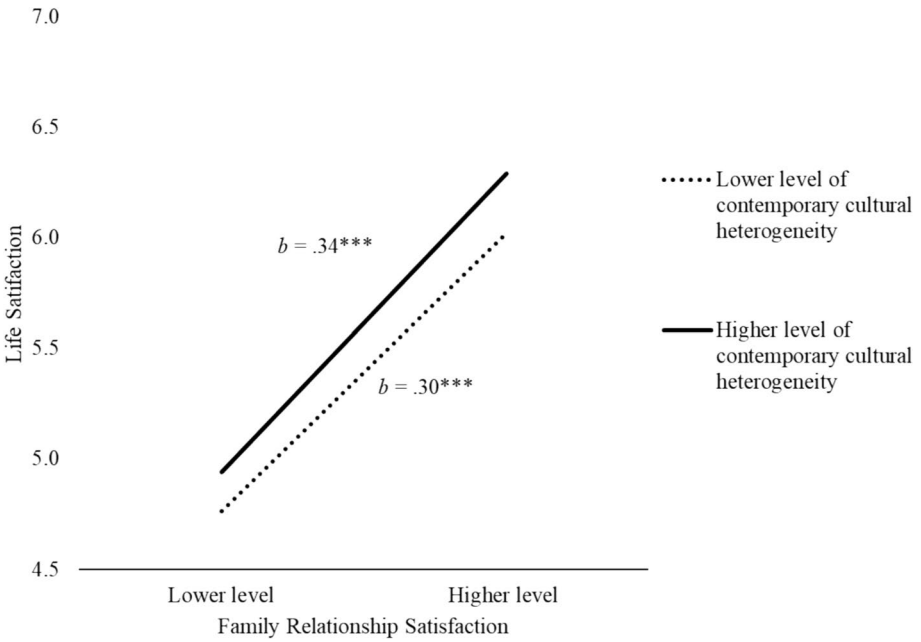


**Fig. 2** An interaction effect of contemporary cultural heterogeneity and family relationship satisfaction in predicting individuals' life satisfaction. *Note*: The value for lower and higher levels of family relationship satisfaction and contemporary cultural heterogeneity refers to 1*SD* below and above their mean in the sample. *b* refers to unstandardized coefficients. *** $p < .001$

and the weakest correlation being found in Bulgaria ($r = 0.17$). Importantly, we obtained evidence for the significant moderating role of cultural heterogeneity, both historical and contemporary, on this relationship. Specifically, the positive relation between family relationship satisfaction and life satisfaction was significantly stronger in societies with greater historical or contemporary cultural heterogeneity. In addition, the moderating role of historical cultural heterogeneity was found to be more robust than that of contemporary cultural heterogeneity.

Results from this study carry broad implications for research on well-being. Although the level of individual well-being is affected by personal characteristics across cultures (for a review, Diener et al., 2003), personality traits cannot fully account for its variation (Steel et al., 2008); relationship factors need to be considered (Clark et al., 2018).

The present study shows that satisfaction with family relationships is crucial for individuals' life satisfaction across societies. Despite their varying magnitudes, the positive association between family relationship satisfaction and life satisfaction was evident across 50 societies with diverse geographical locations, varying levels of socioeconomic development, and diversity in cultural heritage. Not only do these results highlight the importance of secure family relationships on people's well-being (Carnelley & Rowe, 2007, 2010; Feeney, 2007; Mikulincer & Florian, 2001; Mikulincer et al., 2011), but they also provide further support for the pan-cultural importance of family relationships, which are highly valued across different societies (Ko et al., 2020). Additionally, consistent with previous studies (Kagitcibasi, 2013; Love & Holder, 2016), the present study demonstrates the

pan-cultural importance of social relationships, highlighting that the need to belong is a fundamental human motive (Baumeister & Leary, 1995; Tay & Diener, 2011).

The present study also underscores the importance of distal contextual factors, especially historical ones, on individual life satisfaction. Previous work on cultural heterogeneity has mainly focused on its direct effect on contemporary emotional experience (Niedenthal et al., 2018; Wood et al., 2016) and personality traits (Becker et al., 2014; Shrira et al., 2018). Instead of focusing on the direct effect of cultural heterogeneity on the level of life satisfaction across cultures, the present study emphasizes the moderating role of these societal characteristics (Brady et al., 2018). Previous work has demonstrated the moderating effect of contemporary socio-ecological factors, such as the level of economic development (e.g., Hamamura et al., 2017) and the degree of residential mobility (Wang & Li, 2020), on subjective well-being, whereas little work has been done to explore the moderating effect of historical socio-ecological factors. Building on previous work, the present study found that socio-ecological characteristics, especially historical ones, are powerful in shaping the association between family relationship satisfaction and life satisfaction among individuals in 50 societies.

People respond to the pressure imposed by contemporary socio-ecological characteristics (e.g., Hamamura et al., 2017; Wang & Li, 2020). On the other hand, socio-ecological pressure characterizing previous history may result in long-term institutional adaptations, such as in the socialization of children in families (Bond & Lun, 2014), making the effect of historical socio-ecological factors observable nowadays despite changes in the socio-ecological challenges of present times (Fincher et al., 2008; Rychlowska et al., 2015; Talhelm et al., 2014). The findings in this research demonstrate the importance of understanding both historical and contemporary factors in shaping people's psychological functioning (Li et al., 2016; McCloskey, 2010; Welzel, 2013).

When considering the moderating effect of two indicators of cultural heterogeneity simultaneously, the moderating effect of historical cultural heterogeneity remained significant, while the effect of contemporary cultural heterogeneity became non-significant. These results indicate that the moderating effect of historical cultural heterogeneity was more robust; a conclusion also evident in previous work. For instance, Schaller and Murray (2008) observed a stronger association of personality traits with historical (versus contemporary) prevalence of infectious diseases. Similarly, Rychlowska et al. (2015) found that emotional expression tendency was more strongly correlated with historical (versus contemporary) cultural heterogeneity. One possibility for the stronger moderating role of historical cultural heterogeneity is that socio-ecological demands in specific societies might take a longer time to shape the function and effects of family life, even though its importance is universally shared across societies (Bomhoff & Yean, 2013). We need more studies to further evaluate the relative effects of historical versus contemporary socio-ecological factors, not only on life satisfaction but also other psychological phenomena.

## 7 Limitations and Future Directions

Several limitations to this research require further consideration. First, conclusions were based on self-reported and correlational data. We acknowledge that experiments are needed to confirm causality. However, given the nature of historical cultural heterogeneity that makes the experimental approach impossible, we must rely instead on the plausibility of the rationale developed to predict and explain our results (Bond, 2018).

Second, using a single item to indicate participants' family relationship quality has its limitations. Although some studies have shown that single-item measures can perform as well as multiple-item scales (Fisher & To, 2012), some relevant findings have suggested different patterns of cultural variation in various aspects of family relationship quality (e.g., anticipated provision of aid and positive experiences; Lansford et al., 2005). Additionally, we needed to clarify which family relationship (e.g., family of origin, family of procreation, or both) was being assessed in the question asked. Lansford et al. (2005) have shown that the relationships with parents and the relationships with children were associated with different well-being outcomes. Therefore, future studies should validate the present findings by using a multiple-item scale that covers a wider range of characteristics to assess different aspects of relationship quality for different family relationships. Similarly, to further evaluate the present findings, future studies should consider using more objective indicators for well-being, such as quality of life (e.g., material resources).

Third, the cross-cultural samples obtained in the present study were relatively young ($M_{age} = 25.17$). Some studies suggest that the role of family varies at different developmental stages, playing a more important role for older persons (Thomas et al., 2017). Future studies should be conducted with participants across a more diverse age range, allowing for a more holistic understanding of the association among developmental stages, socio-ecological characteristics, family relationships, and culture.

Fourth, the unbalanced gender ratio (60% female participants) might undermine the chance of detecting potential gender effects, which were found in previous work (e.g., Stavrova et al., 2012). Future studies are needed to evaluate the present findings using gender-ratio-balanced cross-cultural samples.

Fifth, we did not include other potential confounds, such as religious tradition (for a review, see Lim & Putnam, 2010), on the effect of cultural heterogeneity on life satisfaction. Future studies need to evaluate the present findings with consideration of the effect of this potential confound.

Finally, we did not explore the underlying mechanism for the moderating role of cultural heterogeneity on the relationship between family relationship satisfaction and life satisfaction. Future studies might examine whether the level of historical cultural heterogeneity can affect the socialization goals in families (Bond & Lun, 2014), which may affect the functions of family relationships on life satisfaction across cultures. Other institutional factors, such as a society's legal and enforcement systems for desired social behaviors, should also be explored (Smith & Bond, 2019).

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**Data Availability** The dataset and codes are available upon request.

## Declarations

**Conflict of interest** No potential conflict of interest was reported by the authors.

**Ethical Approval** The research was approved by the research ethics committee of the Institute of Psychology of the Polish Academy of Science (approval #7/11/2017), as well as the ethics approval in each country of data collection where local regulations require separate ethics approval.

**Informed Consent** All participants provided informed consent before they completed the questionnaires.



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