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Cultural variability in the association between age and well-being: The role of uncertainty avoidance

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Abstract

Past research has found a mixed relationship between age and subjective well-being. The current research advances the understanding of these findings by incorporating a cultural perspective. We tested whether the relationship between age and well-being is moderated by uncertainty avoidance, a cultural dimension dealing with society's tolerance for ambiguity. In Study 1 (N = 64,228), using a multilevel approach with an international database, we found that older age was associated with lower well-being in countries higher in uncertainty avoidance but not in countries lower in uncertainty avoidance. Further, this cultural variation was mediated by a sense of control. In Study 2 (N = 1,025), we compared a culture with low uncertainty avoidance (the United States) with a culture with high uncertainty avoidance (Romania) and found a consistent pattern: Age was negatively associated with well-being in Romania but not in the United States. This cultural difference was mediated by the use of contrasting coping strategies associated with different levels of a sense of control.

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Aging is not lost youth but a new stage of opportunity and strength.

—Betty Friedan (1994), "How to Live Longer, Better, Wiser"

Old age is the age of giving up and humility.

—Ileana Vulpescu (2005), *De-Amor, de-Amar, de Inima Albastra*

Our world is aging. By the next couple of years, elderly people will outnumber young children for the first time in human history. By 2050, nearly 17% of the global population will be elderly (He, Goodkind, & Kowal, 2016). To respond to the changing characteristics of the global population, psychologists need to make an urgent push to understand the aging mind.

Subjective well-being over the life span is a particularly important topic because of its implications for health outcomes and longevity (e.g., Diener & Chan, 2011). However, it remains unclear how aging is associated with subjective well-being. Psychological theorizing about well-being over the life span has historically been inconsistent, and empirical studies have found positive (e.g., Carstensen, Pasupathi, Mayr, & Nesselroade, 2000), negative (e.g., Shmotkin, 1990), flat (e.g., Twenge, Sherman, & Lyubomirsky, 2016), and U-shaped (e.g., Blanchflower & Oswald, 2008) associations between age and various aspects of well-being (e.g., positive affect, life satisfaction).

The present research aimed to advance the understanding of these mixed findings by incorporating a cultural perspective. We propose that mixed findings in the relationship between age and subjective well-being can be attributed, at least in part, to the sociocultural contexts of the samples under investigation. How certain characteristics are associated with subjective well-being varies significantly across cultures (e.g., Suh, Diener, Oishi, & Triandis, 1998); thus, how age is related to well-being is also likely to depend on cultural contexts. Several studies have indeed found cultural differences in the relationship between age and well-being (or factors related to well-being). For example, research found that older Americans experience less negative emotions in unpleasant situations compared with younger Americans, whereas older and younger Japanese do not differ in the amount of negative emotion they experience (Grossmann, Karasawa, Kan, & Kitayama, 2014). Another study found that older Americans show preferential processing for positively valenced stimuli relative to negative or neutral stimuli, but this *positivity effect* does not emerge with age among Chinese participants (Fung et al., 2008). Despite such clear differences, little research has empirically addressed why cultural differences in the association between age and subjective well-being occur.

In the present research, we aimed to answer this question by focusing on the cultural dimension of *uncertainty avoidance*, which is one of Hofstede's six cultural dimensions (along with individualism, power distance, masculinity, long-term orientation, and indulgence; Hofstede, Hofstede, & Minkov, 2010). A cultural dimension is an aspect of a culture that represents how people respond to a basic problem in life, such as dealing with uncertainty or hierarchy (see Hofstede et al., 2010). Hofstede's cultural dimensions have provided an invaluable framework to explain variation in psychological tendencies across societies (Hofstede et al., 2010). "Uncertainty avoidance" refers to how cultures interpret and respond to ambiguous and uncertain situations. In cultures with low uncertainty avoidance, uncertainty is more tolerated, and people easily accept new ideas and change. In these cultures, individuals feel a sense of control over uncertainty in the environment. In contrast, in cultures with high uncertainty avoidance, uncertainty is viewed as threatening, and individuals respond to novelty and change with stress, anxiety, and decreased perceptions of control (Barr & Glynn, 2004; Hofstede et al., 2010). Although the specific socioecological roots of uncertainty

avoidance have not been well identified, other than as having potential historical origins (see Hofstede et al., 2010, for a discussion of this issue), studies have found psychological correlates of uncertainty avoidance. A finding directly relevant to the current research is the discovery of a negative relationship between a country's uncertainty-avoidance score and levels of well-being. For example, Hofstede et al. (2010) found that after accounting for wealth, uncertainty avoidance is the strongest negative predictor of well-being above any other cultural dimension or objective factor and that in countries with high uncertainty avoidance, a higher percentage of the population claim to be unhappy.

We expected that the link between uncertainty avoidance and subjective well-being would be particularly relevant in the context of aging. A large-scale study of stereotypes of the elderly across 26 countries showed that individuals from cultures with higher uncertainty avoidance hold a more negative perception of aging compared with individuals from cultures with lower uncertainty avoidance (Löckenhoff et al., 2009). Such negative stereotypes about old age are often associated with older adults' anxiety about aging (Ramírez & Palacios-Espinosa, 2016). No research to date, however, has directly investigated the role of the cultural value of uncertainty avoidance on aging and well-being.

Old age is associated with many uncertainties, including shrinking incomes, decline in social status, worsening health, and diminished repertoires of daily activities (e.g., Martin, Poon, Kim, & Johnson, 1996). These biological, social, and environmental changes limit the range of predictable outcomes in older individuals (Rodin, 1986), thereby making uncertainty an inherent condition of old age (Ågren, 1998; Baltes & Smith, 2003). In particular, loss of defined or established social function from changes in career (e.g., retirement) and relationships (e.g., loss of loved ones) brings about a great deal of uncertainty in self-identity and life, and coping with these transitions is key to greater well-being in old age (Carter & Cook, 1995; see also George, 1990). Thus, we theorized that how a culture psychologically equips individuals to deal with uncertainties is bound to have implications for well-being in old age.

Previous research on personality and aging also supported our theorized role of uncertainty avoidance in aging and well-being. Studies show that openness to experience, an individual-level factor conceptually similar to uncertainty avoidance (Jost et al., 2007; McCrae & Sutin, 2009; Stephan, 2009), is key to achieving positive outcomes in later life (Gregory, Nettelbeck, & Wilson, 2010). Uncertainty avoidance may operate similarly, as a societal-level factor that shapes the ways in which individuals respond to uncertainty in later life, thereby influencing subjective well-being in older age. Consequently, we expected a more negative association between age and subjective well-being in cultures higher in uncertainty avoidance, relative to cultures lower in uncertainty avoidance.

The present research also investigated how a sense of control, which is closely associated with subjective well-being in old age (Lachman, 2006), might underlie this cultural moderation. Uncertainty avoidance is associated with how much control individuals feel; individuals in cultures with high uncertainty avoidance tend to experience less of a sense of control in uncertain situations compared with individuals in cultures with low uncertainty avoidance (Barr & Glynn, 2004). We therefore expected that the uncertainty associated with old age would particularly decrease older individuals' sense of control in countries higher in uncertainty avoidance and that this would have negative implications for their well-being. In contrast, we expected that uncertainty in old age would not impair older individuals' sense of control in countries lower in uncertainty avoidance, and this would buffer any age-associated decreases in well-being.

The current research consisted of two studies. In Study 1, using a multilevel approach with a large international database, we investigated whether culture-level uncertainty avoidance explains cross-country variation in the association between age and subjective well-being. In the same study, we also examined how uncertainty avoidance moderates the way in which age is related to a sense of control and how this predicts well-being. In Study 2, we explored the relationship between age and well-being in a country low in uncertainty avoidance (the United States) and a country high in uncertainty avoidance (Romania) to conceptually replicate the pattern of results found in Study 1 and to further investigate the mechanism underlying the cultural difference. Sense of control, as a psychological resource, is closely associated with how individuals cope with stress (Holahan & Moos, 1987; Robinson & Lachman, 2017). Thus, we focused on the coping strategies people use in times of stress to advance a mechanistic understanding of our findings.

Study 1: Cross-Country Variation in the Relationship Between Age and Well-Being

Method

The data for our first study was retrieved from Wave 6 (2010–2014) of the World Values Survey (World Values Survey Association, 2016; 60 nations, $N = 90,350$). Because country-level uncertainty avoidance was the key moderator, 16 countries for which an uncertainty-avoidance score was not available were not included in the analyses. One additional country was excluded because of the unavailability of a country-level covariate score (i.e., age-dependency ratio). We also removed participants for whom data were missing on our key or control variables (age, happiness, life satisfaction, sense of control, education, perceived relative income, gender). This list-wise deletion resulted in a final sample of 64,228 participants ($M = 42.49$ years, $SD = 16.48$) from 43 countries.

Participants reported their age in an open-ended format. Subjective well-being was measured by respondents' ratings of happiness ("Taking all things together, would you say you are . . . " 1, *not at all happy*, to 4, *very happy; M* = 3.15, *SD* = 0.75) and life satisfaction ("All things considered, how satisfied are you with your life as a whole these days?" 1, *completely dissatisfied*, to 10, *completely satisfied; M* = 6.94, *SD* = 2.24). Happiness and life-satisfaction scores were standardized and averaged to create a composite measure of subjective well-being, $r(64226) = .463, p < .001.$[1] Sense of control was measured by respondents' ratings of the degree to which they have free choice and control over what happens to them in their lives (from 1, *no choice at all*, to 10, *a great deal of choice; M* = 7.13, *SD* = 2.19).

For country-level cultural dimensions, Hofstede's (Hofstede et al., 2010) six cultural dimensions were used: *individualism* (the extent to which the country prioritizes personal goals over the goals of collectives), *power distance* (the extent to which the country accepts unequally distributed power), *masculinity* (the extent to which the country emphasizes achievement, assertiveness, and material success, particularly for men), *uncertainty avoidance* (the extent to which the members of society feel uncomfortable with uncertainty, change, and ambiguity), *long-term orientation* (the extent to which the society focuses on future-oriented values), and *indulgence* (the extent to which the society allows gratification of natural human needs). Hofstede's index consists of ratings of unidimensional country-level cultural values for given nations. Higher numbers indicate that the respective cultural values are more strongly emphasized.

The index for uncertainty avoidance, most relevant to the current research, is based on scores from three questions (see Hofstede et al., 2010, for sources of data and more detailed information). These questions ask about work-related stress ("How often do you feel nervous or tense at work?" 1, *always*, to 5, *never; reverse coded*), perceptions of rules ("Company rules should not be broken even

when the employee thinks it is in the company's best interest"; 1, *strongly agree*, to 5, *strongly disagree*; reverse coded), and intention to stay at one job or company for the long term ("How long do you think you will continue working for this company/organization?" 1, *from two to five years*, to 5, *until I retire*). Country-level scores on the three items above were used to generate the uncertainty-avoidance index; higher scores indicate greater country-level uncertainty avoidance (for information about how other Hofstede cultural dimensions are measured, see Hofstede et al., 2010).

We also included a number of individual- and country-level factors as covariates (see Table 1) for the robust testing of the hypothesized role of uncertainty avoidance. Education level (1, *no formal education*, to 7, *university-level education with degree; M* = 4.58, *SD* = 1.65; the median education level was *complete secondary school*), perceived relative income (1, *lowest group in your country*, to 10, *highest group in your country; M* = 4.85, *SD* = 2.13), and gender (31,383 males and 32,845 females) were used as covariates at the individual level. In addition, we included country-level covariates that are associated with general well-being (gross domestic product, or GDP, per capita, political stability, and homicide rate) and aging (elderly dependency ratio and life expectancy at birth).[2] GDP data were obtained from *The World Factbook* (Central Intelligence Agency, 2018). Political stability and elderly dependency data were obtained from The World Bank (2018). The homicide rate was obtained from the *Global Study on Homicide* (United Nations Office on Drugs and Crimes, 2013). Life expectancy at birth was obtained from *World Health Statistics 2014* (World Health Organization, 2014). We used the data for country-level covariates from years overlapping with, or within 5 years of, World Values Survey data collection.

Table 1. Overview of the Variables in Study 1 and Their Functions in the Model Tested

| Level and variable	Function
Individual level	
Age	Predictor
Sense of control	Mediator
Subjective well-being	Outcome
Education	Covariate
Perceived relative income	Covariate
Gender	Covariate
Country level	
Uncertainty avoidance	Moderator
Gross domestic product per capita	Covariate
Political stability	Covariate
Elderly dependency ratio	Covariate
Homicide rate	Covariate
Life expectancy at birth	Covariate

Results

First, we examined correlates of uncertainty avoidance by looking at the zero-order correlations between uncertainty avoidance and other key variables at the country level (i.e., correlations between uncertainty avoidance and national averages of age and subjective well-being). There were no significant correlations between uncertainty avoidance and the averages of age, $r(41) = .015$, $p = .925$, and subjective well-being, $r(41) = -.187$, $p = .230$. We also examined correlations between uncertainty avoidance and country-level covariates. Uncertainty avoidance was significantly correlated with GDP per capita, $r(41) = -.329$, $p = .031$, suggesting that uncertainty avoidance is

endorsed more strongly in less economically developed countries. There were no significant correlations between uncertainty avoidance and the other country-level covariates.

Next, we examined cross-country variation in the zero-order correlations between age and subjective well-being. The correlation between age and subjective well-being in each country was compared across countries, and there was considerable variation (rs = −.288 to .131). (Table S1 in the Supplemental Material available online lists the means and standard deviations for age and subjective well-being and their correlations by country.) To explore the role of uncertainty avoidance, we first regressed the correlations between age and subjective well-being on uncertainty avoidance at the country level. As countries' uncertainty-avoidance scores increased, stronger negative relationships between age and well-being emerged, $\beta = -0.578$, $b = -0.003$, $SE = 0.001$, $t(41) = -4.536$, $p < .001$, 95% confidence interval (CI) for $b = [-0.004, -0.001]$ (see Fig. 1). We also tested the independent effect of uncertainty avoidance above and beyond Hofstede's other cultural dimensions (individualism, power distance, masculinity, long-term orientation, and indulgence). Uncertainty avoidance was the only significant predictor of the correlation between age and subjective well-being after the other cultural dimensions were included in the model, $\beta = -0.527$, $b = -0.002$, $SE = 0.001$, $t(34) = -4.416$, $p < .001$, 95% CI for $b = [-0.003, -0.001]$.[3]

Fig. 1. Scatterplot (with best-fitting regression line) showing the association between uncertainty avoidance and within-country correlations between age and subjective well-being in Study 1. Hofstede's uncertainty-avoidance score (ranging from 0–100) is reported on the x-axis.
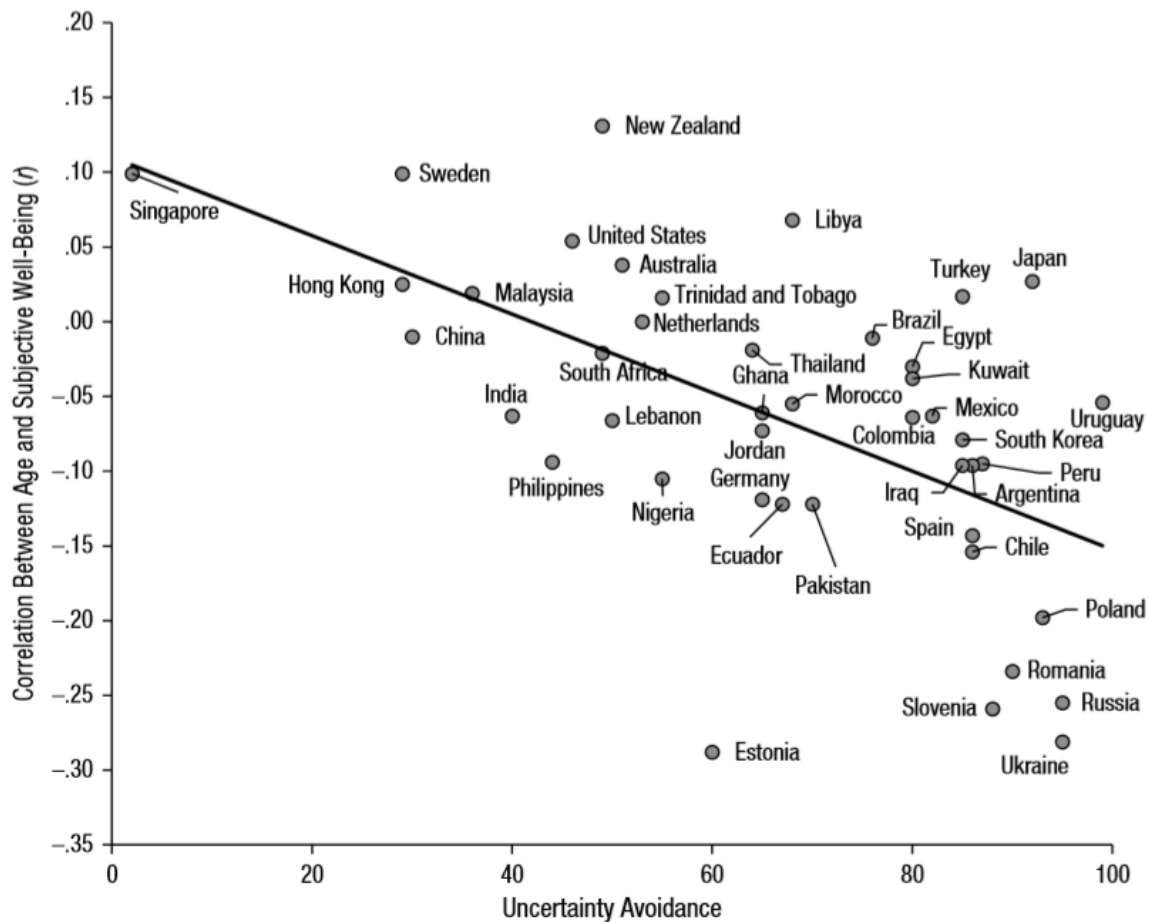
We then used multilevel modeling to formally examine whether uncertainty avoidance explained the cross-country variation in the association between age and subjective well-being, given that the data were hierarchical, with individuals nested within countries. The intraclass correlation coefficient was .138, indicating that 13.8% of the variance in subjective well-being was explained by the countries in which the respondents resided. In the following analyses, we used standardized scores for both individual-level and country-level variables except for gender (dummy coded; $0 =$ male, $1 =$ female). Age and continuous covariates (i.e., education and perceived relative income) were standardized using the mean and standard deviation of each country ($0 =$ the country mean of the respective variable, $1 = 1$ SD above the mean in each country). Sense of control, the mediator, was standardized using the grand mean and standard deviation across all the participants ($0 =$ the grand mean of sense of control, $1 = 1$ SD above the grand mean). Country-level variables were standardized using the mean and standard deviation across country-level scores ($0 =$ the mean of the respective variable across countries, $1 = 1$ SD above the mean across countries). We used Stata Version 14 (StataCorp, 2015) for the analyses.

We first examined whether uncertainty avoidance moderated the slope of age predicting subjective well-being by testing the cross-level interaction between age (individual level) and uncertainty avoidance (country level) on subjective well-being without covariates (Model 1). The slope between age and subjective well-being was allowed to vary across countries (this was the case in the subsequent models as well). As expected, as uncertainty avoidance increased, the relationship between age and subjective well-being became more negative, $\beta = -0.051$, $b = -0.043$, $SE = 0.010$, $z = -4.19$, $p < .001$, 95% CI for $b = [-0.063, -0.023]$.

In Model 2, all of our control variables at the individual level (i.e., perceived relative income, education, and gender) and country level (i.e., GDP per capita, political stability, elderly dependency ratio, homicide rate, and life expectancy at birth) were included. The main finding remained consistent: The increase in uncertainty avoidance was associated with more negative relationships between age and subjective well-being, $\beta = -0.043$, $b = -0.037$, $SE = 0.010$, $z = -3.78$, $p < .001$, 95% CI for $b = [-0.056, -0.018]$. Figure 2 presents the cross-level interaction between age and uncertainty avoidance. There was no significant association between age and subjective well-being in countries lower in uncertainty avoidance (1 SD below the mean), $\beta = 0.017$, $b = 0.015$, $SE = 0.014$, $z = 1.09$, $p = .276$, 95% CI for $b = [-0.012, 0.042]$. In contrast, age was negatively associated with subjective well-being in countries higher in uncertainty avoidance (1 SD above the mean), $\beta = -0.068$, $b = -0.059$, $SE = 0.014$, $z = -4.25$, $p < .001$, 95% CI for $b = [-0.085, -0.032]$.

We hypothesized that sense of control mediates the moderation effect of uncertainty avoidance on the association between age and subjective well-being—that is, the interaction between age and uncertainty avoidance would predict subjective well-being via its effect on sense of control. We examined the potential role of sense of control as a mediator through multiple steps. As a first step, we tested whether uncertainty avoidance moderated the ways in which age is associated with sense of control. The same model (Model 2) was run with sense of control as the outcome variable. We found a significant negative cross-level interaction between age and uncertainty avoidance on sense of control, $\beta = -0.021$, $b = -0.046$, $SE = 0.019$, $z = -2.47$, $p = .013$, 95% CI for $b = [-0.083, -0.010]$. Age was positively associated with sense of control in countries lower in uncertainty avoidance (1 SD below the mean), $\beta = 0.033$, $b = 0.073$, $SE = 0.026$, $z = 2.76$, $p = .006$, 95% CI for $b = [0.021, 0.125]$. By contrast, there was no association between age and sense of control in countries higher in uncertainty avoidance (1 SD above the mean), $\beta = -0.009$, $b = -0.020$, $SE = 0.027$, $z = -0.74$, $p = .460$, 95% CI for $b = [-0.072, 0.033]$. That is, the overall relationship between age and sense of control was not as negative as expected (i.e., the relationship was more positive than neutral in cultures with low uncertainty avoidance and neutral rather than negative in cultures with high

uncertainty avoidance), but the expected moderation of uncertainty avoidance was found (i.e., the association between age and sense of control was more negative in cultures with high uncertainty avoidance than in cultures with low uncertainty avoidance).

Fig. 2. Mean subjective well-being as a function of age and country-level uncertainty avoidance in Study 1. Age was standardized, and subjective well-being was operationalized by calculating the average of standardized happiness and life satisfaction. Error bars indicate 95% confidence intervals.
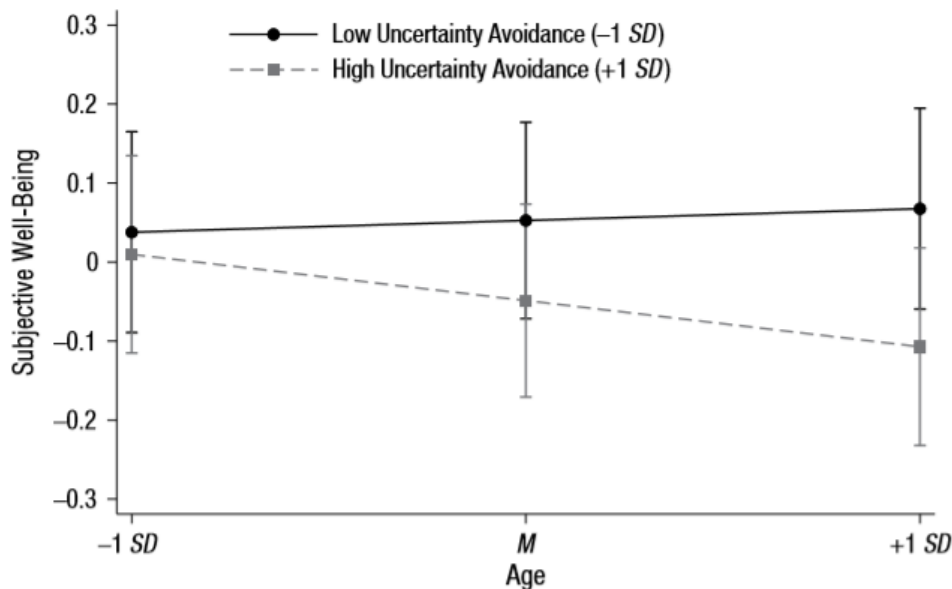

Next, we ran another model (Model 3) in which sense of control was added to Model 2 as an additional predictor to examine the mediating role of sense of control. Including sense of control significantly improved the model (compared with Model 2, without sense of control), $\chi^2(1) = 6{,}073.22$, $p < .001$, and higher sense of control was associated with greater subjective well-being, $\beta = 0.285$, $b = 0.244$, $SE = 0.003$, $z = 79.82$, $p < .001$, 95% CI for $b = [0.238, 0.250]$. After accounting for sense of control, we found that the coefficient for the interaction between age and uncertainty avoidance decreased (Model 2: $\beta = -0.043$, $b = -0.037$, $SE = 0.010$, $z = -3.78$, $p < .001$, 95% CI for $b = [-0.056, -0.018]$; Model 3: $\beta = -0.037$, $b = -0.031$, $SE = 0.009$, $z = -3.63$, $p < .001$, 95% CI for $b = [-0.048, -0.014]$). This result suggests that sense of control partially mediated the Age × Uncertainty Avoidance interaction on subjective well-being. Comprehensive results across the models described above are available in Table S2 in the Supplemental Material.

Last, we ran a path analysis to confirm the mediation model in which the interaction between age and uncertainty avoidance predicted subjective well-being via sense of control. We included perceived relative income, education, and gender as control variables at the individual level and GDP per capita, political stability, elderly dependency ratio, homicide rate, and life expectancy at birth as control variables at the country level. Standard errors were adjusted for the clustering of participants within countries. Consistent with the results above, results showed that the Age × Uncertainty Avoidance interaction significantly predicted sense of control, $\beta = -0.026$, $b = -0.026$, $SE = 0.009$, $z = -2.94$, $p = .003$, 95% CI for $b = [-0.043, -0.009]$, which, in turn, predicted subjective well-being, $\beta = 0.318$, $b = 0.272$, $SE = 0.018$, $z = 15.34$, $p < .001$, 95% CI for $b = [0.237, 0.307]$. The indirect path from the Age × Uncertainty Avoidance interaction to subjective well-being through sense of control was significant, $\beta = -0.008$, $b = -0.007$, $SE = 0.002$, $z = -2.92$, $p = .004$, 95% CI for $b = [-0.023, -0.006]$. The direct path between the Age × Uncertainty Avoidance interaction and subjective well-being was also still significant, $\beta = -0.030$, $b = -0.026$, $SE = 0.008$, $z = -3.16$, $p =$

.002, 95% CI for b = [−0.042, −0.010]. Thus, sense of control partially mediated the link between the Age × Uncertainty Avoidance interaction and subjective well-being (see Fig. 3). The results were consistent regardless of whether control variables were included.

Fig. 3. Path model examining whether the effects of age, uncertainty avoidance, and their interaction on subjective well-being were mediated by sense of control in Study 1. The values shown are unstandardized coefficients; black lines represent significant paths (*p < .05, **p < .01), and gray lines represent nonsignificant paths. The paths from covariates to subjective well-being are omitted for visual simplicity.
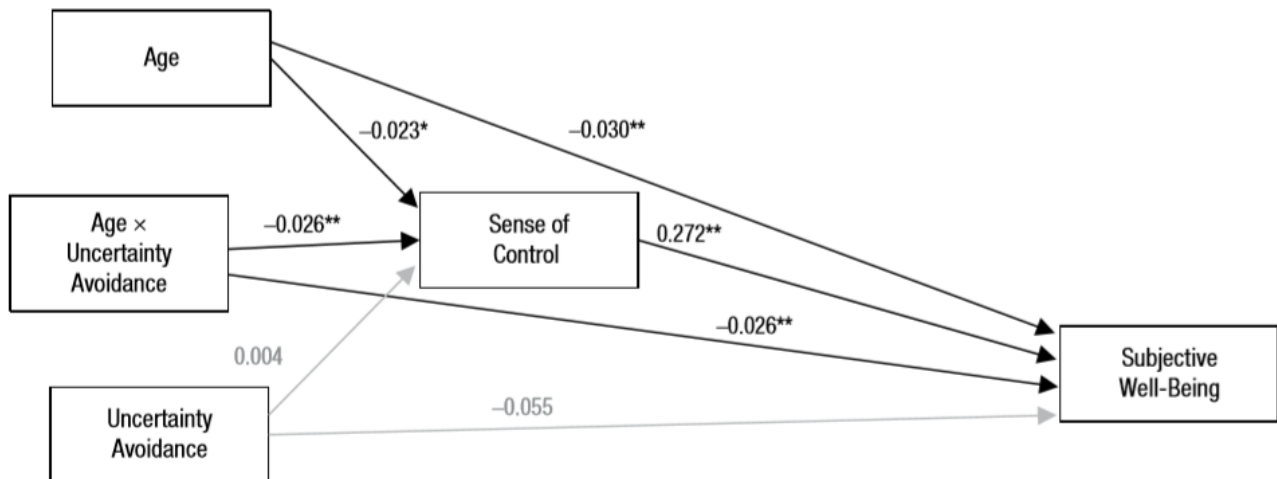
Discussion

Study 1 confirmed the hypothesized role of uncertainty avoidance in explaining the cultural variation in the association between age and subjective well-being. More negative associations between age and well-being were observed in countries with higher uncertainty avoidance. We further found that in countries with high uncertainty avoidance, there was no significant association between age and sense of control. In contrast, older individuals reported higher control over their lives than younger individuals in countries lower in uncertainty avoidance. This positive association between age and control in countries with lower uncertainty avoidance was not expected, but it is consistent with the idea that individuals accumulate mastery experiences with age that support a sense of control (Rodin, Timko, & Harris, 1985). The present finding suggests that accumulation of experiences may not translate into a sense of control in cultures where willingness to embrace uncertainty is low. Taken together, the obtained moderation pattern suggests that older, relative to younger, adults in cultures with lower uncertainty avoidance experience a stronger sense of control, which may be a factor behind their sustained levels of well-being. Older adults in cultures with higher uncertainty avoidance, however, do not seem to have this psychological resource and thus show the negative associations between age and well-being.

Study 2: Focused Cultural-Group Comparison (Romania vs. United States)

In Study 2, we sampled two cultural groups that differ considerably in uncertainty avoidance: Romania (uncertainty-avoidance score of 90; 6th highest-scoring country out of 104) versus the United States (uncertainty-avoidance score of 46; 8th lowest-scoring country out of 104).[4] Because we found that sense of control was a key mediator in Study 1, we investigated stress-coping strategies to further discern why the relationship between age and well-being differs in cultures high

and low in uncertainty avoidance. Sense of control is closely related to the coping strategies individuals use in times of stress (Robinson & Lachman, 2017); higher control is associated with active management of problems and one's state of mind, whereas lower control is associated with avoiding problems and eschewing stressors (e.g., Ben-Zur, 2002). Coping strategies associated with high and low sense of control, in turn, have implications for well-being, and high-control coping tends to have better outcomes for the individual (Aspinwall & Taylor, 1992; Holahan & Moos, 1987). We therefore investigated how age is related to coping strategies in our two cultures and how these patterns predict well-being.

Study 1 showed that age was associated with a greater sense of control in countries lower in uncertainty avoidance, whereas there was no association between age and sense of control in countries higher in uncertainty avoidance. We predicted, on the basis of this finding, that people's coping strategies would be consistent with cultural differences in people's sense of control. With older age, Americans (who live in a culture low in uncertainty avoidance) would be more likely to engage in coping strategies associated with high control and less likely to engage in coping strategies associated with low control. By contrast, we predicted that Romanians (who live in a culture high in uncertainty avoidance) would not show such changes in coping across age. We also tested whether these culturally divergent age-related coping strategies explained the difference in the association between age and subjective well-being between the two cultures.

Method

Participants were 382 Americans (73.0% female; age: mean = 34.81 years, *SD* = 16.40) and 643 Romanians (76.3% female; age: mean = 39.16 years, *SD* = 19.22). We sought a minimum of 350 participants from each cultural group. This target sample size was determined to detect the key interaction between age (low vs. high) and culture (United States vs. Romania) on subjective well-being at a .05 significance level with 90% power, even if the effect size was small (η_p^2 = .015).

Young participants were undergraduates from three large universities, one in the United States and two in Romania. They received course credit for participating in the study. Middle-aged and older participants were recruited in a variety of community settings (parks, cafés, libraries, gyms, retirement homes, etc.) in both countries. Older participants in Romania were also recruited in a class setting by students not involved in the study, who asked their parents or grandparents to volunteer. The oversampling in Romania occurred because of unexpectedly high return rates on these surveys during a short period when the survey was open. Older American participants were given $10 for their participation; older Romanian participants were all volunteers.

Participants completed the study in their native language. The survey was initially developed in English and translated into Romanian by the third and fourth authors, who are fluent in both languages. The survey was then back-translated into English by the first author, who is also fluent in both languages. Any discrepancies were resolved by discussions between the first and third author.

Subjective well-being was measured using the Satisfaction With Life Scale (five items; e.g., "In most ways my life is close to my ideal," "I am satisfied with my life"; Diener, Emmons, Larsen, & Griffin, 1985). The rating scale ranged from 1, *strongly disagree*, to 7, *strongly agree*, with higher scores indicating higher life satisfaction (*M* = 4.67, *SD* = 1.33; α = .85 for Romanians, α = .90 for Americans).

The Brief COPE scale (Carver, 1997) was used to measure strategies for coping with stress. Participants reported how frequently they used each of 14 different strategies (2 items for each

strategy; 28 items in total) to cope with stress in their lives (from 1, *not at all*, to 5, *very much*). (Tables S6 and S7 in the Supplemental Material present descriptive statistics and cultural differences in the full list of coping strategies.) Given our theoretical interest, we extracted two factors through a series of principal component analyses. The first factor captured coping strategies associated with a higher sense of control, consisting of strategies actively changing the actual or perceived situations to address the stressors. These included active behavioral strategies ("I concentrate my efforts on doing something about the situation I'm in" and "I take action to try to make the situation better"; $r = .49$ for Romanians, $r = .58$ for Americans, both $ps < .001$) and cognitive strategies ("I try to see it in a different light, to make it seem more positive" and "I look for something good in what is happening"; $r = .49$ for Romanians, $r = .63$ for Americans, both $ps < .001$) to cope with stressors. We refer to this factor as *high-control coping*. The second factor captured coping strategies associated with a lower sense of control, consisting of strategies for avoiding and disengaging oneself from problems. This factor included denial ("I refuse to believe that it has happened" and "I say to myself this isn't real"; $r = .70$ for Romanians, $r = .63$ for Americans, both $ps < .001$), behavioral disengagement ("I give up trying to deal with it" and "I give up the attempt to cope"; $r = .40$ for Romanians, $r = .62$ for Americans, both $ps < .001$), self-blame ("I blame myself for things that happened" and "I criticize myself"; $r = .62$ for Romanians, $r = .70$ for Americans, both $ps < .001$), and venting ("I express my negative feelings" and "I say things to let my unpleasant feelings escape"; $r = .33$ for Romanians, $r = .36$ for Americans, both $ps < .001$). We refer to this factor as *low-control coping*. The scores for high-control coping and low-control coping were calculated by averaging the scores of coping strategies under their respective category (high-control coping: $M = 3.92$, $SD = 0.63$, $r = .41$ for Romanians, $r = .40$ for Americans, both $ps < .001$; low-control coping: $M = 2.35$, $SD = 0.67$, $\alpha = .61$ for Romanians, $\alpha = .70$ for Americans). See Tables S8 and S9 for detailed results of the principal component analyses.

Results

Descriptive statistics for key variables and the mean-level differences between Romanian and American participants are presented in Table S10 in the Supplemental Material. Also see Table S11 in the Supplemental Material for the zero-order correlations between the key variables in each cultural group.

We examined whether there was a significant cultural difference in the association between age and subjective well-being by running a multiple regression with subjective well-being as the outcome variable and age (mean centered), culture, and their interaction term as the predictor variables. There was a significant interaction between age and culture,[5] $\beta = 0.164$, $b = 0.012$, $SE = 0.005$, $t(1021) = 2.619$, $p = .009$, 95% CI for $b = [0.003, 0.022]$. Age was significantly negatively associated with well-being among Romanians, $\beta = -0.117$, $b = -0.009$, $SE = 0.003$, $t(1021) = -2.77$, $p = .006$, 95% CI for $b = [-0.015, -0.003]$. In contrast, there was no association between age and well-being among Americans, $\beta = 0.048$, $b = 0.004$, $SE = 0.004$, $t(1021) = 1.02$, $p = .306$, 95% CI for $b = [-0.003, 0.011]$. Viewed differently, a significant cultural difference in well-being was observed only among older participants (1 *SD* above the mean age): Older Americans reported significantly higher well-being than older Romanians, $\beta = 0.405$, $b = 0.538$, $SE = 0.117$, $t(1021) = 4.60$, $p < .001$, 95% CI for $b = [0.308, 0.767]$. In contrast, there was no difference in subjective well-being between younger Romanian participants and younger American participants (1 *SD* below the mean age), $\beta = 0.077$, $b = 0.102$, $SE = 0.122$, $t(1021) = 0.83$, $p = .404$, 95% CI for $b = [-0.138, 0.341]$ (see Fig. 4). Overall, we found a pattern of Age × Culture interaction on subjective well-being, consistent with our findings in Study 1.

Fig. 4. Mean subjective well-being as a function of age and culture in Study 2. Age was mean centered, and subjective well-being was operationalized by calculating life-satisfaction scores (ranging from 1 to 7). Error bars indicate 95% confidence intervals.
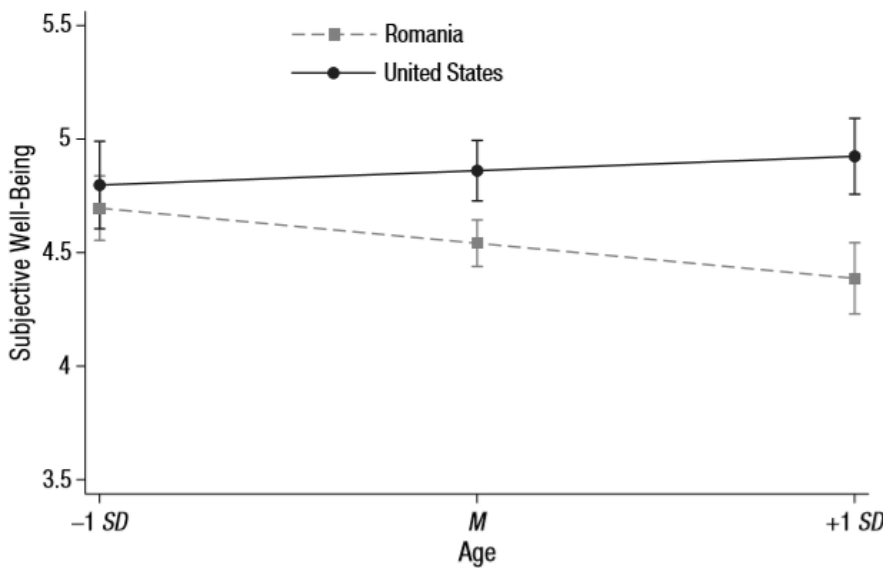

In Study 2, we hypothesized that coping strategies would explain the cultural differences in the association between age and subjective well-being. To test this idea, we first examined cultural differences in how age was associated with coping strategies in a path model. First, we ran a multiple regression with high-control coping as the outcome variable and age (mean centered), culture, and their interaction term as the predictor variables. There was a significant interaction between age and culture as a predictor of high-control coping, $\beta = 0.174$, $b = 0.006$, $SE = 0.002$, $t(1021) = 2.77$, $p = .006$, 95% CI for $b = [0.002, 0.011]$. Older age was associated with more high-control coping among Americans, $\beta = 0.154$, $b = 0.006$, $SE = 0.002$, $t(1021) = 3.30$, $p = .001$, 95% CI for $b = [0.002, 0.009]$, whereas there was no significant relationship between age and high-control coping among Romanians, $\beta = -0.020$, $b = -0.001$, $SE = 0.002$, $t(1021) = -0.47$, $p = .635$, 95% CI for $b = [-0.004, 0.002]$. Viewed differently, among older participants (1 SD above the mean age), Americans reported a significantly greater degree of high-control coping than Romanians did, $\beta = 0.194$, $b = 0.123$, $SE = 0.056$, $t(1021) = 2.20$, $p = .028$, 95% CI for $b = [0.013, 0.232]$. Among younger participants (1 SD below the mean age), there was no significant cultural difference in high-control coping, $\beta = -0.154$, $b = -0.097$, $SE = 0.058$, $t(1021) = -1.67$, $p = .095$, 95% CI for $b = [-0.212, 0.017]$.

We also ran a multiple regression with low-control coping as the outcome variable and age (mean centered), culture, and their interaction term as the predictor variables. There was a significant interaction between age and culture on low-control coping, $\beta = -0.261$, $b = -0.010$, $SE = 0.002$, $t(1021) = -4.21$, $p < .001$, 95% CI for $b = [-0.015, -0.005]$. Older age was associated with less low-control coping among Americans, $\beta = -0.184$, $b = -0.007$, $SE = 0.002$, $t(1021) = -3.99$, $p < .001$, 95% CI for $b = [-0.011, -0.004]$. In contrast, there was no significant association between age and low-control coping among Romanians, $\beta = 0.077$, $b = 0.003$, $SE = 0.002$, $t(1021) = 1.86$, $p = .063$, 95% CI for $b = [-0.0002, 0.006]$. Viewed differently, among older participants (1 SD above the mean age), Romanians reported a significantly higher degree of low-control coping than Americans did, $\beta = -0.573$, $b = -0.386$, $SE = 0.059$, $t(1021) = -6.59$, $p < .001$, 95% CI for $b = [-0.500, -0.271]$. In contrast, among younger participants (1 SD below the mean age), there was no cultural difference in low-control coping, $\beta = -0.052$, $b = -0.035$, $SE = 0.061$, $t(1021) = -0.57$, $p = .570$, 95% CI for $b = [-0.155, 0.085]$.

In short, there were no significant cultural differences in coping strategies in younger age groups, and the noticeable cultural differences emerged among an older group. As age increased, American participants reported using more high-control coping and less low-control coping. In contrast, Romanian participants' coping strategies did not differ as a function of age.

Next, we examined whether the cultural difference in the relationship between age and well-being could be explained by cultural differences in the use of coping strategies with age. A path analysis (see Fig. 5) revealed that, consistent with the results above, the interaction between age and culture predicted high-control coping, $\beta = 0.174$, $b = 0.006$, $SE = 0.002$, $p = .006$, 95% CI for b [0.002, 0.011], and low-control coping, $\beta = -0.261$, $b = -0.010$, $SE = 0.002$, $p < .001$, 95% CI for $b = [-0.015, -0.005]$. High-control and low-control coping, in turn, significantly predicted subjective well-being. High-control coping was positively associated with well-being, whereas low-control coping was negatively associated with well-being[6] (high-control coping: $\beta = 0.211$, $b = 0.443$, $SE = 0.062$, $p < .001$, 95% CI for $b = [0.322, 0.565]$; low-control coping: $\beta = -0.241$, $b = -0.475$, $SE = 0.059$, $p < .001$, 95% CI for $b = [-0.591, -0.359]$).

Fig. 5. Path model examining whether the effects of age, culture, and their interaction on subjective well-being were mediated by high- and low-control coping in Study 2. The values shown are unstandardized coefficients; black lines represent significant paths (*$p < .05$, **$p < .01$), and gray lines represent nonsignificant paths, Culture was dummy coded (Romania = 0, United States = 1).
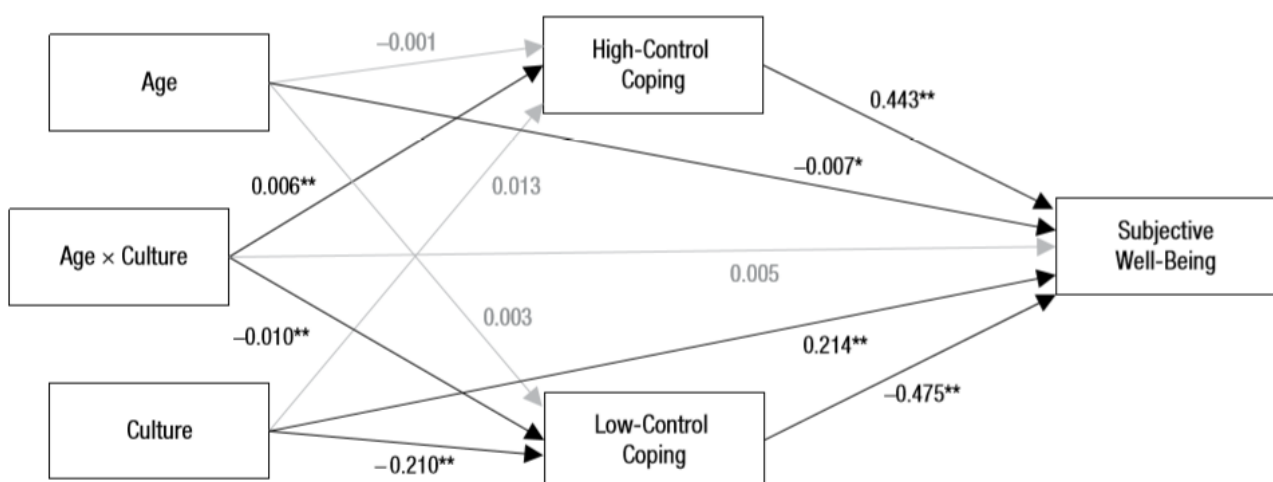
The indirect effect of the Age × Culture interaction on subjective well-being via high-control coping was significant, $\beta = 0.037$, $b = 0.003$, $SE = 0.001$, $p = .010$, 95% CI for $b = [0.001, 0.005]$, as was the indirect effect of Age × Culture on subjective well-being via low-control coping, $\beta = 0.063$, $b = 0.005$, $SE = 0.001$, $p < .001$, 95% CI for $b = [0.002, 0.007]$. In this path model, the direct effect of the Age × Culture interaction on well-being was not significant, $\beta = 0.065$, $b = 0.005$, $SE = 0.005$, $p = .279$, 95% CI for $b = [-0.004, 0.014]$. Thus, coping strategies fully mediated the link between the Age × Culture interaction and subjective well-being. In summary, older age was associated with more high-control coping but less low-control coping in the United States, but there was no significant age-related variation in coping strategies in Romania, which explained the cultural difference in the association between age and subjective well-being.

There were no significant changes in key findings in Study 2 when we controlled for gender, education, and subjective social class.[7] Specific results, including the control variables, are reported in the Supplemental Material.

Discussion

Study 2 provided converging evidence of cultural differences in the relationship between age and subjective well-being. Age was negatively associated with subjective well-being only in Romania, a culture high in uncertainty avoidance. This cultural difference was explained by the differences in coping strategies for stress used by older individuals in the United States and Romania. Consistent with the greater sense of control with older age in cultures lower in uncertainty avoidance (Study 1), results showed that Americans used more high-control coping and less low-control coping with older age, but Romanians did not show such changes. The tendency among older Americans to address stressful situations actively may prevent the decreasing trajectory of subjective well-being among older adults which was markedly observed among Romanians.

General Discussion

The current research is an important step in making sense of previous mixed findings in the relationship between age and well-being. We identified, for the first time, uncertainty avoidance as a key cultural dimension that moderates the implications of age for subjective well-being. Our findings suggest that a universal pathway for the progression of subjective well-being over the life span may not exist and that psychological aging occurs in a cultural and historical context. Our research also contributes to the field of cross-cultural and cultural psychology more broadly. Research studying the effects of culture on psychological functioning has mainly focused on the roles of individualism versus collectivism. In the present research, we turned our attention to an understudied cultural dimension, uncertainty avoidance, and provided evidence that uncertainty avoidance shapes individual psychology in a significant way. How uncertainty avoidance is associated with psychological tendencies is an important but less-examined area that will advance the understanding of the interrelation between culture and psychology.

We note some limitations in the current research. Our data were cross-sectional, so we could not distinguish clearly among aging, period, and cohort effects. However, the inclusion of data from a multitude of countries with various historical backgrounds increases the likelihood that the present findings were driven by aging. Caution should also be exercised in interpretations of causal directions and identified mechanisms on the basis of cross-sectional correlations (see Maxwell, Cole, & Mitchell, 2011). Further research is needed to confirm the model in the current research by employing experimental and longitudinal approaches. Moreover, Romania and the United States in Study 2 differ not only in uncertainty avoidance but also in other cultural dimensions and objective indices; thus, Study 2 alone cannot attest to the role of uncertainty avoidance. However, the two studies taken together complement each other and make up for their respective limitations, and the fact that both studies present highly consistent results increases confidence in uncertainty avoidance as a key factor, although extensive future research is needed for a full understanding.

The present studies also have significant practical implications. For people in cultures with high uncertainty avoidance to experience prolonged well-being into later years of life, efforts to help them cope with the uncertainties associated with aging may be especially important. Specifically, providing more structure and opportunities with defined roles (e.g., volunteering roles, advisory roles, club memberships) may help reduce age-related stress and anxiety and promote well-being into later years (Moen, Dempster-McClain, & Williams, 1992). In doing so, age-related social policies can play an important role (see Bugental & Hehman, 2007; Foster & Walker, 2014). On the basis of

the models presented in the present research, future work should directly identify ways to enhance well-being into old age in high uncertainty-avoidance cultures.

Conclusion

Responding to the changing makeup of the global population structure will be one of humanity's biggest challenges in the years to come. People living longer does not necessarily mean that they are living healthier and more satisfying lives. Identifying the factors related to the association between age and well-being offers insight into how to maintain well-being throughout longer life spans. The present research highlights the importance of considering aging as not only a biological process but also a psychological experience situated in a cultural system.

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Notes

1. The key patterns and significance of moderating effects of uncertainty avoidance on the relationship between age and subjective well-being were consistent regardless of the outcome used (happiness, life satisfaction, or a composite of the two). The results, separated by happiness and life satisfaction, are available in Tables S3 and S4, respectively, in the Supplemental Material available online.

2. We also conducted the analysis with the Gini index—a measure of country-level income inequality—as a covariate. This resulted in the exclusion of an additional five countries. See the Supplemental Material for this analysis.

3. Given that our exploratory analysis showed uncertainty avoidance as the only significant dimension among Hofstede's six cultural dimensions, we report uncertainty avoidance in the subsequent multilevel analyses without including other dimensions. A multilevel analysis including other cultural dimensions is available in the Supplemental Material. The results showed a significant negative moderation of uncertainty avoidance on the relation between age and subjective well-being, consistent with the results presented in the main text.

4. Country scores in Hofstede's six cultural dimensions are available at https://www.hofstede-insights.com/product/compare-countries/.

5. Culture was dummy coded (Romania = 0, United States = 1).

6. Both in the United States and Romania, high-control coping was positively associated with subjective well-being, and low-control coping was negatively associated with subjective well-being (see Table S11 in the Supplemental Material for correlations between coping and subjective well-being in each culture). We also note that from our exploratory analysis, there was a significant interaction between high-control coping and culture on subjective well-being, $b = 0.174$, $p = .027$. High-control coping positively predicted subjective well-being in both cultures, but it was more strongly associated with greater subjective well-being in the United States ($b = 0.375$, $p < .001$) than in Romania ($b = 0.201$, $p < .001$).

7. We explored whether there was a gender effect on the cultural difference in the association between age and subjective well-being. There was no moderating effect of gender.

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