

Culture, Personality, and Subjective Well-Being: Integrating Process Models of Life Satisfaction

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The authors examined the interplay of personality and cultural factors in the prediction of the affective (hedonic balance) and the cognitive (life satisfaction) components of subjective well-being (SWB). They predicted that the influence of personality on life satisfaction is mediated by hedonic balance and that the relation between hedonic balance and life satisfaction is moderated by culture. As a consequence, they predicted that the influence of personality on life satisfaction is also moderated by culture. Participants from 2 individualistic cultures (United States, Germany) and 3 collectivistic cultures (Japan, Mexico, Ghana) completed measures of Extraversion, Neuroticism, hedonic balance, and life satisfaction. As predicted, Extraversion and Neuroticism influenced hedonic balance to the same degree in all cultures, and hedonic balance was a stronger predictor of life satisfaction in individualistic than in collectivistic cultures. The influence of Extraversion and Neuroticism on life satisfaction was largely mediated by hedonic balance. The results suggest that the influence of personality on the emotional component of SWB is pancultural, whereas the influence of personality on the cognitive component of SWB is moderated by culture.

Over the past 3 decades, psychologists have made considerable progress in research on *subjective-well being* (SWB; see Diener, Suh, Lucas, & Smith, 1999, for a review). One major achievement has been the development of scientific measures of SWB. Definitions of SWB distinguish an affective and a cognitive component of SWB. The affective component is an individual's (actual or perceived) *hedonic balance* (i.e., the balance between pleasant affect and unpleasant affect). The cognitive component is an individual's *life satisfaction* (i.e., evaluations of one's life according to subjectively determined standards).

Past research indicates that both components of SWB are influenced by personality (Diener & Lucas, 1999) and by culture (Diener & Suh, 1999). Unfortunately, these studies examined personality and culture in isolation, even though cultural psychologists acknowledge biological constraints (cf. Church, 2000) and most personality psychologists recognize cultural influences on behavior (Diener & Lucas, 1999; McCrae, 2001). A conjoint investigation of personality and cultural determinants of SWB has the advantage of identifying possible interactions between personality and cultural variables. For example, Diener and Diener (1995; see also Kwan, Bond, & Singelis, 1997) demonstrated that self-esteem is a stronger predictor of life satisfaction in individualistic cultures than in collectivistic cultures because individualistic cultures emphasize a positive self-view. The present article provides further evidence for the interactive effects of culture and personality on SWB. In particular, we demonstrate that the influence of Extraversion and Neuroticism on life satisfaction is moderated by culture.

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Personality: A Pancultural Predictor of SWB

Personality research on SWB suggests that "happiness is a thing called stable extraversion" (Francis, 1999, p. 6) because Neuroti-

cism and Extraversion are consistent predictors of SWB in the United States (see Diener & Lucas, 1999, for a review), Canada (Pychyl & Little, 1998), Australia (Hart, 1999; Headey & Wearing, 1989; Wilson & Gullone, 1999), England (Furnham & Cheng, 1999), the Netherlands (Arrindell, Heesink, & Feij, 1999), Germany (Eid, Notz, Steyer, & Schwenkmezger, 1994; Schimmack, 1997), Estonia (Allik & Realo, 1997), Spain (Fierro & Cardenal, 1996), Israel (Francis & Katz, 2000; Gilboa, Bisk, Montag, & Tsur, 1999), China (Furnham & Cheng, 1999), Hong Kong (Kwan et al., 1997), Taiwan (Lu & Shih, 1997), and Japan (Furnham & Cheng, 1999; Yamaoka et al., 1998). Moreover, this relation is not merely a measurement artifact. It is also obtained when personality is assessed by informant reports (Spain, Eaton, & Funder, 2000), when affect is assessed with daily diaries or repeated ratings of on-line affect (see Lucas & Fujita, 2000, for a review), and when personality is assessed years before the affect measures (Costa & McCrae, 1980; Headey & Wearing, 1989; Suh, Diener, & Fujita, 1996). Last but not least, twin studies have consistently demonstrated a genetic basis of Extraversion, Neuroticism (e.g., Borkenau, Riemann, Angleitner, & Spinath, 2001; Jang, McCrae, Angleitner, Riemann, & Livesley, 1998; Saudino et al., 1999) and SWB (Tellegen, Lykken, Bouchard, Wilcox, Segal, & Rich, 1988). Taken together, these findings suggest that SWB has a pancultural genetic basis.

However, previous research on personality and SWB has paid little attention to the fact that the cognitive and affective components of SWB possess discriminant validity—that is, the cognitive and affective components are differentially related to theoretically relevant variables (Lucas, Diener, & Suh, 1996). Hence, predictors of SWB can be more strongly related to one component than to the other component. Schimmack, Diener, and Oishi (2002) proposed a causal model of the relations between personality (Extraversion and Neuroticism) and the two components of SWB. This model assumes that personality is more strongly related to the affective component of SWB than to the cognitive component of SWB (Figure 1). The model regards Extraversion and Neuroticism as affective dispositions that influence the amount of pleasant and unpleasant affect that people experience in their lives (Costa & McCrae, 1980; Diener & Lucas, 1999). The model also postulates that participants rely in part on their hedonic balance to form life-satisfaction judgments (Ross, Eyman, & Kishchuck, 1986; Schimmack et al., 2002; Suh, Diener, Oishi, & Triandis, 1998). That is, when respondents form a life-satisfaction judgment they retrieve past pleasant and unpleasant events from memory. The ratio of pleasant memories to unpleasant memories is used as one source of information to form a judgment of life satisfaction. The model implies that Neuroticism and Extraversion influence life satisfaction indirectly through their influence on hedonic balance. In other words, Schimmack et al. (2002) proposed a *mediator model* of the relation between personality traits and life satisfaction.

One implication of the mediator model is that Extraversion and Neuroticism have a stronger effect on hedonic balance than on life satisfaction because hedonic balance may not be the only source of information that people use to make life-satisfaction judgments. To the extent that hedonic balance figures prominently in life-satisfaction judgments, Extraversion and Neuroticism are strong predictors of life satisfaction. To the extent that life-satisfaction judgments are based on other information that is not determined by

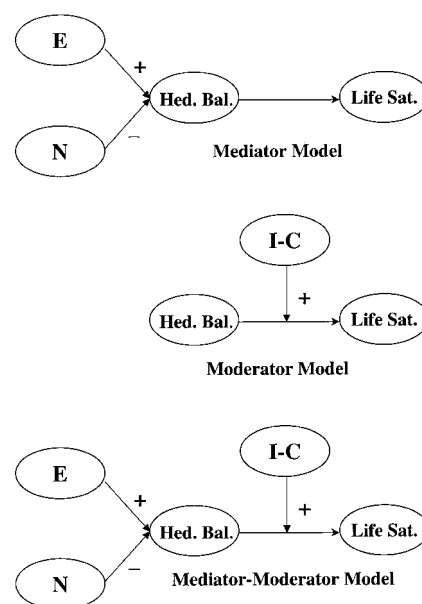


Figure 1. Models of personality, culture, and subjective well-being. E = Extraversion; N = Neuroticism; Hed. Bal. = hedonic balance (pleasant affect – unpleasant affect); Life Sat. = life satisfaction; I-C = individualism–collectivism.

personality traits, Extraversion and Neuroticism are weaker predictors of life satisfaction. For example, Schimmack et al. (2002) found that, in addition to hedonic balance, satisfaction with academic performance and romantic satisfaction predicted life satisfaction, and satisfaction with these life domains was not influenced by Extraversion and Neuroticism. In sum, the mediator model implies that the influence of Extraversion and Neuroticism on life satisfaction depends on the weight of hedonic balance in life-satisfaction judgments.

Cultural Influences on SWB

Culture influences SWB in at least two different ways. First, culture has direct effects on SWB. People living in individualistic, rich, and democratic cultures have higher levels of SWB than do those living in collectivistic, poor, and totalitarian cultures (Diener & Suh, 1999; Veenhoven, 1993). Second, culture moderates the relation between hedonic balance and life satisfaction (Suh et al., 1998). Suh et al. (1998) found that the relation between hedonic balance and life satisfaction was significantly stronger in individualistic cultures than in collectivistic cultures. For the present article, this indirect role of culture is more relevant.

Individualistic cultures emphasize the independence of individuals, whereas collectivistic cultures emphasize the interdependence of individuals and their close others (Hofstede, 1980; Kashima, Yamaguchi, Kim, Choi, Gelfand, & Yuki, 1995; Markus & Kitayama, 1991; Triandis, 1995). Individualistic cultures emphasize freedom of choice and individuals' needs, whereas collectivistic cultures emphasize duties, others' needs, and acceptance of one's fate. Consistent with these ideas, Oishi, Diener, Lucas, and Suh (1999) found that freedom was a stronger predictor of life

satisfaction in individualistic cultures than in collectivistic cultures.

Individualistic cultures also place more importance on emotions. Emotions provide direct feedback about the fit between the one's needs and goals and the actual state of affairs (Frijda, 1986; Lazarus, 1991; Ortony, Clore, & Collins, 1988; Reisenzein & Spielhofer, 1994; Scherer, 1984; Schimmack & Diener, 1997; Smith & Ellsworth, 1985). Hence, for people in individualistic cultures, emotions provide important information about life satisfaction. A life filled with many pleasant emotions and few unpleasant emotions indicates that one's needs and goals are fulfilled and that life is good. In collectivistic cultures, fulfillment of personal goals is also important, but members of these cultures are expected to subordinate personal goals to the interest of in-group members, especially those with a higher status (Radhakrishnan & Chan, 1997).

For collectivists, following cultural norms is more important than maximizing pleasure (Rozin, 1999; Suh et al., 1998). Hence, collectivists tend to pay less attention to the emotional consequences of events, and emotions feature less prominently in their life-satisfaction judgments. For example, Rozin (1999) asked students in India (a collectivistic culture) and the United States (an individualistic culture) to agree or disagree with the statement "Whether or not an outcome of an action will be pleasant or unpleasant for me is not an important consideration" (p. 114). Whereas only 12% of the students in the United States agreed with this statement, 34% of the students in India agreed with this statement. This finding has direct implications for cultural influences on SWB. "While it is clear that for Americans doing what is pleasant is a major part of living a successful life, this seems to be less the case for, among others, Hindus in India" (Rozin, 1999, p. 114). As a result, hedonic balance is a weaker predictor of life satisfaction in collectivistic cultures than in individualistic cultures (Suh et al., 1998). The influence of culture on the relation between hedonic balance and life satisfaction can be represented in a *moderator model* (Figure 1).

The Integrated Mediator–Moderator Model

The moderator model and the mediator model share the common assumption that hedonic balance is correlated with life satisfaction because people consider hedonic balance in life-satisfaction judgments. The mediator model assumes that this causal process explains the relation of Extraversion and Neuroticism with life satisfaction. Extraversion and Neuroticism are dispositions that influence hedonic balance. They influence life satisfaction to the extent that people rely on experienced affect to form life-satisfaction judgments. The moderator model assumes that cultures differ in the degree to which members rely on emotional information to judge life satisfaction. As a consequence, hedonic balance is a weaker predictor of life satisfaction in collectivistic cultures than in individualistic cultures. Integrating these assumptions leads to the mediator–moderator model (Figure 1).

The most important prediction of the integrated mediator–moderator model is that personality and culture interact in the determination of life satisfaction (i.e., the cognitive component of SWB). Personality should be a stronger predictor of life satisfaction in individualistic cultures because the influence of personality on life satisfaction is mediated by hedonic balance and the influ-

ence of hedonic balance on life satisfaction is moderated by culture. For example, Pam, a stable extravert in the United States, often experiences pleasure and rarely experiences displeasure. Therefore, she reports being very satisfied with her life. In contrast, Juan, a stable extravert living in Mexico, also frequently experiences pleasure and rarely experiences displeasure. Juan, however, pays less attention to his emotional experiences when forming a life-satisfaction judgment. Consequently, Juan's high level of hedonic balance does not predict a high level of life satisfaction.

The mediator–moderator model also implies that personality has a stronger influence on hedonic balance than on life satisfaction. This prediction follows from the assumption that personality influences hedonic balance directly, whereas it influences life satisfaction only indirectly through hedonic balance. As a moderating variable, culture should influence only the relation between hedonic balance and life satisfaction. Culture, within this model, is not expected to influence the relationship between personality and hedonic balance. Hence, the model predicts that personality has a universal influence on hedonic balance, whereas the effect on life satisfaction is moderated by culture.

Unfortunately, previous investigations of the relation between personality and SWB in different cultures provide insufficient evidence to evaluate a test of the mediator–moderator model because they used different measures of personality and SWB. A study by Kwan et al. (1997) is an exception. The authors reported correlations of Extraversion and Neuroticism with life satisfaction in the United States and Hong Kong. The mediator–moderator model predicts weaker correlations in the sample from Hong Kong because Hong Kong is a more collectivistic culture than the United States (Hofstede, 1980; Suh et al., 1998). The differences between the correlations in the two cultures were in the predicted direction but not statistically significant. We conducted the present study to test the integrated mediator–moderator model in a cross-cultural study with several individualistic and collectivistic cultures from different regions in the world. To summarize, the main predictions based on the mediator–moderator model were as follows:

1. Extraversion and Neuroticism are significantly related to hedonic balance, and this relation is not moderated by culture.
2. The influence of Extraversion and Neuroticism on life satisfaction is mediated by hedonic balance (mediator model; Schimmack et al., 2002).
3. Hedonic balance and life satisfaction are more highly correlated in individualistic cultures than in collectivistic cultures (Suh et al., 1998).
4. Extraversion and Neuroticism are more highly correlated with life satisfaction in individualistic cultures than in collectivistic cultures.

Method

Description of Cultural Samples

The present study includes respondents from Germany, Ghana, Japan, Mexico, and the United States. These countries represent a wide range of cultures and geographical regions. Table 1 summarizes the cultural differences between the five nations. Hofstede's (1980) and Triandis's rankings (cited in Suh et al., 1998) of the cultural samples reveal a marked difference between the two individualistic nations (i.e., United States and Germany) and the three collectivistic nations (i.e., Japan, Mexico, and Ghana).

Table 1
Location of National Samples on Cultural Dimensions

National sample	Classification	Hofstede's (1980) IC factor scores	Triandis's ^a IC ratings	PCVS	
				Self-direction	Tradition
United States	Individualistic	91	10	1.41	-2.14
Germany	Individualistic	67	8	2.83	-3.74
Japan	Collectivistic	46	4	0.70	-1.20
Mexico	Collectivistic	30	5	0.55	-0.99
Ghana	Collectivistic		3	0.44	-1.10

Note. Pairwise Comparison Value Survey (PCVS) scores above zero indicate above-average preference for a value, and scores below zero indicate below-average preference for this value. IC = individualism–collectivism.

^a Cited in Suh et al. (1998).

Participants in the present study also completed the Pairwise Comparison Value Survey (PCVS; Oishi, Schimmack, Diener, & Suh, 1998; the value data are reported in more detail elsewhere). The PCVS measures value preferences for Schwartz's (1994) 10 universal values, which include the individualistic value of *self-direction* (e.g., freedom, independence) and the collectivistic value of *tradition* (e.g., respect for tradition, humility, accepting one's portion in life). The value data demonstrate that our respondents in Germany and the United States were more individualistic than were our respondents in Japan, Ghana, and Mexico.

Participants

Table 2 provides an overview of the number of participants at each location as well as their mean age and gender distribution. In three of the five countries, data were collected from two locations. Table 2 therefore presents summary information for each data collection site. All participants were university students, except for the participants from Chihuahua, Mexico, who were teachers. Participation was voluntary in Mexico and Japan, rewarded with course credit in United States and Germany, and rewarded with \$2 in Ghana.

Materials and Procedure

Participants completed a survey composed of several measures. We focus only on those parts of the survey relevant to the present article. The survey began with demographic questions, followed by the NEO Five Factor Inventory (NEO-FFI), a short form of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), to assess Extraversion and Neuroticism, followed by frequency judgments of affects to assess hedonic

balance. Afterward, participants completed 87 items that are not relevant for the present investigation before they answered the questions about life satisfaction. Hence, life-satisfaction judgments did not directly follow the questions about hedonic balance.

Extraversion and Neuroticism. Extraversion and Neuroticism were measured with the NEO-FFI. The NEO-FFI measures the Big Five personality dimensions, Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness, with 12 items for each trait. Participants in the United States and in Ghana completed the original English version of the NEO-FFI. German students completed the standard adaptation of the NEO-FFI by Borkenau and Ostendorf (1991). We created Spanish and Japanese versions of the NEO-FFI that were back-translated by the cooperating researchers in Mexico and Japan. Although we administered the complete NEO-FFI, the present article uses only the Neuroticism and Extraversion scales of the questionnaire (see Table 3 for the reliabilities of the scales).

Life satisfaction. The Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Pavot & Diener, 1993) is a five-item

Table 2
Demographic Variables

Sample	N	Age	% Women
United States			
Illinois	65	19	49
El Paso	103	23	56
Germany—Berlin	56	24	73
Japan			
Tokyo	57	20	49
Kobe	90	21	58
Mexico			
Chihuahua	80	38	24
Juarez	39	18	49
Ghana	159	26	37
Total	651	24	48

Table 3
Descriptive Statistics

Scale/Nation	M	SD	α
SWLS			
United States	22.79	7.61	.90
Germany	20.48	5.95	.82
Japan	20.08	6.18	.79
Mexico	24.78	5.50	.76
Ghana	21.19	4.64	.61
Hedonic balance			
United States	1.13	1.43	.84
Germany	0.60	1.51	.91
Japan	0.40	1.52	.78
Mexico	1.88	1.12	.83
Ghana	1.47	1.09	.75
Neuroticism			
United States	2.88	0.74	.84
Germany	3.10	0.62	.83
Japan	3.45	0.63	.75
Mexico	2.67	0.55	.70
Ghana	2.81	0.58	.72
Extraversion			
United States	3.38	0.60	.78
Germany	3.29	0.51	.78
Japan	3.19	0.54	.75
Mexico	3.53	0.48	.65
Ghana	3.43	0.44	.61

Note. SWLS = Satisfaction With Life Scale.

scale that assesses the cognitive component of SWB. Participants indicate, for example, how satisfied they are with their lives and how close their life is to their ideal life. The SWLS had been translated into German, Spanish, and Japanese in a previous cross-cultural study by Diener and his colleagues (e.g., Suh et al., 1998). We used these translations in the present study. The SWLS typically uses a 7-point response format. We changed the response format to a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*) because a 5-point response format was used for most of the questionnaires in the survey. To present means that are comparable to the typical SWLS scores, we transformed the ratings to fall into the typical range of SWLS scores (range = 5–35). This linear transformation has no effect on the results (see Table 3 for the reliabilities of the scales).

Hedonic balance. Hedonic balance was assessed with frequency judgments of pleasant affect (e.g., pleasant, cheerful, good humored) and unpleasant affect (e.g., unpleasant, downhearted, depressed). We chose to measure the pleasure–displeasure dimension of affect because it is most closely related to the concept of SWB (Larsen & Diener, 1992). The response format was a 5-point frequency scale with vague quantifiers (1 = *very rarely*, 5 = *very often*). Unpleasant affect ratings were subtracted from pleasant affect ratings to obtain indicators of hedonic balance (pleasant–unpleasant, cheerful–downhearted, and good humored–depressed; see Table 3 for reliabilities). One advantage of hedonic balance scores over unipolar measures of pleasant and unpleasant affect is that they control for response styles (e.g., extremity biases; Schimmack & Diener, 1997).

Results

We analyzed the data in three steps. We first computed simple correlations to provide an impression of the general pattern of associations between the four variables in each cultural sample. Next, we performed a series of hierarchical regression analyses to test the significance of cultural differences in the strength of associations and to control for confounding variables (e.g., different gender compositions of the cultural samples). Finally, we used confirmatory factor analyses and structural equation modeling (SEM). The confirmatory factor analyses address the concern that cultural differences in the correlations are an artifact of the lower reliabilities of some scales in the collectivistic samples, whereas the structural equation models provide a direct test of the mediator–moderator model. We used a two-tailed alpha level of .05 to test significance.

Simple Correlations

The correlations between hedonic balance and life satisfaction were stronger in the individualistic samples (United States, Germany) than in the collectivistic samples (Japan, Mexico, Ghana; Table 4). This pattern provides further support for the moderator model (Suh et al., 1998). Table 4 also reveals that Extraversion and

Neuroticism are more strongly correlated with life satisfaction in the individualistic samples than in the collectivistic samples. This finding supports the mediator–moderator model. The mediator–moderator model also predicts that hedonic balance is influenced by Extraversion and Neuroticism in all cultures. Consistent with this prediction, individualistic cultures do not differ systematically from collectivistic cultures in this relation. Finally, Table 4 shows the within-nation correlations between Neuroticism and Extraversion. The models do not make any predictions about this correlation, which is typically slightly negative in the United States (e.g., Schimmack & Diener, 1997). The present results suggest that this correlation is the same across cultures. In sum, the pattern of simple correlations is consistent with the mediator–moderator model. The following analyses subject the data to more rigorous statistical tests.

Testing Statistical Significance and Controlling for Age, Sex, and Context Effects

We examined the reliability of the patterns in Table 4. In addition, we statistically controlled for the influence of several confounding variables. Our national samples differed in age and in gender composition, so it was necessary to make sure that any differences in patterns of relationships were not due to age or gender differences between the samples. In addition, we examined the possibility that cultural effects were due to larger context effects in collectivistic cultures. This analysis was motivated by the finding that individualists think more frequently about their life satisfaction than do collectivists (Diener & Suh, 1999). Furthermore, they tend to use the same sources of information in repeated assessments of life satisfaction (Schimmack et al., 2002). These findings suggest that individualists have a set of chronically accessible sources to judge life satisfaction. In contrast, collectivists are less concerned with their SWB (Diener & Suh, 1999). Hence, it is possible that life-satisfaction judgments do not activate chronically accessible information as much as they do for individualists. In this case, collectivists' life-satisfaction judgments may be more strongly influenced by information that was activated by preceding questions (Schwarz & Strack, 1999). If collectivists were more strongly influenced by context effects, then the finding of weaker effects of personality traits on life-satisfaction judgments would be an artifact of the assessment situation. To test this hypothesis, we computed the average rating for the five survey items immediately preceding the life-satisfaction scale and used this index to control for possible context effects.

To test the significance of moderator effects of culture, we computed a series of hierarchical regression analyses with SWLS scores as the dependent variable. In the first analysis, we entered hedonic balance, individualism–collectivism (IC; United States and Germany = 1; Japan, Mexico, and Ghana = 0), sex (male = 0, female = 1), age, and the context index (CON) as predictors. In the second step, we entered the products Hedonic Balance \times IC, Hedonic Balance \times Sex, Hedonic Balance \times Age, and IC \times CON as predictors. The moderator model predicts a significant effect for the Hedonic Balance \times IC interaction. In the first step, hedonic balance ($\beta = .48$) and CON ($\beta = .16$) were significant predictors. In the second step, the Hedonic Balance \times IC interaction was the only significant predictor that contributed to life satisfaction ($\beta = .23$), $t(649) = 4.59$, $p < .05$. This finding demonstrates that the

Table 4
Simple Correlations Within Nations

Country	SWLS–HB	SWLS–N	SWLS–E	HB–N	HB–E	N–E
United States	.61	–.48	.47	–.59	.53	–.32
Germany	.62	–.65	.44	–.58	.44	–.22
Japan	.45	–.31	.42	–.57	.42	–.27
Mexico	.27	–.33	.20	–.57	.32	–.35
Ghana	.30	–.23	.15	–.60	.44	–.38

Note. SWLS = Satisfaction With Life Scale; HB = hedonic balance; E = Extraversion; N = Neuroticism.

cultural differences in the magnitude of the correlation between SWLS and hedonic balance in Table 4 are significant and were not due to age or sex differences between the samples. Furthermore, the findings rule out that this effect was merely due to a stronger effect of preceding questions on life-satisfaction judgments in the collectivistic samples.

Similar analyses were repeated with Neuroticism and Extraversion as predictors. Neuroticism ($\beta = -.57$) and CON ($\beta = .19$) were significant predictors in Step 1. Only the Neuroticism \times IC interaction entered as a significant predictor in Step 2 ($\beta = -.15$), $t(649) = 2.22$, $p < .05$. Similarly, Extraversion ($\beta = .68$) and CON ($\beta = .18$) were significant predictors in Step 1. As predicted, the Extraversion \times IC interaction entered as a significant predictor in Step 2 ($\beta = .14$), $t(649) = 2.05$, $p < .05$. In addition, the Extraversion \times Age interaction was significant ($\beta = -.44$), $t(649) = 2.82$, $p < .05$, suggesting that Extraversion is a weaker predictor of life satisfaction for older participants.

Next, we examined whether the relations between hedonic balance, Neuroticism, and Extraversion were moderated by IC. The mediator–moderator model predicts that these relations are the same across cultures. We first used hedonic balance as the criterion variable and Extraversion as the main predictor, along with IC, sex, and age (CON was not included because it could only influence life-satisfaction judgments). In the second step, interactions of Extraversion with IC, sex, and age were entered. In the first step, Extraversion ($\beta = .45$) and IC ($\beta = -.19$) were significant predictors. In the second step, none of the interaction terms was significant. The analysis was repeated with Neuroticism as the main predictor. In Step 1, Neuroticism ($\beta = -.59$) and IC ($\beta = -.17$) were significant predictors. None of the interaction terms was a significant predictor in Step 2. Finally, we used Neuroticism as the criterion variable and Extraversion as the predictor to examine potential cultural moderator effects of the correlation between Neuroticism and Extraversion. In the first step, Extraversion ($\beta = -.33$) and sex ($\beta = .13$) were significant predictors. None of the interaction terms was a significant predictor in Step 2. These findings demonstrate that the relations among hedonic balance, Extraversion, and Neuroticism are the same in individualistic and in collectivistic cultures.

In sum, these analyses demonstrate that the correlation of life satisfaction with hedonic balance, Neuroticism, and Extraversion was moderated by IC, whereas the correlations among Neuroticism, Extraversion, and hedonic balance were not moderated by IC. Furthermore, the analyses demonstrate that the effect of culture was not a spurious artifact of the different gender and age compositions of the cultural samples. In addition, the findings rule out the concern that respondents in collectivistic cultures were more strongly influenced by the context of the preceding items in the questionnaire. In short, the results are consistent with the mediator–moderator model.

Structural Equation Modeling

We used confirmatory factor analysis and SEM for a more sophisticated understanding of the data. Although it is difficult to test moderator models by means of SEM, we were able to incorporate the cultural moderator effect by using a series of multiple-groups comparisons. In multiple-groups modeling, the same model is fitted separately to the covariance matrices of each culture.

Model parameters can then be constrained to test the prediction that the relation between two latent variables is the same across samples. If a constrained model fits the data as well as an unconstrained model, then the relation is the same across cultures. However, if a constrained model shows a significant decrement in fit relative to an unconstrained model, then the relation between two variables is different across cultures. The mediator–moderator model predicts that constraining the relations among Neuroticism, Extraversion, and hedonic balance should not produce a significant decrement in fit but constraining the relations of these variables to life satisfaction should produce lower fit.

Confirmatory factor analysis and SEM require a set of observed variables for each construct to estimate latent factors (i.e., a measurement model). Our measurement model included the five SWLS items as indicators of life satisfaction and the three hedonic balance scores as indicators of hedonic balance. The 12 Extraversion items were randomly assigned to three Extraversion indicators, and the 12 Neuroticism items were randomly assigned to three Neuroticism indicators. We first conducted a series of confirmatory factor analyses that included only two constructs at a time. These analyses provided correlations between latent variables of our four variables. These analyses controlled for the different reliabilities of our observed measures in the different cultural samples because confirmatory factor analysis estimates correlations between latent variables without random measurement error. For each pair of variables, we estimated the fit of three models. The first model assessed the fit of the unconstrained model. The second model constrained the correlations separately within the individualistic samples (United States = Germany) and the collectivistic samples (Japan = Mexico = Ghana). We expected this model to fit the data as well as the unconstrained model because we did not predict differences among the individualistic or among the collectivistic cultures. The third model constrained the correlations across all samples. We expected that this model should not fit the data as well as the previous model for correlations of life satisfaction with Neuroticism, Extraversion, and hedonic balance. However, the third model should fit the data as well as the second model for correlations among Neuroticism, Extraversion, and hedonic balance. The differences in the chi-square values were used to test significances (Table 5).

The results replicate the findings based on observed variables (Table 6). None of the models that constrained correlations between latent variables within individualistic cultures and within collectivistic cultures produced a significant decrease in fit. However, the model that constrained these correlations across all five samples produced a significant decrease for the correlations of life satisfaction with Neuroticism, Extraversion, and hedonic balance but not for the correlations among Neuroticism, Extraversion, and hedonic balance. The overall fit indices of the confirmatory factor analyses are good. This finding suggests that our measures had at least sufficient measurement similarity to allow for meaningful comparisons.

The last analyses were a set of nested structural equation models. We started with a measurement model, in which the four latent variables were allowed to correlate freely with each other. The second model imposed the mediator model (Figure 1) on the relations between the four latent factors. Extraversion and Neuroticism were allowed to covary to accommodate the negative correlations between the two traits. This model did not impose con-

Table 5
Model Fit of Confirmatory Factor Analyses

Model	χ^2	df	AIC	RMSEA	BBNFI	BBNNFI	CFI
1a. HB-LS ^a	151	95	-38	.031	.925	.956	.970
1b. HB-LS ^b	157	98	-39	.031	.922	.955	.969
1c. HB-LS ^c	169	99	-29	.033	.916	.947	.963
2a. N-LS ^a	132	95	-58	.025	.927	.967	.978
2b. N-LS ^b	135	98	-61	.025	.925	.968	.977
2c. N-LS ^c	145	99	-53	.027	.919	.961	.972
3a. E-LS ^a	151	95	-39	.031	.911	.947	.964
3b. E-LS ^b	158	98	-38	.031	.907	.945	.962
3c. E-LS ^c	161	99	-37	.031	.906	.944	.960
4a. HB-N ^a	51	40	-29	.021	.967	.986	.993
4b. HB-N ^b	53	43	-33	.020	.965	.988	.993
4c. HB-N ^c	54	44	-34	.019	.965	.989	.993
5a. HB-E ^a	79	40	-1	.039	.943	.944	.970
5b. HB-E ^b	81	43	-5	.037	.941	.949	.971
5c. HB-E ^c	81	44	-7	.037	.941	.951	.971
6a. N-E ^a	50	40	-30	.020	.952	.980	.990
6b. N-E ^b	53	43	-33	.019	.950	.983	.990
6c. N-E ^c	53	44	-35	.019	.949	.983	.990

Note. *N* = 651. Boldface chi-square values indicate significant decrease in fit ($\Delta\chi^2, p < .05$) in nested comparisons with the unconstrained model. AIC = Akaike information criterion; RMSEA = root-mean-square error of approximation; BBNFI = Bentler-Bonnet normed fit index; BBNNFI = Bentler-Bonnet nonnormed fit index; CFI = comparative fit index; HB = hedonic balance; LS = life satisfaction; N = Neuroticism; E = Extraversion.

^a Unconstrained. ^b Constrained within individualism and collectivism. ^c Constrained across all samples.

straints on the mediator model across cultural samples. The mediator model fit the data reasonably well, but fit was significantly lower than for the measurement model (Table 7). Exploratory analyses revealed that model fit could be restored by specifying a path from Neuroticism to life satisfaction in the German sample and a path from Extraversion to life satisfaction in the Japanese sample (Model 3). This means that the correlations between Extraversion and Neuroticism and life satisfaction were fully mediated by hedonic balance in 8 out of 10 cases. Model 4 examined the possibility that Extraversion and Neuroticism influence life satisfaction directly and that hedonic balance has no effect on life-satisfaction judgments. In other words, the high correlation between life satisfaction and hedonic balance is spurious because of shared influences of the personality traits. This

model produced a significant reduction in fit. Furthermore, fit indices indicated that this model did not fit the data as well as the mediator-moderator model (Model 2). This finding is consistent with our prediction that personality does not influence life satisfaction directly. Rather, these effects appear to be mostly mediated by hedonic balance.

In the following tests, we used Model 2 rather than Model 3 as the baseline model for the examination of cultural influences on the mediator model. It was necessary to use Model 2 because path coefficients are influenced by the structure of the model. That is, the path from hedonic balance to life satisfaction is influenced by the presence or absence of a path from Neuroticism to life satisfaction. In other words, it is not possible to constrain the relation between hedonic balance and life satisfaction across Germany and the United States if we allow for a direct path from Neuroticism to life satisfaction in the German sample but not in the U.S. sample.

To test moderator effects of culture, we first constrained the correlation between Extraversion and Neuroticism and the paths from Extraversion and Neuroticism to hedonic balance across all samples. The previous analyses suggested that these relations are the same in all samples, and therefore these constraints should not produce a significant decrease in fit. As expected, the increase in chi-square was not significant (Table 7). Furthermore, fit indices that reward parsimony (e.g., Akaike information criterion, Bentler-Bonnet nonnormed fit index) were better for the constrained Model 5. This finding indicates that the relationships among these variables did not differ reliably across cultural groups.

Model 6 constrained the relation between life satisfaction and hedonic balance separately for the two individualistic and for the three collectivistic samples (Figure 2). These constraints did not produce a significant decrease in fit (see Table 7). Finally, Model 7 constrained the relation between life satisfaction and hedonic balance across all cultural samples. This model did not fit the data.

In sum, the structural equation models support the key predictions of the mediator-moderator model: (a) The influence of Extraversion and Neuroticism on hedonic balance was not moderated by culture, (b) the influence of hedonic balance on life satisfaction was moderated by IC, and (c) the influence of Extraversion and Neuroticism on life satisfaction was largely mediated by hedonic balance.

Table 6
Correlations Between Latent Factors

Country	HB → LS	N → LS	E → LS	N → HB	E → HB	N-E
Unconstrained model						
United States	.68	-.59	.55	-.71	.67	-.41
Germany	.76	-.79	.53	-.68	.52	-.33
Japan	.59	-.39	.57	-.69	.61	-.39
Mexico	.32	-.44	.30	-.71	.56	-.50
Ghana	.48	-.38	.25	-.82	.70	-.58
Partially constrained model						
IND	.71	-.64	.55	-.70	.64	-.39
COL	.47	-.40	.40	-.74	.62	-.47

Note. All correlations are significant at $p < .05$. HB = hedonic balance; LS = life satisfaction; E = Extraversion; N = Neuroticism; IND = individualism; COL = collectivism.

Table 7
Structural Equation Modeling Fit Indices

Model and comparison	χ^2	df	AIC	RMSEA	BBNFI	BBNNFI	CFI
Model							
Baseline model: E and N → HB; E, N, HB → LS	558	363	-168	.029	.855	.928	.943
Mediator model (N → LS = 0; E → LS = 0)	580	373	-166	.030	.850	.926	.939
Relaxed mediator model (HB → LS = 0)	571	371	-170	.029	.852	.928	.941
Model 2: N-E, N → HB, E → HB; constrained across samples	575	368	-161	.030	.851	.925	.939
Model 5 and HB → LS constrained within IND and COL	595	385	-175	.029	.846	.927	.938
Model 5 and HB → LS fully constrained	600	388	-176	.030	.844	.927	.938
Model 5 and HB → LS fully constrained	634	389	-144	.032	.836	.916	.928
Comparison							
1 vs. 2	22	10	2			-.002	-.004
1 vs. 3	13	8	-2			.000	-.002
1 vs. 4	17	5	-7			-.003	-.004
2 vs. 5	15	12	-9			.001	.001
5 vs. 6	5	3	-1			-.002	-.002
6 vs. 7	27	1	25			-.009	-.008

Note. *N* = 651. Boldface chi-square values indicate significant decrease in fit in comparisons of nested models. Akaike information criterion (AIC) = $\chi^2 - 2df$, negative values indicate good fit. Model 1: Correlations between latent factors, no constraints; Model 2: Mediator-moderator model as shown in Figure 1, no constraints; Model 3: Model 2 with *N* → *LS* free in German sample and *E* → *LS* free in Japanese sample; Model 4: *N* → *LS* and *E* → *LS*, but *HB* → *LS* fixed at zero; Model 5: Model 2 and *N*-*E*, *N* → *HB*, *E* → *HB* constrained across all samples; Model 6: Model 5 with *HB* → *LS* constrained within individualistic samples and within collectivistic samples; Model 7: Model 5 with *HB* → *SWLS* constrained across all samples. For model comparisons, data represent the change in that statistic. BBNFI = Bentler-Bonett normed fit index; BBNNFI = Bentler-Bonett nonnormed fit index; RMSEA = root-mean-square error of approximation; CFI = comparative fit index; *E* = Extraversion; *N* = Neuroticism; *HB* = hedonic balance; *LS* = life satisfaction.

Discussion

This study tested the mediator-moderator model of life satisfaction, and the findings support the model's predictions (Figure 2). Extraversion and Neuroticism predicted hedonic balance to the same extent in all cultural samples. This finding suggests a pan-

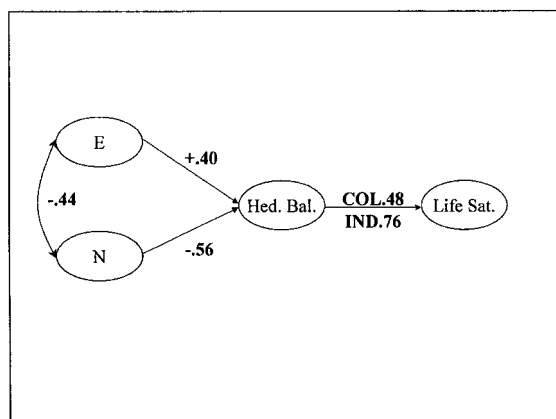


Figure 2. Mediator-moderator model with path coefficients of Model 6. *E* = Extraversion; *N* = Neuroticism; Hed. Bal. = hedonic balance (pleasant affect - unpleasant affect); COL = collectivism; IND = individualism; Life Sat. = life satisfaction.

cultural influence of affective dispositions on hedonic balance. The influence of Extraversion and Neuroticism on life satisfaction was largely mediated by hedonic balance. The mediator model fit the data in all five samples reasonably well, with a small decrease in fit compared with the measurement model. Exploratory analysis revealed that fit could be restored by allowing a direct influence of Neuroticism on life satisfaction in the German sample and a direct effect of Extraversion on life satisfaction in the Japanese sample. Future research needs to examine whether these relations can be replicated. Our findings also replicate Suh et al.'s (1998) finding of stronger correlations between hedonic balance and life satisfaction in individualistic cultures than in collectivistic cultures. Furthermore, we extend this finding by using SEM to eliminate cultural differences in the reliability of the measures of life satisfaction. The effect remained significant even when the lower reliability of life-satisfaction judgments in collectivistic cultures was taken into account. We also examined whether the effect was due to larger context effects in collectivistic cultures. People in collectivistic cultures may think less about their life satisfaction, and therefore they may be more influenced by the context generated by the survey item immediately preceding the life-satisfaction items. Our findings provide no support for this hypothesis. The correlation between our CON (based on the mean of the five survey items immediately preceding the SWLS) and life-satisfaction judgments did not differ between participants from individualistic and collectivistic cultures. Finally, the most important finding was that

culture moderated the effect of personality traits on life satisfaction. Extraversion and Neuroticism were stronger predictors of life satisfaction in individualistic cultures than in collectivistic cultures. This finding is consistent with the hypothesis that Extraversion and Neuroticism are primarily affective dispositions that influence hedonic balance. If people rely less on hedonic balance to form life-satisfaction judgments, then Extraversion and Neuroticism have a weaker effect on life satisfaction. We discuss some of the limitations and implications of the present findings.

Limitations

Our samples differ on various dimensions other than culture. Although statistically controlling for age and sex did not influence the results, it remains possible that our findings are contaminated by other confounding variables. Nevertheless, we found that the influence of individualism and collectivism generalized across three collectivistic cultures and two individualistic cultures. This finding suggests that the effect is not an artifact of the sampling procedure. Suh et al. (1998) demonstrated the moderator effect of culture in two large samples with over 40 nations. We were able to replicate this effect with a sample of only five nations. This finding indicates that the moderator effect of IC is a pervasive and strong effect that does not require a large sample size to be statistically significant.

Another limitation of our study is the cross-sectional design. All variables were assessed at one moment in time in the same questionnaire. Hence, the present data cannot rule out alternative models that reverse the causal claims embedded in the mediator–moderator model. For example, one could argue that life satisfaction influences personality and that this effect is stronger in individualistic cultures. However, theoretical considerations render alternative models implausible. For example, Extraversion and Neuroticism are more stable over time than is life satisfaction (Hart, 1999), which is inconsistent with the idea that life satisfaction determines personality. Furthermore, Schimmack et al. (2002) tested the mediator model in a longitudinal study in which personality was assessed before hedonic balance and life satisfaction. The consistency between the present findings and prior findings from a longitudinal study suggests that the underlying processes are the same. Nevertheless, future research should examine the mediator–moderator model in a cross-cultural longitudinal study.

Another concern could be the influence of response styles. Several considerations render it unlikely that the main findings are response artifacts. First, cultural differences in response styles are a major threat to comparisons of mean differences between cultures. For example, the low levels of life satisfaction in Japanese cultures may reflect a modesty bias (Chen, Lee, & Stevenson, 1995). However, our findings concern the relation between variables within cultures. Whereas response styles may influence the mean value of a group on an attribute, they are less likely to influence the pattern of covariations within cultures. Second, past research has demonstrated that response styles have a very small effect on the agree–disagree response formats that we used for the assessment of personality and SWB (Green, Goldman, & Salovey, 1993). Finally, it is hard to explain why response styles would attenuate the correlation between life satisfaction and hedonic balance but not the correlations among Neuroticism, Extraversion, and hedonic balance. However, readers should be cautious in

interpreting the absolute strength of path coefficients in Figure 2, which may be influenced by common method variance. To address this concern, future research should test the mediator–moderator model using multiple measures of each construct to control for systematic measurement variance (cf. Andrews & Withey, 1976; Diener, Smith, & Fujita, 1995; Green et al., 1993).

Another limitation of the present study is the lack of predictors of life satisfaction that have a stronger effect on life satisfaction in collectivistic cultures than in individualistic cultures. Previous studies found that cultural norms (Suh et al., 1998) and financial satisfaction (Oishi et al., 1999) were stronger predictors of life satisfaction in collectivistic cultures than in individualistic cultures. Unfortunately, these variables were not assessed in the present study. One of the most pressing needs for future research is to identify additional predictors of life satisfaction in collectivistic cultures. In sum, the limitations of the present study point out several avenues for future research. At the same time, the present findings suggest that future efforts will be rewarded with deeper insights into both universal and culture-specific determinants of well-being.

Implications

The mediator–moderator model has several implications for future research. One important implication concerns the interplay between biological and cultural factors. Previous studies often focused on one factor or the other. However, biologists and psychologists increasingly recognize that genetic and cultural factors influenced each other during human evolution (Chen, Burton, Greenberger, & Dmitrieva, 1999). Hence, it is important to investigate genetic and cultural factors together rather than separately. The present study is a small step in this direction.

Our findings provide further evidence for a pancultural influence of Extraversion and Neuroticism on hedonic balance. Hedonic balance may be strongly influenced by biological factors that are rooted in the neuropsychology of emotions (e.g., Rolls, 1999). To avoid misunderstandings, we note that we do not suggest that hedonic balance is exclusively determined by biological factors. Indeed, cross-cultural studies often find reliable differences between cultures in hedonic balance (Diener & Suh, 1999), which suggest cultural influences on hedonic balance. However, biological factors may play a greater role in determining hedonic balance than do cultural factors.

Our findings also show that personality effects on life satisfaction were moderated by culture. To the extent that life satisfaction is more than an optimal hedonic balance, personality traits have weaker effects on life satisfaction than on hedonic balance. A neurotic introvert (i.e., the opposite of a happy personality) may achieve major goals (e.g., raising children, making major discoveries, helping others in misery) without gaining much pleasure from these activities. This hedonically unhappy person may still experience the satisfaction of a successful and meaningful life, especially in collectivistic cultures that place less emphasis on hedonic balance. In short, satisfaction with important life domains can contribute to life satisfaction in addition to hedonic balance (Schimmack et al., 2002).

Of course, it is possible that satisfaction in important life domains is itself strongly determined by biological factors. However, two arguments suggest that strong genetic effects on life domains

are unlikely. First, Borkeu, Riemann, Spinath, and Angleitner (2000) found that genes have a stronger impact on global measures of individual differences, whereas situation-specific measures are more strongly influenced by environmental factors. Second, existing evidence suggests that satisfaction with important life domains (e.g., work, romantic relationships) is only partially influenced by general affective dispositions and genes. For example, Extraversion and Neuroticism explained 10% of the variance in job satisfaction in a sample of policemen in Australia in three repeated assessments over a period of 5 years (Hart, 1999). A meta-analysis estimated that affective dispositions account for up to 25% of the variance in job satisfaction (Connolly & Viswesvaran, 2000). Twin studies of job satisfaction show heritability coefficients that range from 0% to 30% (Arvey, McCall, Bouchard, Taubman, & Cavanaugh, 1994; Hershberger, Lichtenstein, & Knox, 1994). Hence, only up to 30% of the variance in job satisfaction can be attributed to genetically determined affective dispositions. With regard to marital satisfaction, affective dispositions (i.e., predominantly Neuroticism) explain about 15% of the variance (Bouchard, Lussier, & Sabourin, 1999; Kelly & Conley, 1987; Robins, Caspi, & Moffitt, 2000). Hence, there is room for work environments and romantic partners to influence life satisfaction beyond the pervasive influence of genetic factors.

Another important line of future research is to examine the influence of culture on personality. Although genetic factors play an important role in determining Extraversion and Neuroticism, personality also appears to be influenced by the shared family environment (Borkeu et al., 2001), societal changes (Twenge, 2000), and culture (Lynn & Martin, 1997; McCrae, in press). For example, Twenge (2000) found that Neuroticism scores increased over the second part of the past century in the United States. McCrae (in press) found differences in the mean levels of Neuroticism and Extraversion between nations. Furthermore, these differences predicted nations' levels of life satisfaction (published in Diener et al., 1995). Extraverted nations had higher levels of life satisfaction, and neurotic nations had lower levels of life satisfaction. These findings suggest that cultures can influence the personality of their members, with implications for their members' well-being. However, it is also possible that national differences in personality dimensions are influenced by genetic differences between cultural groups (Chen et al., 1999). Future research with biological markers of personality will be helpful in determining the causal direction of these relations.

Conclusion

The present article provides cross-cultural support for the hypothesis that happiness is a thing called stable extraversion. At the same time, the present findings qualify this statement in two ways. First, the statement has greater validity for the affective component than for the cognitive component of SWB. Second, the statement has greater validity for the cognitive component of SWB in individualistic cultures than in collectivistic cultures. For a fuller understanding of SWB, researchers need to consider both personality–genetic and social–cultural factors.

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Received March 12, 2001

Revision received July 10, 2001

Accepted October 15, 2001 ■

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