

Cultural and Temperamental Variation in Emotional Response

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To examine the relative influence of cultural and temperamental factors on emotional response, we compared the emotional behavior, reports of emotional experience, and autonomic responses of 50 European American (EA) and 48 Chinese American (CA) college-age dating couples during conversations about conflicts in their relationships. EA couples showed more positive and less negative emotional behavior than did CA couples, despite similarities in reports of emotional experience and autonomic reactivity. Group differences in emotional behavior were mediated by cultural (values and practices) but not temperamental factors (neuroticism and extraversion). Collapsing across groups, cultural factors accounted for greater variance in emotional behavior but lesser variance in reports of emotional experience compared with temperamental factors. Together, these findings suggest that the relative influence of cultural and temperamental factors on emotion varies by response component.

Keywords: culture, expression, emotion, temperament, behavior

How does culture influence people's emotional responses? Although scientists have long been interested in cultural influences on emotion, they still know remarkably little about how culture shapes emotional response (i.e., the changes in behavior, reports of emotional experience, and physiology that occur during an emotional event). In part, this is because most cross-cultural studies have focused on people's judgments of emotional facial expressions (e.g., Boucher & Carlson, 1980; Chan, 1985; Ekman et al., 1987; Matsumoto & Ekman, 1989), the antecedent events that elicit specific emotions (e.g., Boucher & Brandt, 1981; Matsumoto, Kudoh, Scherer, & Wallbott, 1988; Scherer, Matsumoto, Wallbott, & Kudoh, 1988), and the appraisals associated with specific emotions (e.g., Mauro, Sato, & Tucker, 1992; Mesquita, 2001; Scherer, 1997) rather than people's actual physiological, subjective, and behavioral responses to emotional events. Given the fundamental role that emotion plays in psychological and social functioning and the increasing frequency of cross-cultural exchange in clinical, educational, and occupational settings, ex-

amining cultural variation in emotional response is important. To address this gap in the literature, we compared the emotional responses of European American (EA) couples and Chinese American (CA) couples during an interpersonally meaningful event: while they were discussing an area of conflict in their relationship. Before presenting the study, we briefly review the existing literature.

Cultural Variation in Emotional Response: Previous Empirical Findings

Culture refers to socially shared and transmitted patterns of ideas (values, norms, and beliefs) that are instantiated in everyday practices, institutions, and artifacts (Kroeber & Kluckhohn, 1952). As mentioned above, the role of culture in shaping emotional response under controlled laboratory conditions has been examined in only a handful of studies. In these studies, the researchers compared the mean levels of emotional facial behavior, reports of emotional experience, and/or autonomic reactivity of different ethnic and national groups during an emotion-eliciting event (e.g., while watching films, reliving emotional events, or being exposed to loud noises).¹ With a few exceptions (e.g., Drummond & Quah, 2001; Levenson, Ekman, Heider, & Friesen, 1992; Tsai, Levenson, & Carstensen, 2000), these studies find group differences in emotional behavior and/or reports of emotional experience, against a backdrop of group similarities in autonomic reactivity (e.g., Soto, Levenson, & Ebling, 2005; Tsai, Chentsova-Dutton, Friere-Bebeau, & Przymus, 2002; Tsai & Levenson, 1997). Typically, group differences are interpreted as evidence that emotional responses

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¹ When we use the terms *national* and *ethnic* to describe differences between countries or subgroups within the same country, respectively, we do not assume a priori that these differences are due to cultural factors.

are culturally shaped, whereas group similarities are interpreted as evidence that emotional responses are universal.

There are, however, significant limitations to this research. First, surprisingly few studies have used interpersonal tasks to elicit emotion, despite the fact that many emotional experiences in everyday life occur in social contexts (Frijda & Mesquita, 1994). This is particularly true in many East Asian and other non-Western contexts (Lutz, 1988; Mesquita & Karasawa, 2002). Indeed, cultural values and beliefs about emotion may be particularly relevant during interactions with other people (Tsai & Levenson, 1997).

Second, it is unclear from these studies whether observed differences are due to cultural or temperamental factors. *Temperamental factors* refer to individual differences in emotional reactivity and regulation that appear within the first 7–9 months of life and that remain relatively stable across the life span (Kagan, 1998),² whereas cultural factors refer to shared environmental influences. Temperamental factors are partly genetic and partly environmental in origin; indeed, studies of children and adults suggest that temperamental factors are primarily shaped by a combination of common genetic factors and “nonshared” environmental influences (i.e., environmental influences that vary across different members of the same family, such as peer groups or physical accident or illness) (Bouchard, 1994; Chen et al., 1990; Goldsmith, Buss, & Lemery, 1997; Plomin & Caspi, 1999; Tellegen et al., 1988). Although temperamental factors may also be shaped by shared cultural ideas and practices, shared environmental factors appear to play less of a role than do genetic and nonshared environmental factors (Goldsmith et al., 1997; Goldsmith & Campos, 1986). Therefore, to avoid confusion, we use the term *temperamental factors* to refer to the aspects of emotional reactivity and regulation that are not culturally influenced. Because few cross-cultural studies of emotion include measures of cultural and temperamental factors, when ethnic or national differences in emotional response are observed, it is often unclear whether they are due to cultural factors (the “cultural variation” hypothesis), temperamental factors (the “temperamental variation” hypothesis), or both.

Although both cultural factors and temperamental factors may shape emotional response, findings from the existing literature suggest that their relative influence on emotional behavior, reports of emotional experience, and autonomic reactivity may differ. For instance, pronounced group differences in emotional behavior have been observed in cross-cultural studies of emotion (e.g., Friesen, 1972; Soto et al., 2005; Tsai et al., 2002). In contrast, temperamental factors (i.e., neuroticism and extraversion) are only weakly correlated with spontaneous facial expression (Riggio & Riggio, 2002; Tan, Foo, Chong, & Ng, 2003).³ Together, these findings suggest that, at least in some situations, cultural factors may shape emotional behavior more than temperamental factors.

Similarly, a number of studies have demonstrated ethnic or national differences in reports of emotional experience (e.g., Diener & Suh, 1999; Kitayama, Markus, & Kurokawa, 2000; Scollon, Diener, Oishi, & Biswas-Diener, 2004; Soto et al., 2005), suggesting that cultural factors may shape reports of emotional experience. However, other studies suggest that temperamental factors are moderately to highly correlated with reports of emotional experience (Costa & McCrae, 1980; David, Green, Martin, & Suls, 1997; Emmons & Diener, 1985; Gomez, Cooper, & Gomez, 2000;

Gross, Sutton, & Ketelaar, 1998; Rusting & Larsen, 1997; Schimmack, Radhakrishnan, Oishi, & Dzokoto, 2002). Thus, cultural and temperamental factors may shape reports of emotional experience to an equal degree. Finally, because few researchers have observed ethnic or national differences in autonomic reactivity (for a review, see Levenson, Soto, & Pole, 2005; Tsai, 1999) and temperamental factors have been associated with autonomic reactivity (e.g., Eysenck, 1967), temperamental factors may shape autonomic reactivity more than cultural factors.

A third limitation of existing research is its reliance on group comparisons. In part, this may be because few researchers actually measure the cultural factors that may produce group differences in emotional response. Although ethnic and national groupings are reasonable proxies for cultural values, ideas, and practices, they imply that one group endorses a particular set of cultural values and engages in a particular set of cultural practices, whereas the other group does not. In actuality, however, individuals from different ethnic and national groups may vary only in the degree to which they endorse specific values or engage in particular practices. This may be especially true among different ethnic groups living in the same country. For instance, although Asian Americans may be less individualistic than European Americans, both may strongly endorse individualistic values.

By conducting group comparisons to determine whether or not cultural factors influence emotional response (i.e., treating culture as a dichotomous variable), scientists cannot take full advantage of the cultural variation that exists between and within groups. If we assume that a cultural variable spans ethnic or national groupings, then examining the associations between specific cultural factors and emotional response in a culturally diverse sample (i.e., treating culture as a continuous variable) allows researchers to capitalize on this variation. For instance, to assess how endorsement of collectivistic values is associated with emotional response, in addition to comparing two groups that differ in their endorsement of collectivistic values (e.g., European Americans vs. Chinese Americans), one could examine the relationship between collectivistic values and emotional response across the entire sample of European Americans and Chinese Americans. If collectivistic values are correlated with emotional response, this association should exist regardless of ethnic or national grouping.

The Present Study

Therefore, in the present study, we examined the relative influence of cultural and temperamental factors on emotional response during a meaningful interpersonal task. Dating couples were asked to discuss areas of conflict in their relationships, a task that has proved effective in eliciting both positive and negative emotional responses (Levenson

² Because temperamental factors interact with experience to shape behavior, the behavior of individuals with the same temperament may vary considerably. Moreover, the behavioral expression of temperamental factors may depend on the situation.

³ Various scholars have argued that neuroticism and extraversion are adult versions of temperament (Clark & Watson, 1999).

& Gottman, 1983; Tsai & Levenson, 1997).⁴ We obtained measures of emotional behavior, reports of emotional experience, and autonomic reactivity during the conversations. We also administered measures of temperamental factors (neuroticism and extraversion) and cultural factors (cultural values and orientation) so that we could assess the degree to which group differences in emotional response were explained by these factors. In addition to conducting between-group comparisons, we collapsed across ethnic groupings to assess the relative contribution of specific cultural and temperamental factors to each component of emotional response across the entire sample. By including both cultural and temperamental measures in our analyses, we were able to control for the overlap between the two (Hofstede & McCrae, 2004).

We focused on EA and CA dating couples for three reasons. First, of the studies that have measured multiple components of emotional response, most compare individuals oriented to Western culture (particularly American culture) with those oriented to East Asian cultures (e.g., Chinese or Japanese cultures), and we wanted to be able to place our findings in the context of an existing body of research. Second, ethnographic accounts and empirical studies have shown consistent differences between Western and East Asian samples in temperament (e.g., Ahadi, Rothbart, & Ye, 1993; Freedman, 1974; Klein & Ballantine, 1991; Prior, Kyrios, & Oberklaid, 1986) as well as in their cultural ideas and practices related to emotion (e.g., Russell & Yik, 1996). Thus, we believed that studying European Americans and Chinese Americans would provide sufficient between- and within-group variation to examine the relative influence of cultural and temperamental factors on emotional response. Finally, we focused on European Americans and Chinese Americans because two perspectives have emerged in the literature regarding emotional expression in Western and East Asian cultures, as described below.

Overall Versus Positive Expressiveness

One perspective proposes that members of Western cultures express their emotions more than do members of East Asian cultures (Benedict, 1946; Hsu, 1985; Kleinman, 1986; see review by Russell & Yik, 1996; Song, 1985; Tseng & Hsu, 1969; Wu & Tseng, 1985; Yamamoto & Steinberg, 1981). Indeed, prevailing stereotypes of East Asians as “stoic” and “inscrutable” reflect the notion that East Asians are overall less expressive than their Western counterparts. There is also empirical support for this perspective: Japanese controlled (or masked with smiles) their negative emotions while watching a disgusting film in the presence of an authority figure more than did Americans (Friesen, 1972); mainland Chinese children were less expressive than European American children while watching emotional slides (Camras, Chen, Bakeman, Norris, & Cain, in press), and “more Chinese” Chinese Americans showed less negative emotion than did “less Chinese” Chinese Americans while being exposed to a loud noise (Soto et al., 2005). Chinese Americans also reported experiencing less intense negative emotion than did Mexican Americans while being exposed to loud noises (Soto et al., 2005).

Although these differences may be due to temperamental factors (e.g., Freedman, 1974; Kagan et al., 1994; Lewis, 1989), they have been primarily attributed to cultural factors such as individualism and collectivism (Markus & Kitayama, 1991; Triandis, 1995). Because

many Western cultures are individualistic (i.e., emphasize the importance of individual rights, positive uniqueness, and freedom of expression), individuals are encouraged to openly express their thoughts, desires, and feelings. In contrast, because many East Asian cultures (including those of China, Hong Kong, and Taiwan) are collectivistic (i.e., emphasize the importance of maintaining interpersonal harmony and adjusting one’s thoughts, desires, and feelings to fit in with those of the group), individuals are encouraged to moderate and control their thoughts, desires, and feelings.

Another perspective, however, suggests that members of Western cultures maximize their experience and expression of positive emotion and minimize their experience and expression of negative emotion compared to their East Asian counterparts (Heine, Lehman, Markus, & Kitayama, 1999; Kitayama et al., 2000). There is also empirical support for this perspective: Members of Western cultures consistently report being more satisfied and experiencing more positive affect than do members of East Asian cultures (Diener & Suh, 1999); Americans reported experiencing positive emotions more frequently over the course of a week than did Japanese (Kitayama et al., 2000), and during conversations with their romantic partners, European Americans reported experiencing more positive affect than did Chinese Americans (Tsai & Levenson, 1997). No group differences were observed in reports of negative emotional experience in these studies. In terms of emotional behavior, European Americans smiled more intensely and frequently than did Hmong Americans while they relived happy events from their lives, but did not differ from Hmong Americans in expressions of negative emotion when they relived sad and disgusting events (Tsai et al., 2002). Consistent with these findings, European Americans reported expressing more happiness than did Asian Americans, with no differences in the reported expression of anger, sadness, fear, or shame, and across the entire sample, the more individualistic individuals were, the more likely they were to express happiness (Halim, 2003).

Several scholars suggest that these differences in positive expressiveness are due to cultural factors. Ethnographic accounts and empirical findings suggest that compared with East Asian cultures, Western cultures (in particular, American culture) place a premium on the experience and expression of positive emotions such as happiness, enthusiasm, and cheerfulness (Bellah, Sullivan, Swidler, & Tipton, 1985; Hochschild, 1983; Hoffman, 1989; Markus & Kitayama, 1991; Sommers, 1984; Tsai, Knutson, & Fung, 2006; Wierzbicka, 1994). Interestingly, Western-East Asian differences in the experience and expression of positive emotion have also been attributed to differences in individualism and collectivism. In individualistic cultures, individuals are motivated to “stand out” and differentiate themselves from others by promoting their good qualities and their successes (Heine et al., 1999). In contrast, in collectivistic cultures, individuals are motivated to fit in with others and conform to the expectations of their groups. Thus, in accordance with cultural norms, individuals oriented to Western cultures may be more likely to express positive feelings and less likely to express negative feelings, whereas individuals oriented to East Asian cultures may be more likely to express negative

⁴ Although we used this task in another study (Tsai & Levenson, 1997), we did not obtain measures of emotional behavior or temperamental factors in that study.

Table 1
Sample Demographics

Variable	European American couples (<i>n</i> = 50) <i>M</i> (<i>SE</i>)	Chinese American couples (<i>n</i> = 48) <i>M</i> (<i>SE</i>)
Age (years)	20.78 (0.20)	20.39 (0.20)
Socioeconomic status ^{a*}	3.51 (0.09)	3.24 (0.10)
Years in college	2.65 (0.15)	2.40 (0.15)
Length of relationship (years)	1.84 (0.14)	1.73 (0.14)
Relationship satisfaction ^{b*}	109.37 (1.74)	103.39 (1.78)

^a On a 5-point rating scale, 1 = lower income, 3 = middle income, 5 = upper income. ^b Higher scores indicate greater relationship satisfaction.

* $p < .05$.

feelings for not meeting group expectations or to express the appropriate balance of positive and negative emotions that allow them to “fit in” with others or the situation. In the present study, we examined whether differences in emotional response between European Americans and Chinese Americans were consistent with the *positive expressiveness* or *overall expressiveness* perspectives.

Hypotheses

For the between-group comparisons, we predicted that (a) group differences would emerge in emotional behavior and reports of emotional experience but not in autonomic reactivity, (b) group differences in emotional behavior would be mediated by cultural factors but not temperamental factors, and (c) group differences in reports of emotional experience would be mediated by both cultural factors and temperamental factors. For the analyses conducted on the entire sample, we predicted that (d) cultural factors would account for greater variation in emotional behavior than would temperamental factors, (f) cultural and temperamental factors would account for comparable variation in reports of emotional experience, and (g) temperamental factors would account for greater variation in autonomic reactivity than would cultural factors.

Method

Participants

Ninety-eight heterosexual college-age dating couples (50 EA and 48 CA) were recruited from San Francisco Bay Area colleges and universities via flyers, class announcements, and advertisements. Partners were required to be full-time college students and to have been dating each other exclusively for at least 1 year (mean length of relationship = 1.8 years, $SE = .07$).

EA couples comprised partners who were both of EA descent. EA participants were included in the study if they (a) were born in the United States, (b) had parents who were born in the United States, (c) grew up in households in which English was spoken, and (d) reported that the majority of their friends when they were growing up were also EA.

CA couples comprised partners who were both CA. CA participants were included in the study if they (a) were born in North America,⁵ China, Taiwan, or Hong Kong, (b) had parents who were born in either China, Taiwan, or Hong Kong, (c) grew up in a household in which a Chinese dialect was spoken, (d) proficiently spoke and understood a Chinese dialect, and (f) reported that the majority of their friends when they were growing up were Chinese or CA. Among CA participants, 65.3% were

born overseas, and the rest were born in the United States. For those born outside of the United States, the average length of time spent in the United States was 11.74 years ($SD = 4.18$). Thus, on average, CA participants were exposed to American culture for at least half their lives.

EA and CA couples did not differ in the length of their relationships, age, or years in college; however, EA couples were of higher socioeconomic status than CA couples, $F(1, 96) = 4.17, p < .05$, and reported being more satisfied with their relationships than CA couples, $F(1, 96) = 5.76, p < .05$ (see Table 1 for sample demographics). Because none of the findings changed when we included socioeconomic status as a covariate in our analyses, we do not discuss this variable further. Because previous findings have shown a strong correlation between relationship satisfaction and emotional response (Levenson & Gottman, 1985), we included it as a covariate in our analyses.

Dependent Variables

Areas of disagreement. Before arriving at the laboratory, each partner was asked to complete the Couples Problem Inventory (Gottman, Markman, & Notarius, 1977), adapted for dating couples, in which they rated the perceived severity of 10 relationship issues (e.g., sex, communication, family/friends, and jealousy) on a 0 to 100 scale ranging from 0 (*don't disagree at all*) to 100 (*disagree very much*). During the conflict conversation, partners were asked to discuss the topic that they reported as being the most severe area of disagreement in their relationship.⁶ Chi-square analyses revealed no significant group differences in the areas of disagreements discussed; for both groups, the two most commonly discussed areas of relationship conflict were jealousy (discussed by 22% of EA couples and 19% of CA couples) and communication (discussed by 16% of EA couples and 21% of CA couples). The groups also did not differ in the reported severity of the topic discussed (mean for EA couples = 46.82, $SE = 3.77$; mean for CA couples = 52.64, $SE = 3.77, F(1, 92) = 1.19, ns$).

Relationship satisfaction. Couples completed versions of the Locke–Wallace Marital Adjustment Test (Locke & Wallace, 1959) and the Locke–Williamson Test (Burgess, Locke, & Thomes, 1971), adapted for dating couples. Together, these instruments sample five areas related to couples' relationship satisfaction: (a) agreement about various topics such as money and sex, (b) overall happiness, (c) satisfaction with physical/sexual rela-

⁵ One participant was born in Canada, but moved to the United States during the first year of his life; the rest were born in the U.S.

⁶ In the version adapted for this study, couples also listed the area of disagreement that currently created the greatest amount of conflict in their relationships. If more than one area received the highest rating of severity, the experimenter asked the couple to discuss the area that was listed as the most current area of disagreement.

tions, (d) communication styles, and (e) joint time spent in outside activities. Internal consistency estimates were .83 for EA females, .86 for EA males, .82 for CA females, and .88 for CA males.

Emotional behavior. Two remotely controlled high-resolution video cameras, partially hidden behind darkened glass, were used to record couples' emotional behavior. To record the audio portion of the conversations, a lavalier microphone was clipped to each partner's collar. A team of coders (6 women and 2 men) used the Specific Affect Coding System (SPAFF; Gottman & Krokoff, 1989; SPAFF version 2.0, Gottman, 1989) to measure couples' second-by-second emotional behavior during the conflict conversation.⁷ SPAFF is a reliable and valid coding system devised to measure 17 different emotional behaviors demonstrated by couples during social interaction. During each second of the 15-min conflict conversation, coders identified the emotional behavior displayed by each partner based on the partner's facial expression, vocal tone and pitch, and verbal content; seconds during which partners displayed no emotional behavior were coded as "neutral." Inter-rater reliability, based on one-third of the couples, was high (mean $\kappa = .89$, $SD = .11$). Although all 17 emotional behaviors were coded, we were only interested in the codes that clearly represented positive (interest, affection, humor, happiness, and validation) and negative (fear/tension, disgust, contempt, anger, sadness, shame, and embarrassment) emotional states and that have been recognized across cultures.^{8,9} Because the incidence of any single behavior was low, we created a "positive emotional behavior" aggregate by summing all positive emotional behaviors and a "negative emotional behavior" aggregate by summing all negative emotional behaviors.

To assess the proportions of total emotional behaviors that were positive or negative, we divided the number of seconds during which participants showed positive or negative emotional behaviors by the total number of seconds during which they showed any emotional behavior (i.e., all 17 codes). EA couples and CA couples did not significantly differ in the number of seconds during which they showed emotional behaviors; however, there was a trend toward CA couples showing more emotional behavior than EA couples (mean for EA couples = 228.29, $SE = 17.92$; mean for CA couples = 270.89, $SE = 18.29$, $F(1, 96) = 2.75$, $p < .10$).

Reports of emotional experience. Immediately after the conversation, participants completed an inventory that we have used in previous research, in which they provided "global" reports of how intensely they felt 20 states using a 9-point Likert scale ranging from 0 (*none at all*) to 8 (*the most intense I have ever felt*). We focused on the states that are considered positive (amusement, contentment, excitement, interest, and satisfaction) and negative (anger, anxiety, contempt, disgust, fear, sadness, shame, and embarrassment) emotions. However, the inventory also included a number of states that are not typically viewed as emotions or that have questionable valence (arousal, boredom, confusion, pain, relief, surprise, and tension); for the purposes of the present study, these functioned as "filler" items.¹⁰ To reduce the number of variables we included in our analyses, we created two aggregates (global reports of negative emotional experience and global reports of positive emotional experience) by calculating the means of the reported intensity of negative and positive emotions, respectively. Internal consistency estimates for the positive and negative aggregates were .76 and .81 for EA females, .66 and .81 for EA males, .85 and .84 for CA females, and .89 and .82 for CA males.

In addition, couples were shown a videotaped recording of their conversations. While watching the recording, each partner used a rating dial that traversed a 180-degree path, ranging from 1 (*extremely negative*) to 5 (*neutral*) to 9 (*extremely positive*) to rate how he or she felt during each moment of the conversation. The validity of this approach as a means of obtaining "continuous" reports of emotional experience has been demonstrated elsewhere (Gottman & Levenson, 1985). Mean rating dial responses were computed for each partner during the conflict conversation. Higher values indicated more positive continuous reports of emotional experience.

Autonomic reactivity. Continuous recordings of each partner's autonomic responses, averaged by second, were collected with a Grass model

7 polygraph that was connected to a microcomputer system, using software written by Robert W. Levenson. For specific information regarding physiological signal detection, please see Tsai & Levenson (1997). We used two measures of physiological response that sample the cardiac and electrodermal systems and that are most commonly used in studies of emotional responding: (a) cardiac interbeat interval (milliseconds) and (b) skin conductance level (micromhos).¹¹

For each of the autonomic measures, the mean levels were computed for each partner during the 5-min preinstruction silent interval and during the 15-min conflict conversation. To control for possible group differences in autonomic response during resting baseline, the change in autonomic response for each partner was calculated by subtracting the mean level of autonomic response during the preinstruction silent interval from the mean level of autonomic response during the conflict conversation (Rogosa, 1988).¹² Decreases in cardiac interbeat interval and increases in skin conductance levels indicate increases in arousal.

Cultural values. Before arriving in the laboratory, participants used a 7-point rating scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), to rate how much they endorsed 20 values taken from a variety of value inventories (e.g., Hofstede, 1980; Kluckhohn & Strodtbeck, 1961). We were interested in two types of values. The first type included items such as "Life's uncertainties are what make it so exciting" and "Change is a welcome part of life," which Schwartz (1992) refers to as values related to "openness to change." The second type included items such as "One should lead a balanced life," "One gets into trouble when one does not exert self-control or self-restraint," and "Children should obey their parents," which Schwartz (1992) refers to as values related to "safety/conservation." We focused on these values because previous studies have found that individualistic cultures endorse openness to change values more than collectivistic cultures, whereas collectivistic cultures endorse safety/conservation values more than individualistic cultures (Schwartz, 1992). Therefore, from this point on, we refer to openness to change values as *individualistic* values and safety/conservation values as *collectivistic* values. Internal consistency estimates for the individualistic and collectivistic values were .68 and .67 for EA females, .61 and .65 for EA males, .60 and .55 for CA females, and .68 and .72 for CA males. Although on the low end, these estimates are well within the range reported for measures of

⁷ Half of the coders were Chinese American, and the other half of the coders were European American. Coders viewed an equal number of CA and EA couples.

⁸ The other five behaviors were belligerence, domineering, defensiveness, whining, and stonewalling. There were no significant group differences in these behaviors.

⁹ Although researchers have distinguished between "basic" negative emotions such as anger and disgust and "self-conscious" negative emotions such as shame and embarrassment, the findings were the same for these two types of negative emotion, and therefore, we combined them in our analyses.

¹⁰ There were no significant group differences in these states.

¹¹ We also obtained other cardiovascular (i.e., finger pulse amplitude, pulse transmission time to the ear, pulse transmission time to the finger, and finger temperature) and respiratory (respiratory rate, and intercycle interval) measures. Because there were no group differences in these measures and because they were correlated with cardiac interbeat interval, we only report findings regarding cardiac interbeat interval to conserve space.

¹² We did not use physiological responses during the events-of-the-day conversation as the baseline measure because these conversations varied considerably across couples, with some couples talking only about neutral events and others talking about positive and negative emotional events.

values in other studies (e.g., Oishi, Schimmack, Diener, & Suh, 1998; Tsai et al., 2006).

Cultural orientation. All participants completed the General Ethnicity Questionnaire–American version (GEQA) (Tsai, Ying, & Lee, 2000), which assessed how engaged they were in American practices. In addition, CA participants completed the General Ethnicity Questionnaire–Chinese version (GEQC), which assessed how engaged they were in Chinese practices. For both the GEQA and GEQC, participants use a 5-point Likert type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) to rate 25 items pertaining to their social affiliation, activities, attitudes, exposure, and food and a 5-point scale ranging from 1 (*very much*) to 5 (*not at all*) to rate 13 items pertaining to their language use and proficiency. Internal consistency estimates for the GEQA were .86 for EA females, .88 for EA males, .89 for CA females, and .86 for CA males. Internal consistency estimates for GEQC were .86 for CA females and .89 for CA males. The reliability and validity of the GEQC and GEQA are reported in Tsai, Ying, et al. (2000).

Temperamental factors. To assess temperamental factors, we administered the NEO inventory (NEO–FFI, Costa & McCrae, 1992), which assesses neuroticism and extraversion. Participants rated how strongly they agreed with various statements, using a 5-point rating scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency estimates for neuroticism and extraversion were .80 and .82 for EA females, .84 and .78 for EA males, .84 and .83 for CA females, and .78 and .78 for CA males.

Procedure

The procedures in this experiment were based on procedures originally developed by Levenson & Gottman (1983) and used in subsequent studies (e.g., Roberts & Levenson, 2001; Tsai & Levenson, 1997). Before the laboratory session, couples completed questionnaires at home. Partners were instructed not to see each other for at least 8 hours before the laboratory session. Upon arrival to the laboratory, physiological sensors were attached to each partner by the experimenter. Experimenters were of the same cultural background as participants because previous research suggests that participants perform better and respond in a less biased way when they and their experimenters share a common cultural background (Murphy, Alpert, Moes, & Simes, 1986; Waid & Orne, 1981).

To obtain measures of their autonomic responses at baseline before receiving any experimental instruction (preinstruction silent interval), we asked couples to sit in silence and empty their minds of any thoughts, feelings, and memories for 5 min (a screen was placed in between partners so that they could not see each other). Couples were then asked to discuss the events of their day for 15 min. The purpose of this first conversation was to acclimate couples to the experimental setting. Couples then discussed the greatest area of conflict in their relationships, based on their responses to the Areas of Disagreement Form and as determined by the experimenter.¹³ During the 15-min conflict conversation, the experimenter and Jeanne L. Tsai were in the adjoining room, collecting the autonomic data and recording couples' emotional behavior. Immediately after the conflict conversation, participants provided global reports of their emotional experiences during the conversation. Participants were then shown a videotaped recording of their conversations and instructed to use the rating dial to report how positive or negative they felt during each moment of the conversation.

Data Analyses and Results

In all of the analyses described below, dyad was the primary unit of analysis (i.e., couples were treated as subjects).

Group Differences in Cultural and Temperamental Factors

To ensure that EA and CA couples differed in their orientation to American culture and cultural values, we conducted 2 (Group [EA couples, CA couples]) \times 2 (Partner [female, male]) repeated measures analyses of variance (ANOVA) on responses to the cultural orientation and values measures. Group was treated as a between-subjects factor, and Partner was treated as a within-subjects factor. As predicted, EA couples were more oriented to American culture, $F(1, 96) = 64.08, p < .001$, and endorsed more individualistic values than CA couples, $F(1, 96) = 2.83, p < .10$, although the latter difference was only marginally significant.¹⁴ Also as predicted, CA couples endorsed collectivistic values more than did EA couples, $F(1, 96) = 7.04, p < .01$. Because collectivistic and individualistic values were negatively correlated with each other ($r = -.22, p < .05$) and because EA and CA couples were highly similar in terms of individualistic values, we did not include individualistic values in our subsequent analyses. As shown in Table 2, although CA couples were more oriented to American culture than to Chinese culture, they were still moderately oriented to Chinese culture.

To assess whether the groups differed in temperamental factors, we conducted similar analyses on measures of neuroticism and extraversion. Consistent with findings from previous studies (Jung, 1995; Tsai et al., 2006), CA couples scored higher on neuroticism than did EA couples, $F(1, 95) = 14.40, p < .001$. However, no significant group differences emerged in extraversion (see Table 2 for group means), which contradicts previous findings that European Americans score higher on extraversion than Chinese Americans or other Asian Americans (Jung, 1995; Tsai et al., 2006).

Hypothesis 1: Between-Group Comparisons

Hypothesis 1 predicted that group differences would emerge in emotional behavior and reports of emotional experience but not autonomic reactivity.

Emotional behavior. To examine whether there were group differences in emotional behavior, we first conducted an omnibus 2 (Group [EA couples, CA couples]) \times 2 (Emotion [positive, negative]) \times 2 (Partner [female, male]) repeated measures ANOVA, treating Group as a between-subjects factor and Emotion

¹³ Couples were also randomly assigned to one of two conditions. In one condition (private context), couples discussed their conflict in a room by themselves; in the other (public context), they discussed their conflict in the presence of an authority figure. However, because there were no significant main effects or interactions involving the presence or absence of the authority figure, we do not discuss this factor further.

¹⁴ There was also a significant Group \times Partner interaction, $F(1, 96) = 8.86, p < .01$. Post hoc comparisons revealed that CA women were more oriented to American culture than were CA men, although both were less oriented to American culture than EA participants. EA men and women did not differ in orientation to American culture. There were no significant interactions involving Partner for the rest of the measures.

Table 2
Cultural Factors and Temperamental factors

Variable	European American couples (<i>n</i> = 50) <i>M</i> (<i>SE</i>)	Chinese American couples (<i>n</i> = 48) <i>M</i> (<i>SE</i>)
Cultural factors		
Orientation to American culture ^{a***}	4.06 (0.04)	3.56 (0.04)
Orientation to Chinese culture ^a		2.95 (0.05)
Collectivistic values ^{b***}	5.09 (0.08)	5.41 (0.09)
Individualistic values ^{b†}	5.38 (0.12)	5.09 (0.12)
Temperamental factors		
Neuroticism ^{c***}	2.77 (0.07)	3.15 (0.07)
Extraversion ^c	3.50 (0.06)	3.47 (0.06)

^a 1 = *not at all*, 5 = *extremely*. ^b 1 = *strongly disagree*, 7 = *strongly agree*. ^c 1 = *strongly disagree*, 5 = *strongly agree*.

† *p* < .10. ** *p* < .01. *** *p* < .001.

and Partner as within-subjects factors.¹⁵ The main effect of Group was not significant; however, the Group × Emotion interaction was [Hotelling's trace = .11, $F(1, 96) = 10.48$, $p < .01$]. There were no significant interactions involving Partner.

To decompose the significant Group × Emotion interaction, we conducted separate 2 (Group [EA couples, CA couples]) × 2 (Partner [female, male]) repeated measures ANOVAS on positive and negative emotional behaviors. The main effect of Group was significant for both positive [$F(1, 96) = 6.48$, $p < .05$, Cohen's $d = .55$] and negative [$F(1, 96) = 7.72$, $p < .01$, Cohen's $d = .59$] emotional behaviors. Consistent with the positive expressiveness but not the overall expressiveness perspective, EA couples showed more positive and less negative emotional behavior than did CA couples (see Figure 1). These findings held after controlling for relationship satisfaction. Therefore, as predicted by Hypothesis 1, group differences emerged in emotional behavior.

Reports of emotional experience. To examine whether there were group differences in global reports of emotional experience, we conducted an omnibus 2 (Group [EA couples, CA couples]) × 2 (Emotion [positive, negative]) × 2 (Partner [female, male]) repeated measures ANOVA. There were no significant main effects or interactions involving Group (Positive emotion: mean of EA couples = 1.75, $SE = .15$; mean of CA couples = 1.75, $SE = .15$; Negative emotion: mean of EA couples = 1.27, $SE = .12$; mean of CA couples = 1.43, $SE = .12$). We also conducted a 2 (Group [EA couples, CA couples]) × 2 (Partner [female, male]) repeated measures ANOVA on continuous reports of emotional experience. Again, analyses revealed no significant main effects or interactions involving Group (mean of EA couples = 4.57, $SE = .15$; mean of CA couples = 4.36, $SE = .16$). Therefore, contrary to Hypothesis 1, there were no group differences in reports of emotional experience.

Autonomic reactivity. To examine whether there were group differences in autonomic reactivity, we conducted an omnibus 2 (Group [EA couples, CA couples]) × 2 (Measure [cardiac interbeat interval, skin conductance level]) × 2 (Partner [female, male]) repeated measures ANOVA. Consistent with Hypothesis 1, there were no significant main effects or interactions involving Group (cardiac interbeat interval: mean for EA couples = -21.01, $SE = 5.15$; mean for CA couples = -11.74, $SE = 5.21$; skin

conductance level: mean for EA couples = 1.93, $SE = .26$; mean for CA couples = 1.88, $SE = .26$).¹⁶

In summary, as predicted by Hypothesis 1, group differences emerged in emotional behavior but not in autonomic reactivity. Consistent with the positive expressiveness but not the overall expressiveness perspective, EA couples showed more positive and less negative emotional behavior than did CA couples. Contrary to Hypothesis 1 and previous findings, group differences did not emerge in global or continuous reports of emotional experience.

Hypotheses 2 and 3: Mediators of Group Differences in Emotional Response

Hypothesis 2 predicted that group differences in emotional behavior would be mediated by cultural factors but not by temperamental factors. Hypothesis 3 predicted that group differences in reports of emotional experience would be mediated by both cultural and temperamental factors; however, because no group differences in reports of emotional experience emerged, we did not test this hypothesis.

To test Hypothesis 2, we conducted a series of multiple regressions to evaluate whether the four criteria for mediation were met (Baron & Kenny, 1986; Frazier, Tix, & Barron, 2004). To maintain independence of the data, we treated dyad as the unit of analysis by calculating one score per dyad for each measure of emotional response (averaging across partners within the same dyad) and one score per dyad for each of the predictor and mediator variables. Specifically, we examined whether (a) the independent variable (Group, EA couples = 0, CA couples = 1) was significantly correlated with the outcome variable (emotional behavior), (b) the independent variable (Group) was significantly correlated with the potential mediator (orientation to American culture, collectivistic values, neuroticism, extraversion), (c) the potential mediator (orientation to American culture, collectivistic values, neuroticism,

¹⁵ The main effect of Partner was not the focus of the present article, and, therefore, we do not discuss it further.

¹⁶ No significant effects emerged when we conducted these analyses on mean physiological responses.

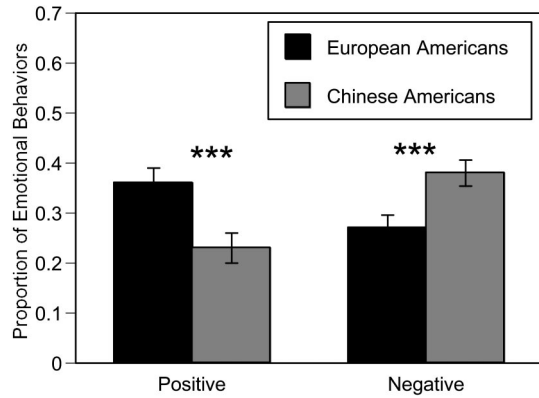


Figure 1. Group differences in emotional behavior. *** $p < .001$.

extraversion) was significantly correlated with the outcome variable (emotional behavior), controlling for the independent variable (Group), and (d) the mediational effect was significant according to the Sobel test. Separate analyses were conducted for each potential mediator. To control for differences in relationship satisfaction, we treated dyadic relationship satisfaction (the mean of each partner's relationship satisfaction) as a covariate.

For positive emotional behavior, the first criterion for mediation was met: Group was correlated with positive emotional behavior ($B = -0.09$, $SE = 0.05$, $\beta = -.18$, $t = -1.83$, $p = .07$), although this association was marginally significant. We continued with the remaining steps because scholars have recently questioned the importance of this first step in demonstrating mediation (Shrout & Bolger, 2002). The second criterion was met for orientation to American culture ($B = -0.43$, $SE = 0.06$, $\beta = -.60$, $t = -7.46$, $p < .001$), collectivistic values ($B = 0.35$, $SE = 0.12$, $\beta = .28$, $t = 2.80$, $p < .01$), and neuroticism ($B = 0.29$, $SE = 0.09$, $\beta = .28$, $t = 3.07$, $p < .01$) but not for extraversion ($B = 0.02$, $SE = 0.08$, $\beta = .03$, $t = 0.28$, ns). The third criterion for mediation, however, was met only for collectivistic values ($B = -0.08$, $SE = 0.04$, $\beta = -.21$, $t = -2.12$, $p < .05$). The Sobel test revealed that this mediational effect was marginally significant (Sobel = -1.71 , $p < .10$), probably due to our relatively small sample size (Frazier et al., 2004).

For negative emotional behavior, the first criterion for mediation was met: Group was significantly correlated with negative emotional behavior ($B = 0.08$, $SE = 0.04$, $\beta = .21$, $t = 2.11$, $p < .05$). As reported above, the second criterion was met for orientation to American culture, collectivistic values, and neuroticism but not for extraversion. The third criterion for mediation, however, was not met for any of these variables.

Therefore, consistent with Hypothesis 2, group differences in positive emotional behavior were partially mediated by cultural factors, specifically collectivistic values. Also consistent with the Hypothesis 2, temperamental factors did not mediate group differences in either positive or negative emotional behavior. Contrary to Hypothesis 2, cultural factors did not mediate group differences in negative emotional behavior.

Hypotheses 4–6: Relative Contribution of Cultural and Temperamental Factors Across the Entire Sample

The previous analyses focused on group comparisons. However, as mentioned earlier, relying on group comparisons overlooks variation that exists within as well as between groups. Thus, although group may serve as a proxy for cultural values and practices, it cannot replace directly measuring these factors. Therefore, in the next series of analyses, we collapsed across groups and conducted a series of hierarchical regressions to test our hypotheses regarding the relative contribution of cultural factors and temperamental factors to each component of emotional response. Hypothesis 4 predicted that cultural factors would account for greater variation in emotional behavior than would temperamental factors; Hypothesis 5 predicted that cultural and temperamental factors would account for comparable variation in reports of emotional experience; and Hypothesis 6 predicted that temperamental factors would account for greater variation in autonomic reactivity than would cultural factors.

As with the mediational analyses, these regressions were conducted on dyadic scores (or the average of partners' scores for each dyad) to maintain independence of the data. The zero-order correlations for emotional behavior, reports of emotional experience, cultural factors, affective traits, and relationship satisfaction are provided in Table 3.

For each component of emotional response, we entered relationship satisfaction at the first step to partial out any variance accounted for by this variable. At the second step, we entered the emotional response variables other than the one that we were predicting (i.e., the criterion variable) because we were interested in the contribution of cultural and temperamental factors to each component of emotional response, independent of the other components of emotional response.¹⁷ At the third step, we entered cultural factors, and at the fourth step, we entered temperamental factors. We conducted the analyses again, reversing the order in which the cultural and temperamental factors were entered. Because the order in which we entered cultural and temperamental factors did not alter the results, we only present the findings from the first order here.

To conserve space and simplify presentation of the results, we only report findings from the steps that involve cultural factors and temperamental factors, that is, the third and fourth steps (results from the other steps are available upon request). If cultural factors significantly contribute to variation in emotional response, then the changes in R-squared should be significant at the third step. If temperamental factors significantly contribute to variation in emotional response, then the changes in R-squared should be significant at the fourth step. If both contribute to variation in emotional response, then the changes in R-squared should be significant at both steps.

Emotional behavior. Hypothesis 4 predicted that variance in emotional behavior would be accounted for by cultural factors more than temperamental factors. Consistent with this hypothesis, for positive emotional behavior, the change in R^2 was significant at the third step [culture: R^2 change = $.07$, $F(2, 89) = 3.94$, $p < .05$], but not the fourth step [traits: R^2 change = $.01$, $F(2, 87) =$

¹⁷ Results were the same when global and continuous reports of emotional experience were entered into the equation.

Table 3
Correlations Among Measures of Emotional Response, Cultural Factors, and Temperamental Factors^a

	Positive behaviors	Negative behaviors	Global positive reports	Global negative reports	Continuous reports	IBI	SCL	Collectivistic values	American orientation	Neuroticism	Extraversion	Rel sat
Positive behaviors	—											
Negative behaviors		-.37***	.32***	-.30**	.42***	.17	-.07	-.24*	.21*	-.13	.11	.34***
Global positive reports			-.01	.25*	-.06	-.01	-.14	.07	-.28**	.20*	-.12	-.28**
Global negative reports				.004	.48***	.21*	-.12	-.01	.10	-.10	.22*	.15
Continuous reports					-.62**	-.12	-.15	.10	-.05	.33***	.04	-.48***
IBI						.20*	-.02	-.09	.06	-.23*	.03	.37***
SCL							-.15	-.17	-.22*	.06	-.02	-.01
Collectivistic Values								-.08	-.04	-.15	.09	.003
American orientation									-.02	.11	-.10	.004
Neuroticism										-.30**	.10	.26**
Extraversion											-.31**	-.45***
												.22*

Note. IBI = cardiac interbeat interval; SCL = skin conductance levels; Rel sat = relationship satisfaction.

^a Based on dyadic scores (i.e., average of partners' scores within each dyad).

* $p < .05$. ** $p < .01$. *** $p < .001$.

0.37, *ns*]. In the final model, positive emotional behavior was significantly correlated with collectivistic values ($B = -0.09$, $SE = 0.04$, $\beta = -.23$, $t = -2.43$, $p < .05$).¹⁸ Also as predicted, for negative emotional behavior, the change in R^2 was significant at the third step [culture: R^2 change = .06, $F(2, 89) = 3.27$, $p < .05$] but not at the fourth step [traits: R^2 change = .002, $F(2, 87) = 0.11$, *ns*]. In the final model, negative emotional behavior was significantly correlated with orientation to American culture ($B = -0.12$, $SE = 0.05$, $\beta = -.26$, $t = -2.41$, $p < .05$).¹⁹

Thus, consistent with Hypothesis 4, cultural factors accounted for a greater percentage of the variance in emotional behavior than did temperamental factors. Specifically, the less collectivistic (or the more individualistic) couples were, the more they displayed positive emotional behavior, and the more oriented couples were to American culture, the less they displayed negative behavior. These findings are consistent with the positive expressiveness perspective, in which being individualistic and being oriented to an individualistic culture are associated with maximizing positive emotion and minimizing negative emotion. Because American orientation was negatively rather than positively correlated with negative emotional behavior, these findings are not consistent with the overall expressiveness perspective.

Reports of emotional experience. Hypothesis 5 predicted that variance in reports of emotional experience would be accounted for by both cultural and temperamental factors. Contrary to prediction, for global reports of positive emotional experience, the change in R^2 was not significant at the third [culture: R^2 change = .01, $F(2, 89) = 0.50$, *ns*] or fourth [traits: R^2 change = .04, $F(2, 89) = 2.06$, *ns*] steps. However, in the final model, the correlation between global reports of positive emotional experience and extraversion approached significance ($B = 0.55$, $SE = 0.29$, $\beta = .20$, $t = 1.92$, $p = .06$). For global reports of negative emotional experience, although the change in R^2 was not significant at the third [culture: R^2 change = .01, $F(2, 89) = 0.50$, *ns*] step, it was significant at the fourth step [traits: R^2 change = .05, $F(2, 87) = 3.57$, $p < .05$]. In the final model, global reports of negative emotional experience were significantly correlated with extraversion ($B = 0.50$, $SE = 0.22$, $\beta = .21$, $t = 2.30$, $p < .05$).²⁰ Neuroticism was also correlated with global reports of negative emotional experience ($B = 0.36$, $SE = 0.19$, $\beta = .19$, $t = 1.84$, $p < .10$), although this correlation was marginally significant. For continuous reports of emotional experience, the change in R^2 was not significant at the third [culture: R^2 change = .00, $F(2, 88) = 0.01$, *ns*] or fourth [traits: R^2 change = .02, $F(2, 86) = 1.05$, *ns*] steps.

Thus, Hypothesis 5 received mixed support. Contrary to Hypothesis 5, cultural factors did not account for a significant percentage of the variance in either global or continuous reports of emotional experience. Also contrary to Hypothesis 5, temperamental factors did not account for significant variance in continuous reports of emotional experience or global reports of positive emo-

¹⁸ Moderator analyses revealed that the relationship between collectivistic values and positive emotional behavior held across groups.

¹⁹ Moderator analyses revealed that the relationship between orientation to American culture and negative emotional behavior held across groups.

²⁰ Moderator analyses revealed that Group did not moderate relationships between neuroticism and extraversion and global reports of emotional experience.

tional experience, although there was a marginally significant correlation between global reports of positive emotional experience and extraversion. However, consistent with Hypothesis 5, temperamental factors did account for a significant percentage of the variance in global reports of negative emotional experience. The more neurotic and extraverted couples were, the more intense were their global reports of negative emotional experience.

Autonomic reactivity. Finally, Hypothesis 6 predicted that temperamental factors would account for greater variation in cardiac interbeat interval and skin conductance levels than would cultural factors.²¹ Contrary to Hypothesis 6, for cardiac interbeat interval, the change in R^2 was significant at the third step [culture: R^2 change = .08, $F(2, 88) = 3.93, p < .05$], but not the fourth step [traits: R^2 change = .004, $F(2, 86) = 0.19, ns$]. In the final model, cardiac interbeat interval was significantly correlated with orientation to American culture ($B = -24.48, SE = 10.58, \beta = -.25, t = -2.31, p < .05$).²² Also contrary to Hypothesis 6, for skin conductance levels, the change in R^2 was not significant at the third [culture: R^2 change = .01, $F(2, 88) = 0.48, ns$] or fourth [traits: R^2 change = .03, $F(2, 86) = 1.20, ns$] steps.

Thus, contrary to Hypothesis 6, temperamental factors did not account for significant variance in cardiac interbeat intervals or in skin conductance levels. Unexpectedly, cultural factors accounted for a significant percentage of the variance in cardiac interbeat interval. Specifically, greater orientation to American culture was associated with decreases in cardiac interbeat interval (or increases in cardiovascular arousal).

Discussion

In the present study, we examined the degree to which cultural and temperamental factors accounted for variation in emotional response during an interpersonal task. Although most emotional experiences occur in the presence of others, few studies have actually used interpersonal tasks to compare the emotional responses of individuals from different cultural contexts.

Cultural Factors Shape Emotional Behavior More Than Temperamental Factors

Three findings support the cultural variation hypothesis for emotional behavior: (a) group differences emerged in both positive and negative emotional behavior, (b) group differences in positive emotional behavior were partially mediated by collectivistic values, and (c) collapsing across groups, cultural factors (i.e., collectivistic values and orientation to American culture) were negatively correlated with positive and negative emotional behavior, respectively. Contrary to the temperamental variation hypothesis, group differences in emotional behavior were not mediated by temperamental factors (i.e., neuroticism and extraversion), nor were temperamental factors associated with positive or emotional behavior across the entire sample. Indeed, analyses revealed that cultural factors accounted for 6–7% of the variance in emotional behavior, whereas temperamental factors accounted for 0–1% of the variance in emotional behavior. Thus, the findings support theoretical suggestions that emotional behavior is, to some degree, influenced by cultural factors (Ekman, 1971; Wierzbicka, 1994). Our findings are also consistent with results from twin studies of

toddlers, which showed that expressions of positive emotion are accounted for more by shared environmental factors than by genetic factors (Goldsmith, Buss, & Lemery, 1997). These findings suggest that previously observed group differences in emotional behavior generalize to interpersonal tasks.

Reports of Emotional Experience and Autonomic Reactivity Are Differentially Associated With Cultural and Temperamental Factors

To a lesser degree, our findings also raise the possibility that temperamental factors and cultural factors may differentially shape global reports of negative emotional experience and cardiovascular reactivity. Contrary to prediction, group differences did not emerge in reports of emotional experience. Indeed, cultural factors accounted for only 0–1% of the variation in global or continuous reports of emotional experience. It is possible that by asking couples to talk about their greatest areas of disagreement (which were similar across groups), we elicited a specific type of emotional experience. This may have minimized cultural differences that might have emerged in a more emotionally ambiguous situation.

Instead, temperamental factors accounted for 5% of the variance in global reports of negative emotional experience and 4% of the variance in global reports of positive emotional experience (although the latter did not result in a significant change in R^2). These findings concur with other research findings suggesting that people's global reports of emotional experience reflect their dispositional affective styles (e.g., Costa & McCrae, 1980; David et al., 1997; Emmons & Diener, 1985; Gross, Sutton, & Ketelaar, 1998; Schimmack et al., 2002). Furthermore, these findings raise the possibility that ethnic and national differences in reports of emotional experience observed in previous studies may have been, at least in part, due to group differences in temperamental factors.

Although temperamental factors accounted for greater variation in global reports of emotional experience than did cultural factors, neither temperamental factors nor cultural factors were significantly associated with continuous reports of emotional experience. These findings are consistent with studies that show that temperamental factors are more strongly correlated with global than continuous reports of emotional experience and that suggest online ratings may be less shaped by cultural and temperamental factors than global ratings (Feldman Barrett, 1997; Oishi, 2002; Robinson & Clore, 2002).

Contrary to expectation, cultural factors accounted for a greater percentage of variance in cardiac interbeat interval than did affective traits (8% vs. 1%). Specifically, the more oriented couples were to American culture, the more aroused they were during the conflict conversation. Because few studies have shown links between cultural factors and autonomic reactivity and because no such relationship was found for skin conductance levels, this finding requires future replication. However, if replicated, these

²¹ In these analyses, global reports of positive and negative emotional experience were simultaneously entered in the same step.

²² Moderator analyses revealed that Group did not moderate the relationship between orientation to American culture and cardiac interbeat interval.

findings may not only suggest that physiological responses may be influenced by culture, but might also contradict theories proposing that neuroticism and extraversion are associated with physiological arousal (Eysenck, 1967).

Cultural Differences in Positive Expressiveness

Observed differences in emotional response did not support previous findings that European Americans are more expressive than Chinese Americans overall. In the present study, EA couples showed more positive and less negative emotional behavior than did CA couples. These findings are consistent with descriptions of Americans and members of other individualistic cultures as maximizing their positive and minimizing their negative emotions to stand out or positively differentiate themselves from others.

Interestingly, the present study is one of the first to show that European Americans expressed less negative emotional behavior than Chinese Americans. We suspect that this may be due to the nature of the task used in the present study. Having participants talk about areas of conflict with their partners is not only personally meaningful, but also involves people with whom partners are engaged in significant relationships. In other words, this task represents the kinds of situations in which emotional expression matters. Thus, European Americans may have been particularly motivated to assert their "positive" and "unique" selves, and Chinese Americans may have been particularly motivated to acknowledge that they had not met their partners' expectations.

In future studies, researchers should assess other cultural factors that may more directly shape emotional response such as participants' display rules and norms regarding emotional experience or affect valuation (i.e., the affective states that participants ideally want to feel), for which robust cultural differences have been observed (e.g., Eid & Diener, 2001; Matsumoto, 1990; Tsai et al., 2006). For example, future researchers could examine whether cultural differences in positive emotional expressions are due to cultural differences in the valuation of high- versus low-arousal positive states (Tsai et al., 2006).

Treating Culture as Dichotomous Versus Continuous

Our findings were based on two sets of analyses. In the first set of analyses, we treated culture as a dichotomous variable by comparing group means. In the second set of analyses, we treated culture as a continuous variable by collapsing across groups and examining the associations between cultural and temperamental factors and emotional response measures in the entire sample. For emotional behavior, findings from both sets of analyses converged. For reports of emotional experience and measures of autonomic reactivity, however, collapsing across groups revealed associations that between-group comparisons did not. These findings not only underscore the importance of directly measuring the variables of interest but also suggest that relying solely on between group comparisons may obscure meaningful relationships.

Limitations and Future Directions

The present study has several limitations that point to the need for future research. First, because our sample participants lived in

the United States, the degree of variation in cultural and temperamental factors in our sample may have been restricted in range. Indeed, this fact may explain why we found no group differences in reports of emotional experience. Future studies that include non-American participants may reveal that the amount of variance in emotional response due to cultural factors may be greater than observed in the present sample.

Second, our measures of cultural and temperamental factors were limited in a number of ways. The reliability of our measure of cultural values was on the low end; in future studies, researchers should use more reliable self-report measures of cultural values (e.g., the Asian Values Scale; Kim, Atkinson, & Yang, 1999). In addition, there was some overlap in the content of the inventories used to assess neuroticism and negative emotional experience, and therefore, it is possible that some of the shared variance between neuroticism and reports of negative emotional experience was due to this overlap. Thus, future studies should use measures of neuroticism and emotional experience that do not have overlapping items. Furthermore, with recent technological advances, future researchers can begin to use more precise measures of environmental and genetic factors that will allow them to examine how the two interact and influence each other (Boomsma, Busjahn, & Peltonen, 2002).

Third, future studies should include other emotion-eliciting tasks as well as other measures of emotional response (e.g., neural activity) to assess the generalizability of the current findings and to help identify the conditions under which cultural differences in self-report, behavior, and/or physiology are likely to occur.

Finally, in the present study we examined the relative influences of cultural and temperamental factors at one moment in time. However, both cultural and temperamental factors are dynamic influences that interact with situational contingencies to shape behavior. Therefore, future researchers should examine how cultural and temperamental factors shape emotional responding in different situations. In addition, future researchers should examine how changes in cultural factors (e.g., through migration) and temperamental factors (e.g., through medication) alter emotional response over time. Such studies would allow us to establish causality in ways that the present study does not.

Despite these limitations, this study expands our current understanding of cultural influences on emotional response in several ways. First, the study demonstrates that cultural factors shape emotional behavior above and beyond temperamental factors. Second, the study demonstrates that during an interpersonally meaningful task, EA couples show more positive and less negative emotional behavior than their CA counterparts. Third, the study suggests that the influence of cultural and temperamental factors on emotional response may vary by response component. Indeed, this finding may explain why emotional behavior, reports of emotional experience, and autonomic reactivity are often only weakly correlated with each other (e.g., Bradley & Lang, 2000). Finally, by collapsing across ethnic groupings and measuring specific cultural factors and temperamental factors, the study provides another way of examining cultural and temperamental influences on emotional response that capitalizes on the variability that exists within and between groups. Together, these findings take us closer to understanding how and why people differ in their responses to emotional events.

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