

Gender differences in emotional response among European Americans and Hmong Americans

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The present study examined the effects of gender on the emotional responses (physiology, self-reports of emotion, and emotional facial behaviour) of European Americans (EA) and Hmong Americans (HA) while they relived past emotional events. Women were more emotionally reactive than men: They demonstrated greater changes in electrodermal reactivity overall, reported experiencing more intense emotion while reliving anger and love, and smiled more while reliving happiness and love. The pattern and magnitude of these differences were similar for EA and HA, suggesting that to some degree, the effects of gender on emotional response may hold across ethnic groups.

Stereotypes regarding gender differences in emotion are widely endorsed by members of American culture (Fabes & Martin, 1991; Hess, Senécal, Kirouac, Herrera, Phillipot, & Kleck, 2000; Plant, Hyde, Keltner, & Devine, 2000; Stoppard & Gruchy, 1993; Timmers, Fischer, & Manstead, 2003). In particular, women are believed to express prosocial emotions (e.g., happiness, love) and emotions that imply vulnerability (e.g., sadness) more frequently and intensely than men, whereas men are believed to express

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emotions that imply dominance (e.g., anger and pride) more frequently and intensely than women (Grossman & Wood, 1993; Hess et al., 2000; Plant et al., 2000).

Only a handful of empirical studies, however, have examined whether these stereotypes describe men and women's *actual* emotional responses (i.e., the changes in physiological response, self-reports of emotion, and emotional facial behaviour that occur during an emotional event). Consequently, we know surprisingly little about the accuracy of prevailing gender stereotypes.¹ Moreover, because most studies have focused on European American samples, the degree to which gender differences in emotion generalise to other ethnic and national groups remains unclear. Therefore, in this paper, we report findings from a study that examines whether the effects of gender on different components of emotional response (i.e., autonomic activity, self-reports of emotion, or emotional facial behaviour) generalise to different emotions (anger, disgust, sadness, happiness, pride, and love) across different ethnic groups (European Americans and Hmong Americans). Prior to presenting our study, we briefly review the empirical literature on gender and emotional response.

Gender and emotional response: Previous empirical findings

Although many studies have examined gender differences in a variety of emotional phenomena, such as memory for different emotional events (Seidlitz & Diener, 1998), nonverbal communication of emotion (Buck, Miller, & Caul, 1974; Wagner, Buck, & Winterbotham, 1993), and judgments of nonverbal cues (see Hall, Carter, & Horgan, 2000, for a review), relatively few studies have examined how gender effects emotional response under controlled laboratory conditions. These studies are critical not only because they most directly test the accuracy of gender stereotypes, but also because they may reveal the specific conditions under which gender differences in emotional response emerge. Despite being limited in number, these studies reveal some consistent gender differences in emotional behaviour and self-reports of emotion.

Emotional behaviour. Consistent with gender stereotypes, empirical studies that measure emotional behaviour find that women show more emotional behaviour than men (Becht & Vingerhoets, 2002; Bradley,

¹ We have chosen to use the term "gender" rather than "sex" to describe differences in emotional response between men and women. While "sex" refers to biological differences between men and women, "gender" refers to both biological *and* psychosocial differences (Unger, 1979).

Codispoti, Sabatinelli, & Lang, 2001; Buck et al., 1974; Dimberg & Lundquist, 1990; Halberstadt, Hayes, & Pike, 1988; Hall et al., 2000; LaFrance & Hecht, 2000; Vingerhoets & Scheiers, 2000). For example, one study found that during conversations about their emotional experiences, women smiled more than men (Halberstadt et al., 1988). Similarly, women showed more corrugator activity (associated with negative affect; see Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000, for a review), in response to negative-emotion-inducing slides (Grossman & Wood, 1993) and emotional scenarios (Vrana & Rollock, 2002). Moreover, studies that ask participants to describe their own facial behaviours (Becht & Vingerhoets, 2002; Vingerhoets & Scheiers, 2000) find that women report expressing their emotions more than men do (Fischer & Manstead, 2000; Grossman and Wood, 1993), suggesting that they are somewhat aware of these differences. Some studies suggest that the magnitude of gender differences in emotional behaviour varies by context. For example, gender differences in smiling are particularly pronounced in settings that enhance participants' self-consciousness (e.g., where video cameras recording facial behaviour were clearly visible) or that require self-disclosure (LaFrance & Hecht, 2000; LaFrance, Hecht, & Paluck, 2003).

Self-reports of emotion. During a variety of emotion-eliciting tasks (e.g., in response to emotion-inducing slides, hypothetical emotional vignettes, and emotional imagery), women report experiencing emotions more frequently and more intensely than do men (Bradley et al., 2001; Brody, 1997; Grossman & Wood, 1993; Schimmack, Oishi, & Diener, 2002). Women also report experiencing emotions more frequently and more intensely in retrospect than do men (Fischer & Manstead, 2000; Grossman & Wood, 1993; Hess et al., 2000). The one exception to this pattern of findings is a study in which participants viewed film clips that elicited sadness, disgust, fear, anger, and happiness and in which no gender differences in self-reports of emotion were observed (Kring & Gordon, 1998). Interestingly, this study did observe gender differences in emotional behaviour across all films, suggesting that even when men and women report feeling emotion at similar intensities, women show more emotional behaviour than men.

Physiology. Few studies have examined the effects of gender on the physiological components of emotional response. Among those that have, the pattern of results has been mixed. Studies eliciting emotions on-line (via films and during conversations with spouses) report higher levels of physiological reactivity among men than women for some emotions (anger, fear). For example, Kring and Gordon (1998) found that although men showed less emotional behaviour than women during fear and anger eliciting films, they were *more* physiologically aroused (as measured by skin

conductance response) than women. These findings are consistent with those of Gottman and Levenson (1992), in which husbands were more physiologically aroused than their wives during discussions about areas of conflict in their relationships. However, other studies have observed no gender differences in physiological reactivity. For instance, Vrana and Rollock (2002) found that although European American women reported experiencing more intense emotion and showed more emotional facial behaviour than men during an imagery task, there were no gender differences in heart rate or skin conductance levels. Similarly, no gender differences emerged in skin conductance levels in response to emotionally evocative slides (Bradley et al., 2001; Buck et al., 1974). Together, these findings raise the possibility that gender differences in physiological reactivity may vary by emotion-eliciting task.

In summary, existing studies of gender and emotional response suggest that in terms of emotional behaviour and self-reports of emotion, women are more emotional than men, even for emotions like anger, for which stereotypes suggest that men are more emotional than women. Gender differences in physiological reactivity, however, are more elusive.

Limitations of previous empirical studies

Studies of gender and emotional response, however, are limited in several ways. First, these studies have typically been limited in terms of the types of emotional responses they have measured. For instance, to the degree that studies have examined the effects of gender on emotional behaviour, most studies have focused on smiling (Halberstadt et al., 1988; LaFrance & Hecht, 2000), and to the degree that studies have examined self-reports of emotion, most have focused on retrospective reports (Fischer & Manstead, 2000; Grossman & Wood, 1993; Hess et al., 2000). As a result, it is unclear whether gender differences emerge for other types of emotional behaviours and for on-line ratings. Indeed, findings from one study suggest that gender affects retrospective self-reports of emotion more than on-line self-reports of emotion (Seidlitz & Diener, 1998). Second, most studies have focused on a limited number of emotions (e.g., sadness and happiness), and therefore, the effects of gender on more complex emotions such as pride and love are unknown. Third, with only a few exceptions (Gottman & Levenson, 1992; Halberstadt et al., 1988), most studies have examined gender differences in emotional response using standardised stimuli. Thus, it would be important to examine how gender affects emotional responses to more personally meaningful stimuli.

Finally, only a handful of studies on gender and emotion have included cross-cultural samples or compared different ethnic groups living in the

United States (Becht & Vingerhoets, 2002; Brody, 1997; Fischer & Manstead, 2000; LaFrance & Hecht, 2000; Rodriguez Mosquera, Manstead, & Fischer, 2002; Vrana & Rollock, 2002), and therefore it is unclear how generalisable observed gender differences in emotional response are. Indeed, several studies suggest that gender differences in emotional response may not generalise across different ethnic groups. For instance, Vrana and Rollock (2002) found that the gender differences in self-reports of emotion and emotional facial behaviour in response to hypothetical emotional scenarios that were observed for European American college students were not replicated in a sample of African American college students. Similarly, Brody (1997) found that while European American women reported experiencing more intense emotions than European American men, no such differences emerged for Asian/Asian American women and men. Finally, in a meta-analysis of studies on gender and smiling, LaFrance and colleagues found that although both European American and Asian women tended to smile more than European American and Asian men, respectively, gender differences were more pronounced for European Americans (i.e., the effect size was larger; LaFrance & Hecht, 2000; LaFrance et al., 2003). These differences have been attributed to culture-specific gender roles and gender stereotypes (Vrana & Rollock, 2002) as well as to the greater emphasis placed on collectivism and interdependence (for *both* men and women) in many non-Western samples (Brody, 1997). However, before identifying the specific cultural factors that may interact with gender to shape emotional response, more studies are needed to examine whether gender differences in emotional response emerge across different ethnic groups. Indeed, only one study (Vrana & Rollock, 2002) has examined the effects of gender on multiple components of emotional response in different ethnic groups (i.e., African Americans and European Americans).

The present study

The study presented here attempts to address these gaps in the literature.² First, we examined the effects of gender on a variety of emotional facial behaviours in addition to smiling. Specifically, we used the Facial Action Coding System (FACS) to examine various emotional behaviours. In addition, we sampled on-line self-reports of emotion. Second, we sampled

² The present study was part of a larger study, in which we compared the emotional responses of European Americans and Hmong Americans (Tsai, Chentsova-Dutton, Friere-Bebeau, & Przymus, 2002). In that paper, we focused on the main effects of Ethnicity rather than Gender.

a range of emotional states that included “basic” emotions (anger, disgust, sadness, happiness) as well as more complex states (pride and love). Third, we used an emotion-eliciting task that was personally meaningful; specifically, we asked people to relive past emotional events. Fourth, in addition to studying European Americans, we included Hmong Americans, who were exposed to both American and Hmong cultures. Like other Asian cultures, Hmong culture is more collectivistic and encourages greater emotional moderation and control than American culture (Cerhan, 1990; Lee, 1995; Lee, 1996; Uba, 1994). Therefore, by including Hmong Americans, we could examine whether the effects of gender on emotional response generalised to a culturally different ethnic group.

Hypotheses

Based on previous findings, we predicted that across ethnic groups, women would show more emotional facial behaviour and report more emotion while reliving past emotional events. We did not make any predictions about physiological response, given the mixed nature of previous findings. Also, based on previous work, we hypothesised that the magnitude of gender differences in emotional behaviour and self-reports of emotion would be smaller for Hmong Americans than for European Americans.

METHOD

Participants

Forty-nine male (25 European American, EA, 24 Hmong American, HA) and 49 female college students (23 EA, 26 HA) from a large mid-Western university were recruited to participate in the study through the psychology subject pool, flyers, and class announcements. Participants received \$10 per hour or research credit for their participation. One-way analyses of variance (ANOVA) and chi-square analyses revealed no significant main effects or interactions involving Gender or Ethnicity in age, year in college, annual income or employment status (see Table 1). However, there were significant main effects of Gender and Ethnicity on GPA. Female participants reported higher grade-point-averages (GPA) than did male participants, $F(1, 78) = 5.48, p < .05$; and EA ($M = 3.20, SD = 0.45$) reported higher GPAs than HA ($M = 2.77, SD = 0.57$), $F(1, 78) = 16.33, p < .01$. There was no significant Gender \times Ethnicity interactions for GPA. Controlling for these differences in GPA did not change our results, and therefore, this variable will not be discussed further.

TABLE 1
Sample demographics

	<i>Means (SD) and percentages</i>	
	<i>Females</i>	<i>Males</i>
Age	20.20 (1.88)	20.55 (2.38)
Born in the US (%)	61.2	65.3
Year in college	2.55 (1.32)	2.43 (1.24)
Grade point average*	3.14 (0.47)	2.91 (0.59)
Employment status (% working)	69.1	70.6
Annual income (%)		
\$10,000 or less	69.4	76.5
\$20,000–30,000	16.7	17.6
\$40,000–50,000	13.9	5.9

Note: * $p < .01$.

To increase the cultural homogeneity of the HA sample, HA participants were included in the study if they were: (1) born in either Laos, Thailand, or the United States; (2) had Hmong parents who were born and raised in Laos; and (3) were fluent in both Hmong and English. EA participants were included in the study if they were: (1) born in the United States; (2) had EA parents and grandparents who were born and raised in the United States; and (3) fluent in English. Predictably, HA and EA were significantly different in their place of birth, $\chi^2(2, N=98)=54.63, p < .01$, and reported proficiency in speaking ($M=4.41; SD=0.76$ for HA; $M=4.98; SD=0.94$ for EA), $F(1, 93)=25.44, p < .01$, understanding ($M=4.48; SD=0.75$ for HA; $M=5.00; SD=0.00$ for EA), $F(1, 92)=23.55, p < .01$, and writing English ($M=4.48; SD=0.75$ for HA; $M=4.96; SD=0.20$ for EA), $F(1, 92)=18.52, p < .01$. HA ($M=17.53; SD=2.84$) spent fewer years in the United States than did their EA counterparts ($M=20.54; SD=2.37$), $F(1, 96)=32.35, p < .01$. Among HA born overseas, women ($N=19$) came to the United States at younger ages than did men ($N=17$), Mean for HA women = 2.04, $SD=1.78$; Mean for HA Men = 4.69, $SD=3.36$; $F(1, 34)=9.08, p < .01$.

Cultural orientation. The General Ethnicity Questionnaire – American version (GEQ-A; Tsai, Ying, & Lee, 2000) and the General Ethnicity Questionnaire – Hmong version (GEQ-H; Tsai, 2001) were administered to assess orientation to American and Hmong cultures, respectively. While HA completed both measures, EA completed the GEQ-A only. Both the GEQ-A and GEQ-H assess cultural orientation in specific life domains including social affiliation (e.g., “Now, my friends are American/Hmong”), activities

(e.g., “I engage in American/Hmong forms of recreation”), attitudes (e.g., “I am proud of American/Hmong culture”), exposure (e.g., “I was raised in a way that was American/Hmong”), food (e.g., “At home, I eat American/Hmong food”), and language (e.g., “How fluently do you speak English/Hmong?”). Participants rated 38 items on a 5-point Likert scale (1 = *very much*, 5 = *not at all*). This measure had adequate internal consistency (GEQA: .87 for EA, .83 for Hmong; GEQH: .88 for Hmong; for additional information about the instrument’s psychometric properties see Tsai, 2001). Findings indicated that although HA students reported being moderately oriented to Hmong culture, on average they were more oriented to American ($M = 3.80$, $SD = 0.38$) than to Hmong culture ($M = 3.36$, $SD = 0.47$). These findings are consistent with the fact that HA in this sample were either born in or immigrated to the USA in early childhood. EA were more oriented to American culture ($M = 4.10$, $SD = 0.36$) than HA ($M = 3.80$, $SD = 0.38$), $F(1, 95) = 16.42$, $p < .01$. There were no significant main effects or interactions involving Gender.

Task

In previous studies, the relived emotion task has been shown to be an effective elicitor of emotional response (Levenson, Carstensen, Friesen, & Ekman, 1991). Participants recalled and relived six emotions (anger, sadness, disgust, happiness, love, and pride); the order of the emotions was randomised to avoid order effects. Participants were asked to recall a time in their lives when they felt the target emotion very strongly and to describe the event to the interviewer. For each relived emotion, participants were provided with a label for the targeted emotion (e.g., “sadness”), as well a description of this emotion based on Lazarus (1991) (e.g., “A time when you felt that you lost something or someone that you might never get back, so that you wanted to stop doing things and withdraw from others”). Participants were then asked to relive the target emotion. Participants pressed a button on a handheld switch to indicate when they began to relive the emotion. They depressed the button when they stopped reliving the emotion or when they were told to stop (after two minutes).

After each relived emotion, participants used a 9-point Likert scale (0 = *not at all*, 8 = *the most in my life*) to rate how strongly they experienced the target emotion when it originally occurred and while they were trying to relive it. To control for individual differences in the ability to relive emotions, participants were also asked to rate how able they were to relive each target emotion on a 9-point Likert scale (0 = *not at all able*, 4 = *moderately able*, and 8 = *extremely able*). Participants were in a room by themselves when they were reliving their emotions and spoke to interviewers through a small

microphone attached to their shirt collars. Interviewers were in an adjacent room and spoke to participants through an intercom.

Procedure

Upon arrival at the laboratory, participants were greeted by a trained female interviewer of the same ethnicity as themselves.³ Participants completed the demographic questionnaire and measure of cultural orientation. Interviewers then attached the physiological sensors to participants. Before the relived emotion task, participants were instructed to be silent and relax for three minutes to obtain a baseline measure of their physiological responses and facial behaviour. Participants then completed an emotion inventory. Next, participants underwent a practice trial, during which they attempted to relive a time in their lives when they felt surprised. Participants then relived the six emotions of interest (i.e., anger, disgust, happiness, sadness, love, and pride).

Apparatus and dependent measures

Emotional behaviour. Remotely controlled, high-resolution colour video cameras recorded participants' facial behaviour during the study. Cameras were hidden from participants' view behind darkened glass in a bookshelf. Facial behaviour was scored using Ekman and Friesen's (1978) Facial Action Coding System (FACS). FACS identifies visually distinguishable and anatomically based units of facial muscle movements ("action units," or AUs). Three certified female FACS coders blind to the emotion that participants were reliving scored every AU or combination of AUs that occurred during the baseline and relived emotion periods. In order to establish interrater reliability, one-fifth of all videotapes were coded by all raters. Interrater reliability was determined by calculating the ratio of the number of agreements to the total number of agreements and disagreements (Rosenberg & Ekman, 1994). The mean agreement ratio for scoring AUs was 0.97 (range = 0.70 to 1.0).

AUs that met the FACS requirement for at least slight intensity (Ekman & Friesen, 1978) were included in facial behaviour composites for each emotion. AU combinations were grouped into specific emotion categories (contempt, disgust, happiness, general positive and general negative expressions) on the basis of previous empirical findings (Alvarado & Jameson, 1996; Dimberg & Lundquist, 1988; Ekman & Friesen, 1975; Keltner, 1997;

³ Hmong interviewers were bilingual, but all instruments and instructions were delivered to participants in English. Participants were told that they could speak Hmong when they needed to do so, but none actually did.

Keltner & Buswell, 1997; Rosenberg, Ekman, & Blumenthal, 1998; Rozin, Lowery, & Ebert, 1994; Sayette & Hufford, 1995; SPAFF manual, as cited in Gottman & Levenson, 1992; Wiggers, 1982). The specific emotional facial behaviours that we included in our analyses differed for each relived emotion. For relived *anger*, we coded the occurrence of general negative expressions (formed by AU 4) and/or expressions of contempt (formed by unilateral AUs 10, 12 and 14; expressions of anger were subsumed under general negative expressions since they involve AU 4). For relived *disgust*, we coded the occurrence of general negative expressions and expressions of disgust (formed by AUs 9 and 10). For relived *sadness*, we coded the occurrence of general negative expressions and crying. For relived *happiness*, *love*, and *pride*, we coded the occurrence of non-Duchenne or “social” smiles (formed by AU 12) and the occurrence of Duchenne or “felt” smiles (formed by AUs 6+12). Very few Duchenne smiles occurred during relived love and pride and therefore we do not discuss them further. We scored the frequency of the action units in accordance with the FACS manual (Ekman & Friesen, 1978). However, because the distribution of the frequency variables was skewed, we converted these variables to binary occurrence scores (0 = no occurrence, 1 = occurrence). Analyses were conducted on the percentages of participants who showed the target emotional behaviours for each gender and ethnic group.

Self-reports of emotion. A self-report emotion inventory consisting of 25 emotion terms was administered to participants during the baseline period. The inventory included happiness, love, pride, anger, disgust, and sadness; the remaining emotion terms served as fillers. For each of the emotion terms, participants rated how they felt at the moment using an anchored 9-point Likert scale (0 = *no emotion*, 4 = *moderate emotion*, and 8 = *the most you have felt in your life*). Immediately following each relived emotion, participants were asked to rate how intensely they experienced the target emotion: (1) at the time the event originally occurred; and (2) when they relived the emotional event in the lab. We then calculated the change in self-reports of emotion by subtracting mean self-reports of emotion during baseline from mean self-reports of emotion during the relived emotion period.

*Electrodermal activity.*⁴ A system consisting of a Dell Pentium computer, HPVEE software, and Coulbourn Lab Link V bioamplifiers was used to obtain continuous recording of skin conductance level (SCL). A constant-voltage device was used to pass a small voltage between silver–silver chloride

⁴ Although a variety of cardiovascular and respiratory measures were obtained, only electrodermal activity changed significantly from baseline and therefore we focus only on this channel of autonomic activity.

(Ag–AgCl) electrodes filled with paste (one part 0.15 molar NaCl and 2 parts Unibase). The electrodes were attached to the palmar surface of the middle phalanxes of the first and third fingers of the non-dominant hand. SCL was measured in micromhos. Second-by-second recording of skin conductance level was averaged during the baseline period and during the relived periods for each emotion. To calculate the change in SCLs, we subtracted mean SCLs during baseline from mean SCLs during each relived period.⁵

RESULTS

To test our hypotheses, we conducted analyses of variance (ANOVA) for normally distributed variables (i.e., self-reports of emotion) and non-parametric tests for variables that violated assumptions of normality and homogeneity of variance (i.e., changes in levels of skin conductance) and for categorical variables (i.e., emotional facial behaviour). Gender and Ethnicity were treated as between-subjects factors. To examine whether the magnitude of the gender differences varied across ethnic groups when a significant main effect of Gender or Gender \times Ethnicity interaction emerged, we calculated and compared the effect sizes for Gender separately for EA and HA.

Ability to relive emotions and self-reports of emotion during original emotional events

Before testing our hypotheses, we examined whether there were differences between men and women in their self-reported intensity of emotion during the original emotional episode and in their reported ability to relive emotional events. It was revealed by 2 Gender (Male; Female) \times 2 Ethnicity (EA, HA) ANOVAs that there were no significant main effects or interactions in these variables for any of the emotions, with the exception of anger. Women reported that their original anger episodes were more intense ($M=7.13$; $SD=0.87$) than did men ($M=6.48$; $SD=1.24$), $F(1, 92)=9.31$, $p<.01$, and that they were able to relive anger better ($M=5.63$; $SD=1.62$) than did men ($M=4.75$; $SD=2.01$), $F(1, 92)=5.38$, $p<.05$. Therefore, analyses of the emotional response variables for relived anger controlled for these differences.

⁵ Differences in skin conductance held when analyses were controlled for differences in reports of emotional experiences and differences in facial behaviour.

Gender differences in emotional response

Emotional behaviour. The strength of association between Gender and the occurrence of emotional behaviour, taking into account the effects of Ethnicity, was tested using loglinear analyses. Consistent with our hypotheses, loglinear analyses revealed that women showed significantly more social (or non-Duchenne) smiles than men during relived happiness, *Likelihood Ratio change in χ^2* (1, $N=98$) = 6.34, $p = .01$, and love, *Likelihood Ratio change in χ^2* (1, $N=98$) = 4.01, $p = .045$, but not pride, *Likelihood Ratio change in χ^2* (1, $N=98$) = 2.75, $p = .10$, although the later difference approached significance. Contrary to hypothesis, analyses of felt (or Duchenne) smiles during relived happiness revealed no significant main effects of Gender. None of the Gender \times Ethnicity interactions were significant. Also, contrary to hypotheses, analyses revealed no significant main effects or interactions involving Gender or Ethnicity for emotional behaviour during relived anger, disgust, or sadness. Figure 1 (top) shows the percentage of male and female participants who showed the emotional facial behaviour for each relived emotion.

Odds ratios were evaluated as indices of effect sizes for categorical variables. Odds ratios for facial behaviour for women versus men were calculated separately for the two ethnic groups. The Tarone's test was used to assess the homogeneity of odds ratios across ethnic groups. Contrary to hypothesis, the women versus men odds ratios for showing facial behaviour did not significantly differ between EA and HA for relived anger [Tarone's χ^2 (1) = 0.04, *ns*], disgust [Tarone's χ^2 (1) = 3.39, *ns*], sadness [Tarone's χ^2 (1) = 1.19, *ns*], happiness [Tarone's χ^2 (1) = 1.56, *ns*], pride [Tarone's χ^2 (1) = 2.56, *ns*], or love [Tarone's χ^2 (1) = 3.07, *ns*].

Self-reports of emotion. A significant main effect of Gender was revealed by 2 Gender (Male, Female) \times 2 Ethnicity (EA, HA) ANOVAs with change in self-reports of emotion as dependent variables, for anger $F(1, 90) = 4.31$, $p < .05$ and love, $F(1, 92) = 5.49$, $p < .05$. Consistent with our hypotheses, women reported feeling more intense anger and love than did men across groups. The gender difference in self-reports of anger held after controlling for differences in self-reports of anger during the original event and in the ability to relive anger. No gender differences were detected in self-reports of sadness, disgust, happiness, or pride, although the means were in the direction of women reporting more intense emotion than men. Means for change scores in self-reported emotion are presented in Figure 1 (middle).

Effect sizes of gender differences in change scores in self-reports of emotion were calculated separately for the two ethnic groups. The magnitudes of effect sizes across ethnic groups were compared by transforming the effect sizes into z -scores and comparing them to a normal

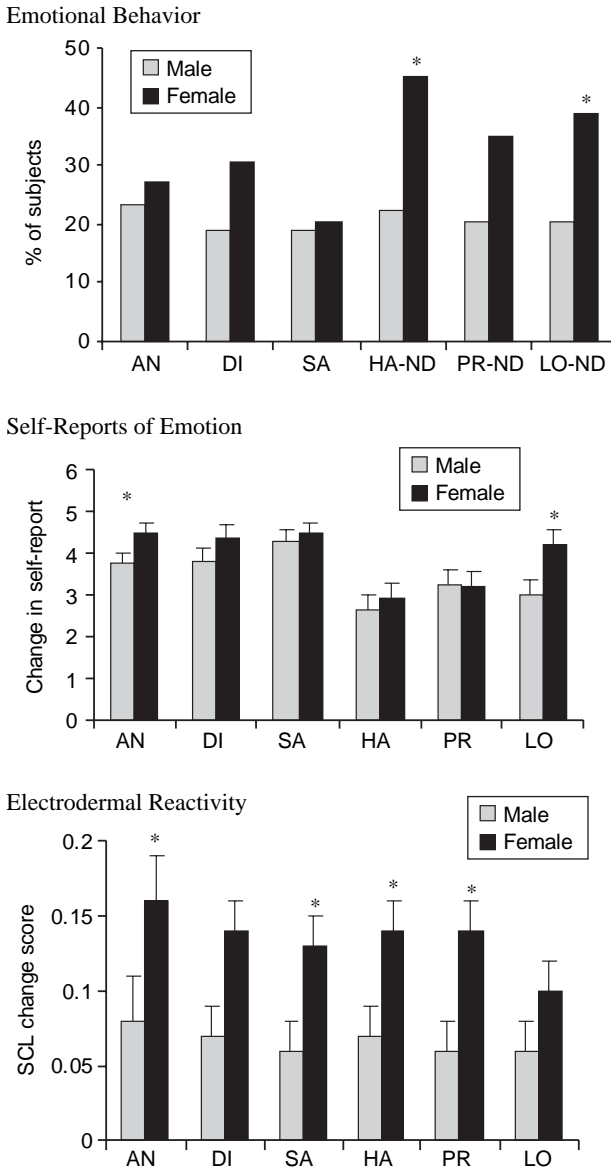


Figure 1. Percentages of men and women who show target emotional facial behaviours (top), mean levels of change from baseline in self-reports of emotion for men and women (middle), and mean levels of change from baseline in skin conductance for men and women (bottom). AN = Anger, DI = Disgust, SA = Sadness, HA = Happiness, PR = Pride, and LO = Love. ND = Non-Duchenne or smiles. * $p < .05$.

distribution. Contrary to hypothesis, the effect sizes did not significantly differ between EA and HA for anger ($z = 0.59$, *ns*), disgust ($z = 0.02$, *ns*), sadness ($z = 0.28$, *ns*), happiness ($z = 0.14$, *ns*), pride ($z = 0.00$, *ns*), or love ($z = 0.26$, *ns*).

Electrodermal activity. We conducted non-parametric Mann–Whitney tests to compare mean levels of change in SCLs for males and females across ethnic groups. These analyses were significant for anger, *Mann–Whitney* $U = 845.5$, $z = 2.52$, $p = .01$; sadness, *Mann–Whitney* $U = 910.5$, $z = 2.06$, $p = .04$; happiness, *Mann–Whitney* $U = 908.5$, $z = 2.08$, $p = .04$; and pride, *Mann–Whitney* $U = 859.5$, $z = 2.42$, $p = .02$. Female participants showed greater increases in skin conductance than their male counterparts, suggesting that they were more physiologically aroused than men. Although not significantly different, means were in the same direction for disgust and love. Mean levels of change in skin conductance during relived emotions are presented in Figure 1 (bottom).

The magnitude of the effects of gender across ethnic groups was compared by calculating the z -scores of differences in Mann–Whitney z -scores and comparing them to a normal distribution. Contrary to hypothesis, the effects of gender did not significantly differ for EA and HA for anger ($z = 0.09$, *ns*), disgust ($z = 0.16$, *ns*), sadness ($z = 0.29$, *ns*), happiness ($z = 0.51$, *ns*), pride ($z = 0.79$, *ns*) or love ($z = 0.29$, *ns*).

In summary, while reliving emotional episodes in their lives, women showed more social smiles during happiness and love, reported experiencing more intense anger and love, and demonstrated greater electrodermal reactivity than men during anger, sadness, happiness, and pride. Although not significantly different, with the exception of self-reports of emotion during relived pride, the means of the emotional response variables were in the direction of women being more emotional than men.

DISCUSSION

In the present study, we examined whether gender differences in emotion would emerge in basic and complex emotions, across different components of response, and in different ethnic groups when participants relived emotional events from their lives. Based on previous findings, we predicted that women would show and report more intense emotional responses than men.

Gender differences in emotional response

In terms of *emotional behaviour*, our predictions were supported: women showed more social smiles during relived happiness and love. However, no

gender differences emerged in Duchenne or felt smiles during the positive emotions or in negative emotional behaviour during relived anger, disgust, or sadness. These findings suggest that gender differences may be particularly pronounced for social, or voluntarily produced, smiles.

In the domain of *self-reports of emotion*, women reported larger increases in anger than men. These findings are interesting because stereotypes suggest that men experience higher levels of anger than women (Hess et al., 2000). It is possible that the explicit request to describe and relive anger episodes may actually produce emotional responses that are opposite to gender stereotypes. Consistent with stereotypes, women in our study also reported experiencing love more intensely than men. There were no significant differences in self-reports of disgust, sadness, happiness, or pride. Thus, compared to studies of retrospective self-reports of emotion, we observed relatively few gender differences in self-reports of emotion. This may have been due to the fact that these self-reports were obtained immediately after participants relived their emotional events. Indeed, studies have suggested that gender differences are less pronounced for on-line compared to retrospective reports (Seidlitz & Diener, 1998). Moreover, we specifically asked participants to relive strong emotional episodes from their lives, and, therefore, we may have selected states of equal intensity across genders.

Finally, in the domain of *physiological response*, women's skin conductance levels increased more than those of men during relived anger, sadness, happiness and pride. Moreover, the means were in the same direction for disgust and love. This is in contrast to studies in which men were more aroused than women or in which no gender differences in skin conductance levels were observed (Bradley et al., 2001; Kring & Gordon, 1998; Vrana & Rollock, 2002), suggesting that our findings may be specific to the relived emotions task. The relived emotion task relies on complex processes such as remembering, interpreting, evaluating, selecting, and re-experiencing past emotional events. Our findings raise the possibility that men and women may engage in these processes to different degrees, resulting in different levels of electrodermal reactivity.

In summary, placed in the context of other empirical findings, our findings suggest that the effects of gender on emotional response vary by type of emotional behaviour, self-report of emotion, and task. These findings also suggest that gender differences may vary by specific emotion. For example, whereas no gender differences were detected during relived disgust, women smiled more and reported experiencing relived love more intensely than men. Clearly, more research is needed to test these hypotheses.

Generalisability across ethnic groups

Based on previous findings, we predicted that gender differences in emotional response would be greater among European Americans than Hmong Americans. Our findings, however, suggest that the effects of gender on emotional response did not significantly differ for the two groups. What might account for these ethnic similarities? On the one hand, these similarities may be due to sociocultural factors. Although Hmong American and European American cultural contexts vary in the relative emphasis that they place on individualism and collectivism and beliefs about emotional expression, they may hold similar views regarding the social roles of men and women, which may explain why the effects of gender on emotional response were similar across ethnic groups. Indeed, proponents of *socio-cultural* perspectives argue that gender differences in power, status, and social roles have consequences for emotional response in a given situation (Brody, 1997; Grossman & Wood, 1993; Hall et al., 2000; LaFrance & Henley, 1997; Shields, 2000; Tiedens, 2000; Vingerhoets & Scheiers, 2000). On the other hand, it is possible that these similarities are due to biological factors. *Biological and evolutionary theories* argue that gender differences in emotion may have evolved because of gender differences in reproductive strategies and mate selection (Barkow, Cosmides, & Tooby, 1992; Buss, 1994; Buss & Schmitt, 1993). Of course, biological and social factors may jointly shape gender differences in emotional response (Brody, 1993, 1997, 1999, 2000; Eagly, 1987; Wood & Eagly, 2002). Additional studies that include other ethnic and cultural groups will shed further light on the origins of gender differences and similarities in emotional response.

Limitations and future directions

This study has a number of limitations that need to be considered in designing future studies. First, situational cues may account for gender differences in emotional response (Deaux & Major, 1987; Thompson & Pleck, 1987). For example, a meta-analysis of gender differences in smiling found that being alone, being in the lab (rather than being observed in the field), knowledge of being observed, and demands for self-disclosure were associated with women showing more smiles than men (LaFrance et al., 2003). Thus, it is possible that women showed more emotional behaviour than men because of features of our experimental design. Although the fact that differences between men and women were not significant for all emotional behaviours argues against this hypothesis, future studies that systematically vary these features are needed to definitively rule out this possibility.

Second, the relived emotion task may produce larger gender differences than tasks eliciting spontaneous emotions. For example, commonly held stereotypes regarding gender and emotion may affect how individuals remember and react to their emotions in retrospect. As a result, gender differences consistent with emotional stereotypes may be more apparent during relived, rather than spontaneously experienced, emotions. Future studies that compare the emotional responses of men and women to spontaneously elicited vs. relived emotion tasks are needed to test this hypothesis.

Third, our study did not include direct measures of cultural values and beliefs regarding emotional expression and experience. Similarly, the study did not assess gender role identification. Several studies have found evidence for gender role differences in different components of emotional response (Kring & Gordon, 1998; Milovchevich, Howells, Drew, & Day, 2001; Narus & Fischer, 1982), with individuals identifying with masculine gender roles reporting higher levels of anger in response to anger-inducing hypothetical vignettes than individuals identifying with feminine gender roles (Milovchevich et al., 2001). Thus, future studies should compare the emotional responses of participants that endorse feminine, androgynous vs. masculine gender roles across ethnic and cultural groups.

In summary, our findings suggest that gender differences may be more pronounced for smiling than other emotional behaviours, may be less pronounced for on-line (vs. retrospective) self-reports of emotion, may vary by task for physiological reactivity, and may hold across different ethnic groups. These findings take us one step further in understanding the complex ways in which gender shapes emotional response.

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