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Gender Differences in Emotional and Overt/Covert Aggressive Responses to Stress

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We examined the role of stress exposure on gender differences in hostile (emotional and behavioral) reactions within the context of a laboratory paradigm. Aggressive behavior was indexed via the intensity (overt) and the duration (covert) of putative shocks delivered to a confederate. Half of the participants were exposed to a chronic stressor (high stress) and half were not (low stress). Participants' emotional responses were measured via self-report mood ratings before and after the experiment. Men displayed higher aggression in both stress conditions, which corresponded to their ratings of state hostility. On the other hand, women in high stress delivered lower intensity shocks, and this decreased overt aggression was positively correlated with sadness ratings. However, women did not decrease their levels of shock duration (covert aggression) under high stress and showed equivalent shock duration compared with men in high stress. These findings are discussed in terms of differential overt manifestations of distress between men and women. Aggr. Behav. 33:261–271, 2007. © 2007 Wiley-Liss, Inc.

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INTRODUCTION

A number of theoretical and empirical papers suggest that men, in response to stress, tend to externalize their negative affect, whereas women show more internalizing feelings [Burns and Katkin, 1993; Ogle et al., 1995]. However, past research has emphasized the importance of measuring different forms of aggression when examining gender differences [Eagly and Steffen, 1986]. For this reason, we present a study in which we explore gender differences in the aversive facilitation or inhibition of two different forms of laboratory aggression, shock intensity (SI) and duration. We also analyzed the role of subjective emotional experiences to stress in understanding gender differences in aggression.

Effects of Aversive Context on Gender Differences in Aggression

In the laboratory, hostile judgments or delivery of putative electric shocks to a stranger are more likely to occur in the context of aversive external stimulation, including foul odors [Rotton, 1979] or hot rooms [Bell and Baron, 1976]. Berkowitz [1990, 1994] formulated a cognitive-neoassociationist model to understand aversive instigation of aggression. He suggested that negative affect can activate a system of connections linking emotions, thoughts, memories, and behaviors that are consistent with the negative effect, making aggression more likely under aversive conditions. This conceptualization is consistent with work in the emotion area, suggesting that negative affect has evolved to help the organism survive by preparing (or *priming*) the body for defensive action under threatening circumstances [Lang et al., 1990]. However, this defensive action can be in the form of attack against possible predator or escape and withdrawal [Berkowitz, 1983]. From this perspective then, aggressive beha-

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vior may be either inhibited or primed by negative emotional activation resulting from environmental threat, depending on the individual's unique experience of the instigating context. For instance, Verona et al. [2002] found that negative emotional activation was related to increased aggressive behavior *only* among a subset of participants who were high on trait negative emotionality. Thus, negative affect primes aggression in some individuals but not others.

In terms of gender differences in the aversive priming of aggression, most studies have examined provocation as the aversive event that instigates aggression. For example, Bettencourt and Miller [1996] reported in a meta-analysis that, under provocation (which typically results in a negative affective state of anger), gender differences in aggression were reduced. Although this past research is enlightening, an important area to explore is the effect of a *general stressor* (and not provocation) on gender differences in aggression. Stress is defined in this study as any physical or psychological strain that is considered aversive, but it does not necessarily have to involve provocation or insult by another person. The examination of stress-induced aggression may help us understand instances of displaced or unjustified aggression against convenient targets, e.g., when a person under financial strain acts aggressively against others who are not necessarily responsible for the perpetrator's situation [Miller et al., 2003]. As an extension of Berkowitz [1990] conceptualization, one purpose of the current study was to explore whether a general aversive context (physical stressor) would differentially prime (or inhibit) men and women's aggressive responses toward a person who was not responsible for their distress.

Gender Differences in Emotional Correlates of Aggression

We know that men are more aggressive than women; however, we do not know exactly why this is the case, although there is evidence that gender role socialization and biological factors play a role [Lightdale and Prentice, 1994; Maccoby and Jacklin, 1974]. The study of gender differences in aggression may help inform our knowledge about aggression in general, in the sense that this work can provide clues as to the underlying mechanisms that make some persons and not others engage in aggression. The current work focuses on putative emotional mechanisms that may influence behavioral responses such as aggression under stress. Work in the stress–response area suggests that men and women may experience different emotional and behavioral responses to distressing situations [Taylor et al., 2000; Tobin et al., 2000]. For example, women report slightly more internalizing emotions, including fear, sadness, or anxiety, than men in response to stress [Rudolph, 2002], and women ruminate more than men about their negative feelings and symptoms after a depression-inducing incident [Nolen-Hoeksema, 1991]. Research indicates that men are more likely than women to report externalizing emotions such as anger and hostility [Tobin et al., 2000; Watson and Clark, 1994].

More importantly, men and women's behavioral responses to stress often differ. Taylor et al. [2000] have hypothesized that, owing to evolutionary processes and differential caregiving roles between the genders, a "fight or flight" response may be more common in men whereas women may be more likely to engage in "tend-and-befriend" responses to stress. Research studies have shown that boys are more likely to directly vent their anger, but girls are more likely to use coping strategies that are less inflammatory [Fabes and Eisenberg, 1992]. Finally, research has shown emotional response is more strongly linked to anger/aggression in men than women. For example, trait anger and hostility is correlated with physiological arousal in men, although this link is weak or non-existent among women [Burns and Katkin, 1993]. In another study conducted by our research group, we found that men's but not women's physiological responses to stress were significantly correlated with their overt aggressive responses in a laboratory experiment [Verona and Curtin, 2006]. In some cases, physiological arousal relates to the *suppression* of anger and hostility in women [Faber and Burns, 1996].

In effect, another argument based on a review of the literature is that women and men's respective emotional experiences of stress (internalizing vs. externalizing emotions, respectively) may relate to different behavioral responses (more aggression in men, more inhibition in women).

Gender Differences in Overt vs. Covert Aggressive Behavior

More recently, researchers have suggested that gender differences in aggression may partly reflect the fact that men and women (or boys and girls) use different forms of aggressive behavior [Eagly and Steffen, 1986]. Bjorkqvist et al. [1992] [Lagerspetz et al., 1988] and [Crick, 1996] have reported that, although men are overall more aggressive than

women, men tend to implement more overt forms of aggression (e.g., kicking, hitting, punching), whereas women utilize covert forms that are more subtle (e.g., gossip, refuse friendship, ostracize). It has been theorized that women feel compelled to inhibit overt aggressive responses, so as to conform to social norms discouraging female aggression [Lightdale and Prentice, 1994], but not covert responses because the latter are not readily recognized as aggressive.

In the laboratory, some researchers have examined the hypothesis that *SI* represents an overt form of aggression (directly observable and unambiguous; Berkowitz and Alioto [1973]; Hynan and Grush [1986]) and *shock duration* (SD) represents a covert aggressive response (not observable to third parties; Zeichner et al. [1994]). For example, Beal et al. [2000] used confirmatory factor analysis to validate the distinction between SI and SD, and found that "modern" racists tended to use more covert forms (SD) than overt forms (SI) of aggression against minority targets, as a way of disguising their discriminatory intentions. This preliminary work is consistent with research on gender differences in laboratory aggression. Recent studies have shown that, although men use higher levels of SI than women [Bartholow and Anderson, 2002], gender differences are less robust in terms of SD [Anderson and Dill, 2000; Giancola and Zeichner, 1995]. We set out to validate further the overt–covert distinction among laboratory measures, and to examine whether gender differences in stress-induced aggression may be evident when measuring SI but not SD.

Overview of Current Study and Predictions

There were *two* primary aims to the current project. First, we examined gender differences in different types of aggression *as a function of a general aversive context* (high vs. low stress). We used a laboratory aggression paradigm that involved measurement of *SI* (considered an overt index) and *SD* (more covert form of aggression) delivered to an innocent target. The main hypothesis was that, because women tend to exhibit more internalizing feelings when under stress [Ogle et al., 1995], we expected women to show an inhibition of overt aggression (SI) in high vs. low stress. On the other hand, we expected increased aggression in high vs. low stress among men because they tend to experience more anger and externalize their distress [Fabes and Eisenberg, 1992]. On the basis of the overt–covert literature reviewed above, we expected more robust gender differences in SI compared with SD [Zeichner et al., 1994].

Our second aim was to examine the effects of the stressor on men and women's subjective emotional responses (self-reported mood), and the relationship between emotional response and aggression. On the basis of our earlier theoretical discussion, we expected men to experience more anger under stress, and their negative mood states, including anger, would be associated with greater aggression [Verona and Curtin, 2006]. Women were expected to experience more internalizing emotions (fear, sadness, and guilt) in response to stress, and these emotions would be negatively related to aggression in women [Faber and Burns, 1996].

METHOD

Participants

Participants were 49 undergraduates (25 women) recruited from introductory psychology classes. The university human subjects review board approved this study, and informed written consent was obtained from all individuals before participation. The average age of the sample was 20 years (SD = 2.9), and most participants were Caucasian-Americans (94%, $n = 46$).

Mass Testing Session

Participants completed aggression and anger trait measures during an initial mass testing session that occurred a few weeks before the experimental session. These forms were completed separately from the experimental session to prevent participants from inferring the true purpose of the subsequent experimental session (i.e., participants were not pre-selected based on their responses to these questionnaires). The participants completed the aggression questionnaire [AQ; Buss and Perry, 1992] as a measure of trait aggression, which contains four factors: physical aggression (nine items), verbal aggression (five items), anger (seven items), and hostility (eight items). Buss and Perry [1992] reported test–retest correlations in the adequate range (0.72–0.80) for the four subscales, and internal consistency is also adequate (from 0.77 to 0.85). Mode of anger expression was measured through scores on the subscales of the 20-item anger expression scale [AX; Spielberger et al., 1985]: Anger in, anger out, and anger control. Coefficient α for the AX/out scale are estimated at 0.73, whereas for the AX/in scale the α coefficients range from 0.70 to

0.84 [Spielberger et al., 1985]. These trait measures were included to establish the validity of the aggression procedures and measures.

Experimental Procedure

Cover story and aggression instructions. At the experimental session, participants completed pre-experiment forms (consent form, demographic sheet, baseline mood ratings) and were introduced to a same-sex student (actually a confederate of the experimenter). They were told that the study involved an investigation of the effects of distraction on supervisor and employee performance, as in a simulated work situation. Participants drew lots to determine the roles of "supervisor" and "employee", with the real participant always assigned the role of supervisor. The confederate and participant were led to separate rooms, where each purportedly received independent instructions. The participant was told that the employee (i.e., confederate) would perform a digit memory task, and the participant was to press a "correct" button to illuminate a yellow light in the employee's room if the employee's response was correct. The participant was to press one of the ten bogus "shock" buttons if the employee's response was incorrect. Participants were told that, as supervisors, they would administer shocks to the employee to simulate "criticism" of job performance, as in a work situation. As in other studies [Verona et al., 2002], before beginning of the procedure, a shock demonstration was conducted to enhance the credibility of the cover story. To control for individual differences in shock sensitivity, each participant was administered three sample electric shocks (Coulbourn Aversive Stimulator Model E13-22 [Coulbourn Instruments; Allertown, PA]) of increasing intensity and rated them for perceived aversiveness on a scale of 1 to 100 ("Not at all painful" to "Extremely painful"). The experimenter's description as to which shock intensities corresponded to which shock levels on the shock box was calibrated to each participant's ratings of these pre-test shocks.

Experimental blocks. There were a total of six task blocks in the experiment, and each block consisted of ten trials. On about 50% of the trials, the "employee" responded incorrectly on the digit-span task, calling for a shock button response from the "supervisor". Only "incorrect" trials were analyzed in computing our measures of aggression because participants administered shocks only on these trials. The experimenter manipulated the employee's responses so that he/she made a large number of errors during each block and across the whole experiment (29 total). After each block, all participants received feedback on their monitor screen as to the number of incorrect responses made by the employee during that block. This procedure ensured participants' continuous investment in, and their focus on, the confederate's performance.

Stress condition. Participants were randomly assigned to either a *high stress* (13 women, 12 men) or *low stress* (12 women, 12 men) condition, and were told of condition assignment *after* the baseline procedures. Participants in high stress were told that they would be providing feedback to the employee during "distraction", and participants in low stress were told that they were in the control ("no distraction") condition. During the procedure, those in high stress were fitted with a small harness placed around their chest, from which brief (50 ms), intermittent blasts of 100 psi compressed air coming from a breathable air tank were administered to their throat across the trials [Grillon and Ameli, 1998; Verona et al., 2002]. Participants in low stress were not fitted with a harness and did not receive air blast administrations. At the end of the study, participants in the high-stress condition were asked to rate the aversiveness (from 1 = "not at all unpleasant" to 10 = "extremely unpleasant") of air blasts administered to them during the procedure.

Mood Measurement

Participants completed a state version of the 60-item positive and negative affect schedule (PANAS-X; Watson and Clark, [1994]) before the beginning of the experiment (at baseline) and at the end of the experimental blocks. Analyses for the PANAS-X scales were conducted on the following negative affect mood scales that were most relevant to the purposes of the study: the fear (six items), hostility (six items), guilt (six items), and sadness (five items) scales. Internal consistency for the original negative affect scales are good (about 0.85; Watson et al. [1988]), and show excellent convergent and discriminant validity [Clark and Watson, 1991]. Changes from pre- to post-experiment in ratings on the PANAS-X were used to examine self-reported differences in affect as a result of being exposed to the experimental context.

Behavioral Measures of Aggression

SI (mean level of shock administered, levels one to ten) and SD (length of time shock button was pressed, measured in milliseconds) were recorded as

indices of overt and covert aggressive behavior, respectively, on "incorrect" trials. The average SI and SD for each of the six blocks was calculated and collapsed into an average SI or duration score across all blocks. Each participant's average score for each aggression measure was standardized using *T*-score transformations (i.e., mean of 50 and standard deviation of10) to convert SI and SD into the same metric for purposes of analyses.

Post-Study Measures and Debriefing

Following the test procedures, participants completed a post-study questionnaire [Verona et al., 2002] and were interviewed. One item asked participants to rate how well they would have performed on the digit memory task relative to the employee on a one ("a lot worse") to ten ("a lot better") scale. Other items asked them to rate their overall impression of the employee (1 = "extremely unfavorable" and 10 = "extremely favorable") and their impression of the employee's competence (1 = "definitely not competent" and 10 = "definitely competent"). These items were used as validity checks on the experimental manipulations, particularly the aggression procedure's efficacy as a measure of hostile behaviors.

During a post-study interview, an effort was made to assess suspicions regarding the true aim of the study. Three participants (two men and one woman) expressed suspicions and were excluded from the experiment and replaced. During scheduled debriefing sessions, participants were informed of the true purposes of the study, of the necessity to use deception in aggression studies, and of the monitoring and recording of their shock responses during the experiment. They were also allowed to ask questions and voice any concerns.

RESULTS

Trait Measures

We examined differences between men and women and between participants in the two stress groups on the trait aggression (AQ) and anger expression (AX) scales using separate two-way gender × stress ANOVAs. High- and low-stress participants did not differ significantly on any of the AQ or the AX scales, confirming the efficacy of random assignment to stress groups. Expectedly, men reported more instances of physical aggression, $F(1,36) = 11.83$, $P < 0.001$, than women on the AQ ($M = 20.8$ and 14.8; SD = 6.3 and 4.3, respectively), but there were no gender differences on other scales of the AQ or on any of the AX scales. No stress × gender interaction was revealed by any of these analyses on trait anger and aggression.

Validation of Manipulations and Aggression Measures

Stress manipulation. As a check on the efficacy of the stressor used in this experiment, participants in the high-stress condition rated the air blasts as "moderately" to "very" unpleasant. On the basis of an independent sample *t*-test, men and women did not differ on their ratings of the unpleasantness of the air blasts, $t(23) = 0.36$, $P = 0.53$ ($M = 5.75$ and 6.15; SD = 2.27 and 2.05, respectively).

Aggression paradigm. The post-study questionnaire showed that participants' overall impression of the employee was somewhat unfavorable (median = 5.0), and they reported that they would have done better than the employee on the digit memory task, particularly men compared with women (medians = 6.5 vs. 5.0, respectively). As validation of the construct validity of the laboratory aggression measures, SI responses were significantly related to AQ physical aggression, AQ verbal aggression, and AX anger out (the tendency to outwardly express anger through shouting or hitting), $r = 0.31$, 0.34, and 0.34, all $P < 0.05$. SD was also positively, albeit non-significantly, related to AQ physical aggression ($r = 0.11$, $P = 0.50$) and to AX anger out ($r = 0.21$, $P < 0.14$). Instead, it was more robustly related to AQ verbal aggression ($r = 0.50$, $P < 0.01$). Thus, SI was more strongly related to physical forms of aggression, whereas SD was more closely associated with verbal aggression.

Factor analysis of aggression measures. We attempted to empirically confirm that the two measures of aggression were indeed distinct. We conducted a principal components factor analysis, with varimax rotation, on SI and SD scores for each subject (six scores for SI and six scores of SD, corresponding to the average SI and SD delivered during each block). The scree plot clearly demonstrated a two-factor solution, which accounted for a total of 85.4% of the variance, with eigenvalues above 1.0. The SI scores for each of the blocks loaded 0.85–0.93 on the first factor (43.5% of variance; eigenvalue = 5.22), with loadings below 0.31 on the second factor. The six SD scores loaded 0.88–0.95 on the second factor (42.0% of the variance; eigenvalue = 5.03), except for the first block (loading = 0.65), with

loadings under 0.31 on the first factor. These results suggest that SI and SD are indeed separable constructs.

Effects of Stress and Gender on Two Types of Aggression

For the aggression scores, we conducted a three-way repeated measures ANOVA, in which aggression type (*SI* vs. *SD—standardized scores*) was the within subjects variable, and gender (*women* vs. *men*) and stress condition (*high* vs. *low*) served as the between subjects variables.[1]

This analysis revealed a significant gender × stress × type of aggression interaction, $F(1,45) = 4.71$, $P \leq 0.05$, and a significant main effect of gender, $F(1,46) = 11.68$, $P \leq 0.001$. Men were overall more aggressive than women across both aggression measures (*T*-score $M = 53.2$ and 47.1; SD = 7.1 and 5.1, respectively). Follow-up stress × type of aggression ANOVAs conducted separately by gender revealed a significant stress × type of aggression interaction among women, $F(1,23) = 8.74$, $P \leq 0.01$, but not men, $F(1,22) = 0.22$, $P = 0.86$. For the SI measure of aggression, women in high stress administered significantly *lower* SI than did women in low stress, $F(1,23) = 5.92$, $P \leq 0.05$ (see Fig. 1, top panel). Women did not decrease their levels of SD in high- vs. low-stress conditions, $F(1,23) = 0.77$, $P > 0.39$ (see Fig. 1, top panel). Men demonstrated high levels of aggressive responding in both conditions and across both measures of aggression (see Fig. 1, bottom panels).

Effects of Stress and Gender on Self-Reported Mood

As per our hypotheses, we expected that (1) men would show greater increases (from pre- to post-experiment) in hostility on the PANAS-X in high vs. low stress, and (2) women would experience greater increases in internalizing emotions (fear, sadness, and guilt) in high vs. low stress. Thus, we first conducted a gender × stress ANOVA on hostility change scores. These analyses did not reveal the expected gender × stress interaction or any other effect. To examine our second hypothesis, we

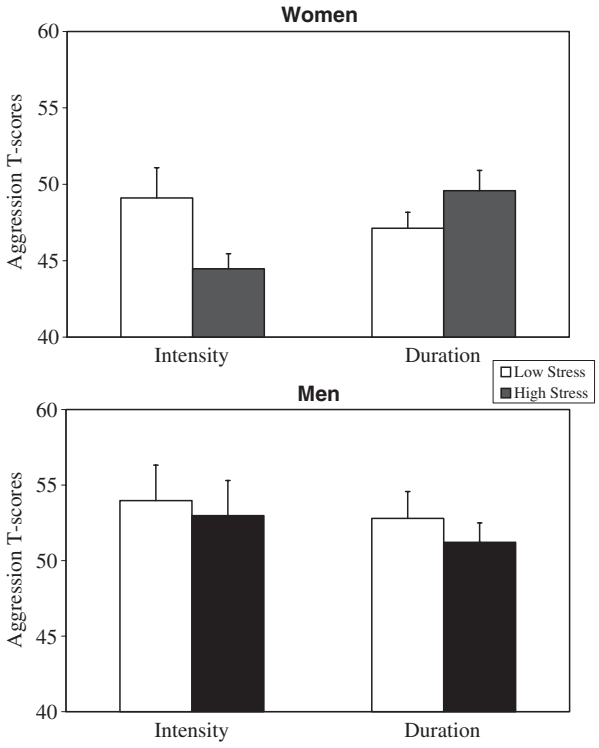

Fig. 1. Shock intensity and duration scores as a function of stress (low vs. high) for women (top panel) and men (bottom panel).

conducted a gender × stress MANOVA on the fear, guilt, and sadness PANAS-X change scores. These analyses revealed a trend effect for the expected gender × stress multivariate interaction, $F(3,42) = 2.55$, $P < 0.07$, but no other effects. However, follow-up univariate analyses did not reveal a significant gender × stress interaction for any of the three mood scales.

Nonetheless, our a-priori predictions regarding men and women's differential emotional responding (and the marginally significant multivariate interaction) warranted examining stress condition effects for the internalizing mood scales separately by gender [Howell, 1992; p 394]. A univariate ANOVA with stress condition as the independent variable was conducted on each of the three internalizing mood scales, separately by gender. High-stress women reported significant increases in sadness and marginally significant increases in guilt relative to low stress women, $F(1,23) = 4.65$ and 3.30, $P = 0.04$ and 0.08 (see Fig. 2). No stress effect was found for fear in women. Among men, stress condition did not affect fear, sadness, or guilt ratings. Thus, in terms of self-reported changes in affect, women exposed to the stressor reported greater increases in negative affective variables

[1]The research literature consistently reports a natural escalation in aggression across trial blocks (Goldstein et al., 1975; Verona and Curtin, 2006). Indeed, this was also the case in our data, in that shock intensity and shock duration increased linearly across the six blocks, $F(1,46) = 7.41$ and 4.00, $P < 0.01$ and 0.05, respectively. However, this block effect did not interact with gender or stress in any of the main analyses. Thus, we excluded block from the analyses to help streamline the results section.

related to sadness and guilt. Men did not report significant differences in mood across conditions, despite the fact that women and men rated the air blasts as equally aversive.

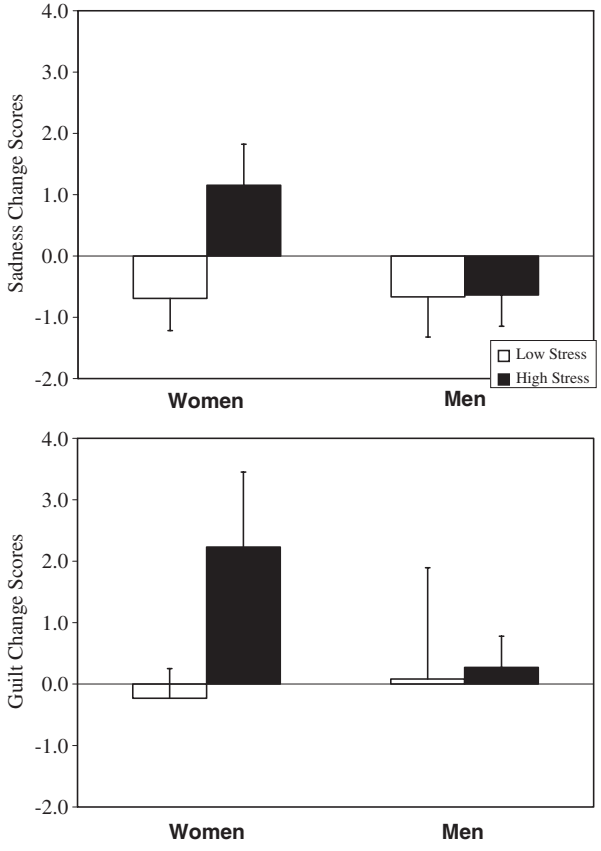

Fig. 2. Ratings of changes in sadness (top panel) and guilt (bottom panel) as a function of stress (low vs. high stress) and gender.

Emotional Correlates of Aggression in Men and Women

Next, we wanted to examine relationships between emotional responses and different types of aggression in men and women. Table I includes the zero-order correlations between emotion (PANAS-X mood ratings) and aggression (SI and SD) measures separately for men and women. This table shows that whereas women's negative emotional ratings were negatively related to overt aggression (SI), many of these relationships were positive for men. To formally test whether gender would moderate the effects of mood on different forms of aggression, we conducted hierarchical regression analyses separately on SI and SD scores. We entered gender in the first step of the analyses, the mood scale in the second step (e.g., either PA, NA, fear, sadness, hostility, or guilt), and the gender × mood scale interaction in the third step; and we evaluated the R^2 change. When the significant interaction involved a continuous variable (i.e., mood ratings), the simple effects involved examining differential correlations (i.e., the interaction term is a test of the difference between correlations; Tabachnick and Fidell [1989; p 325]).

Results for each of these regression analyses conducted on SI and SD are summarized in the top and bottom parts of Table II, respectively. For SI, analyses that included gender, *hostility*, and their interaction yielded a significant gender × hostility interaction. This interaction indicated that whereas men showed a positive relationship between hostility scores and SI ($r = 0.28$), the relationship for women was negative ($r = -0.29$). Analyses including gender, *sadness*, and their interaction yielded a significant gender × sadness interaction, indicating that whereas women exhibited a significant negative relationship

TABLE I. Correlations Between Laboratory Aggression Measures (Shock Intensity and Duration) and Emotion Ratings (PANAS-X Mood Change Scores) for Men and Women Separately

	1	2	3	4	5	6	7	8
Shock intensity		.49*	.11	.16	.19	.28	.07	.14
Shock duration	.26		−.04	−.06	.16	−.17	−.28	−.23
PA change	.04	−.09		−.29	−.40*	−.03	.37†	−.38†
NA change	−.31	−.24	.04		.76**	.79**	.49*	.58**
Fear change	−.13	−.02	.19	.79**		.39†	.10	.46**
Hostility change	−.29	−.17	−.22	.58**	.16		.66**	.55**
Guilt change	−.23	−.14	−.14	.54**	.04	.48*		.34†
Sadness change	−.50**	−.09	−.11	.69**	.55**	.45*	.37†	

Note: Correlations for women and men are presented below and above the diagonal, respectively. PANAS-X, positive and negative affective states questionnaire [Watson and Clark, 1994]. PANAS-X change scores were calculated as difference from pre-experiment to post-experiment. PA, positive affect; NA, negative affect.
† <0.10; * $P<0.05$; ** $P<0.01$.

TABLE II. Summary of Hierarchical Regression Analyses to Examine Gender Moderation of Emotional Correlates (PANAS-X Mood Change Scores) of Two Types of Laboratory Aggression

	β	*T*-statistic	R^2 change
Dependent variable = shock intensity (overt)			
Gender	.57*	3.00	–
NA	−.01	−.60	.01
Gender × NA	.07	−.61	.04
PA	.01	.41	.00
Gender × PA	.02	.55	.01
Fear	.01	.02	.00
Gender × fear	.06	1.11	.02
Hostility	−.01	−.02	.00
Gender × hostility	**.14***	**2.09**	**.08**
Guilt	−.01	−.40	.00
Gender × guilt	0.05	1.07	.02
Sadness	−.06	−1.38	.03
Gender × sadness	**.18***	**2.06**	**.07**
Dependent Variable = shock duration (covert)			
Gender	.53*	2.45	
NA	−.03	−1.01	.02
Gender × NA	.02	.36	.00
PA	−.01	−.29	.00
Gender × PA	.00	−.01	.00
Fear	.01	.40	.00
Gender × fear	.04	.65	.01
Hostility	−.05	−1.19	.03
Gender × hostility	−.02	−.25	.01
Guilt	−.04	−1.58	.05
Gender × guilt	−.03	−.51	.01
Sadness	−.06	−1.09	.02
Gender × sadness	−.01	−.79	.01

Note: PANAS-X, positive and negative affective states questionnaire [Watson and Clark, 1994]; NA, negative affect; PA, positive affect. Gender was included alone in the first step for all analyses, thus no R^2 change is associated with it. Each mood scale was included as a predictor in *separate* regression analyses.
*$P < 0.05$.

between sadness and SI ($r = -0.50$), men showed a small positive relationship ($r = 0.14$). Regression analyses including other mood scales as predictors of SI yielded no significant findings. Thus, the other mood scales did not correlate with SI, and gender did not moderate their effect on SI. In addition, the regression analyses conducted on the SD-dependent measure yielded no significant interactions, except the ubiquitous main effect of gender (see Table II).

DISCUSSION

Stress and Gender Effects on Different Forms of Aggression

Our study was unique in that it explored gender differences in the aversive facilitation or inhibition of aggression using a general stressor, and not provocation, and different measures of aggressive behavior. In addition, this study empirically demonstrated differential relationships between emotion and aggression in men and women. First, women in our study responded with *decreased* SI when exposed to the stressor, suggesting that gender differences in stress-induced aggression may be enhanced (less aggression in women vs. men) under conditions of general stress. This finding differs somewhat from that of Bettencourt and Miller [1996] and others', who have concluded that interpersonal provocation serves to reduce gender differences in physical aggression (i.e., women respond with more aggression under provocation). In effect, gender differences may be enhanced or attenuated depending on the features of the aversive context. As a preliminary demonstration of gender differences in stress-induced aggression, we did not include a provocation induction so as to not confound responses elicited by the stressor vs. provocation. However, future work should involve a direct comparison of men and women's aggressive responses toward an innocent vs. provoking confederate.

Unexpectedly, men did not show differences in their behavioral responding between stress conditions, and they self-reported fewer mood changes as a result of stress exposure. It may have been that men were less distressed by the stressor than were women; however, women and men both rated the air blasts as equally aversive. An alternative explanation could be that men were overall more focused on the supervisor task and on punishing the employee for poor performance than on the stressor (for men in high stress). In essence, the frustrating employee–supervisor interaction represented the negative stressor for men; this interpretation would be consistent with their behavior in the experiment (increased aggression across both stress conditions). These results require replication, wherein frustration regarding the confederate's performance is manipulated in the experiment.

In contrast to SI, gender differences were less robust for SD. These results provide further evidence that SI and SD are distinct measures. Our factor analysis suggested that SI and SD are indeed separable but correlated ($r = 0.49$, $P < 0.001$) measures of laboratory aggression. Beal et al. [2000] found something similar in their study on aggression and modern racism. Results also indicated that both measures are valid indices of angry and aggressive responses, in that they exhibited expected correlations with trait aggression

and anger, but, as would be expected, SI was more robustly related to overt and physical expressions of anger than SD.

The different results for these two measures in terms of gender are also intriguing. Although women in high stress showed a decrease in SI relative to women and men in low stress, high-stress women responded with similar levels of SD as men in the high-stress condition. Our results are consistent with prior work, which has found that women may inhibit SI responses more so than SD responses [Anderson and Dill, 2000; Giancola and Zeichner, 1995]. The interpretation of SD as a covert measure would be in line with Bjorkqvist et al. [1992] definition of covert aggression as a response that disguises aggressive intent and avoids detection and retaliation. The current findings are also consistent with work by Lightdale and Prentice [1994], who found no gender differences in aggression under conditions of deindividuation (the participants felt that their responses were anonymous and they could not be identified). Although speculative, this prior work and the current results suggest that women may be as aggressive as men when their responses are not overt, and their reluctance to engage overtly in aggressive responses is partly due to social pressures to be non-aggressive.

However, some caution should be taken when interpreting findings for SD because there is a paucity of research on this measure [Giancola and Zeichner, 1995]. For example, why was self-reported mood not related to SD? It is likely that SD responses represent a covert attempt at aggression but it is unclear what processes may trigger this type of aggression. It may be that affective priming by exposure to stress is but one pathway for aggression, and some other pathway may be responsible for activating more covert aggressive responses (e.g., reasoned and planned actions). More studies need to be conducted to validate these laboratory measures via examining differential correlations with more naturalistic measures of overt and covert aggression. Nonetheless, research studies like the present contribute to a nomological network in the understanding of different forms of aggression and relationships to gender manifestations of hostility and anger.

Emotional Correlates of Aggression in Men and Women

Our second aim was to examine differential emotional correlates of stress and aggression in men and women. The results showed that among men, but not women, externalizing feelings such as hostility relate closely to *increased* aggression. On the other hand, women exposed to the stressor self-reported greater increases in sadness and guilt compared with those not exposed to the stressor, and increases in sadness were related to an inhibition of overt aggression in women but not men. Even when women experienced hostility, these feelings were *negatively* related to aggressive behavior, suggesting a suppression of outward expressions of and overcompensation for their frustration during the experiment. These findings are consistent with Eagly and Steffen's [1986] conclusions that sex differences in aggressive behavior are partly due to the fact that women experience guilt and anxiety about externalizing their anger. Campbell et al. [1992] have suggested that women's social representations of aggression involve loss of self-control and the experience of guilt following engagement in aggression. Men, however, hold social representations of aggression that tend to justify its use. The results of our study are consistent with these lines of work.

Limitations

As in most studies, this study also has some limitations. First, the aggression paradigm used may be low in ecological validity. For one, the overt (SI) and covert (SD) measures used in the laboratory may not exactly parallel those (e.g., hitting and punching; gossip and passive aggression, respectively) used by men and women in the real world. Another criticism of the laboratory aggression paradigm involves the possibility that the shock responses of participants in this situation might reflect altruism (i.e., desire to aid the confederate) more so than aggression [Tedeschi and Quigley, 1996]. However, one of the strengths of the current experiment was that we used a cover story that was less likely to allow participants to interpret their behaviors as altruistic (i.e., they were to administer shocks to the employee to simulate "criticism" of job performance). We also conducted validation checks by examining relationships between shock responses and trait measures of anger and aggression. The significant relationships between the laboratory and paper-and-pencil indices argue against the idea that shock responses were motivated by altruism.

Finally, some caution should be taken when interpreting the differences in emotional responding on the PANAS-X in men and women. The expected

stress × gender interactions for the mood scales were marginal or not significant, and thus, replication with a larger sample is necessary to confirm the reported effects. Nonetheless, our results were consistent with theoretical conceptualizations and prior research on male and female emotion and aggression.

CONCLUSIONS

A growing body of work highlights differences in the way men and women construe their emotions [Tobin et al., 2000] and respond to stress [Taylor et al., 2000]. This study applied these findings to the area of aggression. The results from this study provide preliminary evidence to pursue further avenues of research related to the underlying processes that produce differential manifestation of distress between men and women. In particular, investigations that examine how specific emotions and cognitions become activated to influence behavior hold great promise for informing treatment geared at helping men and women use more adaptive coping strategies in response to stress.

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