Published in final edited form as:

J Fam Psychol. 2007 September ; 21(3): 354–362. doi:10.1037/0893-3200.21.3.354.

Posttraumatic Stress Disorder and Physical Health Symptoms Among Women Seeking Help for Relationship Aggression

Casey T. Taft,

Veterans Affairs Boston Healthcare System, and Boston, University School of Medicine

Dawne S. Vogt,

Veterans Affairs Boston Healthcare System, and Boston, University School of Medicine

Mindy B. Mechanic, and

California State University, Fullerton

Patricia A. Resick

National Center for Posttraumatic Stress Disorder, VA Boston Healthcare System, and Boston University

Abstract

This study examined associations between intimate partner aggression and physical health symptoms among a sample of help-seeking women experiencing relationship aggression ($N = 388$). Using a structural equation modeling framework, the authors found posttraumatic stress disorder (PTSD) symptoms to fully mediate the associations of both physical and psychological aggression with physical health symptoms. The influence of PTSD symptoms on physical health symptoms was partially mediated by anger/irritability. Results were consistent with studies from other trauma groups suggesting that PTSD is pivotal with respect to explaining the effects of trauma on health.

Keywords

posttraumatic stress disorder; physical health; battered women; intimate partner violence; psychological aggression

Intimate partner aggression has consistently been associated with poorer physical health and higher medical care utilization, with health problems ranging from direct physical injuries to other chronic nervous system, musculoskeletal, cardiovascular, gastrointestinal, and urogenital symptoms and conditions (see Campbell, 2002, for a review). Not surprisingly, women who experience intimate partner aggression also report more work-related disability than women who do not (Coker, Smith, Bethea, King, & McKeown, 2000). Considering that approximately 1.3 million women are physically assaulted by an intimate male partner in the United States annually, and given the severe consequences and costs of this aggression, it is clear that this is a serious national public health problem (National Center for Injury Prevention and Control, 2003).

Research into the physical health effects of relationship aggression has focused primarily on physical aggression. Recent evidence, however, also documents the deleterious impact of psychological aggression. Marshall (1996) found increased psychological aggression to be

associated with more physician visits and higher rates of serious and chronic illness among certain subgroups within a large community sample of women reporting “bad” or “stressful” heterosexual relationships. Straight, Harper, and Arias (2003) found psychological aggression to be associated with poorer self-reported general and functional health when controlling for the effects of physical aggression among a sample of dating female college students. In two large-scale epidemiological studies, Coker and her colleagues (Coker et al., 2000, 2002) have found elevated health symptoms and conditions among women experiencing psychological aggression. In both studies, similar patterns of health problems were found among those experiencing physical aggression–sexual coercion and those experiencing psychological aggression only.

Research is needed to further investigate the unique effects of physical and psychological aggression on health and to better understand the mechanisms for these relationships. Investigations among other trauma groups have found post-traumatic stress disorder (PTSD) symptoms to be central with respect to explaining physical health problems (see Schnurr & Green, 2004). PTSD symptoms have consistently mediated associations between combat exposure and physical health outcomes among samples of military veterans (e.g., Taft, Stern, King, & King, 1999), and associations between PTSD symptoms and physical health have been demonstrated among treatment-seeking samples of women who have experienced non-intimate-partner sexual assault (Zoellner, Goodwin, & Foa, 2000). Considering the high PTSD prevalence rates among help-seeking samples of battered women (e.g., Golding, 1999, found a 64% mean prevalence rate across 11 studies) and research suggesting that stress is associated with poor physical health among this population (Sutherland, Bybee, & Sullivan, 2002), the investigation of PTSD is likely to assist in explaining the association between relationship aggression and health.

Theoretical models attempting to explain the association between PTSD symptoms and poor health have emphasized the role of different forms of negative affect that frequently accompany PTSD, particularly anxiety, anger, and depression severity (Schnurr & Green, 2004). PTSD symptoms predict negative affect variables in prospective studies (e.g., Erickson, Wolfe, King, King, & Sharkansky, 2001), and these factors are consistently associated with poorer health (Adams, Cartwright, Ostrove, Stewart, & Wink, 1998; Miller, Smith, Turner, Guijarro, & Hallet, 1996; Sirois & Burg, 2003). Although common biological and behavioral factors across forms of negative affect, such as autonomic nervous system dysregulation and risky health behaviors, may help account for these relationships, unique factors also undoubtedly play a role (Sirois & Burg, 2003). For example, depression has been linked with poorer immune system functioning (Connor & Leonard, 1998), and anger/hostility in particular may diminish social resources that promote health (Smith, 1992). It is also noteworthy that variables reflecting different forms of negative affect have been uniquely associated with health outcomes when considered together (Adams et al., 1998; Surtees, Wainwright, Khaw, & Day, 2003).

With respect to battered women samples, elevated anxiety, anger, and depression have been reported (Campbell, 2002; Follingstad, Neckerman, & Vormbrock, 1988; Koss, 1990), and one study found that symptoms of anxiety and depression mediated the relation between partner aggression and physical health symptoms (Sutherland, Bybee, & Sullivan, 1998). In a more recent study of battered women, Sutherland and her colleagues (2002) reported that stressful life events indirectly influenced physical health symptoms through their association with depression. We are not aware of any previous study that has examined the impact of anger on physical health among a sample of women experiencing relationship aggression.

In this study, structural equation modeling (SEM) was used to investigate associations between physical and psychological aggression and physical health symptoms among a sample of

women seeking help for relationship aggression. We had two overarching hypotheses. The first hypothesis posited that the effects of physical and psychological aggression on physical health symptoms would be fully mediated via PTSD symptoms. The second hypothesis predicted that the effect of PTSD symptoms on physical health symptoms would be mediated by anxiety, depression severity, and anger/irritability.

Method

Participants

Participants were women seeking help from battered women's shelters and nonresidential community agencies serving battered women. Study inclusion criteria were as follows: (a) Participants reported being involved in an intimate relationship with a male perpetrator for 3 months or longer; (b) participant's most recent episode of physical aggression occurred more than 2 weeks but less than 6 months prior to initial study participation, to reduce the potential for inflation of symptom reports immediately post-assault, and to minimize the degradation of memories for the most recent incidents; and (c) participants endorsed experiencing at least two severe or four minor acts of physical aggression on a modified version of the Conflict Tactics Scale (CTS; Straus, 1979) within the previous year, or a combination of at least one severe and two minor acts.

Among the 493 women who were screened, 7 were ineligible because they did not meet the relationship duration criterion, 38 were ineligible because their last episode of physical aggression occurred outside of the time window for eligibility, 17 were ineligible because they did not meet the physical aggression criterion, and 5 were ineligible for various reasons not related to study criteria. Twelve declined participation following the screening, and 12 were terminated from the study because of apparent drug or alcohol intoxication, the presence of psychotic symptoms, or other factors compromising the validity of their data. Another 14 assessments were judged invalid after the completion of study procedures (e.g., the participant completed questionnaires quicker than possible, provided the same response option for all items, or reported the absence of physical aggression following screening). In total, 388 women provided usable data, and all were included in the primary analyses. Only 12 participants who were invited to complete two sessions at the research site failed to complete both (see the *Procedures* section).

Participants consisted of 251 (65%) African Americans, 113 (29%) Caucasians, 6 (2%) Latinas, 5 (1%) Native Americans, and 13 (3%) individuals who classified themselves as "other" with respect to race and ethnicity. The average age of participants was 34.7 years ($SD = 8.3$ years). The average education was 12.4 years ($SD = 2.0$ years). During their most recent relationship involving aggression, 43 (11%) participants were dating the perpetrator, 193 (50%) were living with the perpetrator, 112 (29%) were married to the perpetrator, and 40 (10%) were divorced or separated from the perpetrator. The average relationship length between the participant and her perpetrator was approximately 7.0 years ($SD = 6.7$ years). Participants experienced physical force from the perpetrator for an average of 4.6 years ($SD = 5.5$ years). At the time of this study, 219 (56%) of the participants were residing in a battered women's shelter, and 169 (44%) were not residing in a shelter and were seeking help for their victimization. Among nonresidential help-seekers, 37 (22%) were residing with the perpetrator. Participants reported that an average of 41.9 days ($SD = 33.2$ days) had passed since their last episode of physical aggression.

Measures

Intimate partner aggression—Intimate partner aggression was assessed with a modified version of the original CTS (Straus, 1979) during the initial screening and the Revised Conflict Tactics Scale (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996) during data

collection for the study. More specifically, at screening, the 8 Physical Assault subscale items of the CTS were administered, plus 5 additional items to further assess mild (“twisted your arm or pulled your hair”) and severe (“caused you to have physical injuries,” “slammed you against a wall or thrown you down stairs,” “forced you to have sex when you did not want to,” “caused you to fear for your life or the lives of your family members”) aggression. The Physical Assault (12 items) and Psychological Aggression (8 items) sub-scales of the CTS2 were assessed during the study to examine associations with other study variables. For the CTS2, respondents reported the frequency with which their perpetrator engaged in each abusive behavior during the previous year on a scale ranging from 0 (*never*) to 6 (*more than 20 times*), and frequency scores were calculated by summing the midpoints of the response categories for each item (e.g., *6 to 10 times* was recoded as 8; see Straus, 1979). The internal consistency reliability estimates for the CTS2 Physical Assault and Psychological Aggression subscales were .91 and .78, respectively.

PTSD symptoms—PTSD symptoms were assessed using the Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). The PDS consists of a trauma screening question and 17 items corresponding with the diagnostic criteria for PTSD (American Psychiatric Association, 1994). Participants rated the frequency of each symptom over the past month with respect to abusive incidents in their relationship according to a 4-point scale ranging from 0 to 3, and these items were summed. The internal consistency reliability estimate for this measure was .90.

Anxiety—Anxiety was measured using the State subscale of the State–Trait Anxiety Inventory (STAI–S; Spielberger, Gorsuch, & Lushene, 1970). This measure was designed to assess anxiety that one is feeling at a particular moment in time and has been used extensively across numerous populations, cultures, and disorders. The STAI–S consists of 20 items rated on a Likert-type scale ranging from 1 (*not at all*) to 4 (*very much so*), with higher scores reflecting higher state anxiety. The internal consistency reliability estimate of the STAI–S was .93.

Depression severity—Depression severity was measured with seven items from the Beck Depression Inventory (2nd ed.; BDI–II; Beck, Steer, & Brown, 1996). This subscale (BDI for Primary Care) has been used previously to reliably assess affective and cognitive symptoms of depression (Beck, Steer, Ball, Ciervo, & Kabat, 1997) and within veteran populations (Vogt, Pless, King, & King, 2005). Participants rated the severity of each symptom on a 4-point scale ranging from 0 to 3, and item scores were summed. The internal consistency reliability estimate for this instrument was .76.

Anger/ irritability—Anger/irritability was measured with the 9-item Anger/Irritability subscale of the Trauma Symptom Inventory (TSI; Briere, 1995). The Anger/Irritability subscale assesses the presence of angry mood and irritable affect, as well as associated angry cognitions and behavior. Items were rated on a 4-point scale ranging from 0 (*never*) to 3 (*often*), referring to the frequency of occurrence over the previous 6 months, and summed to obtain an overall scale score. The internal consistency reliability estimate for this subscale was .85.

Physical health symptoms—Physical health symptoms were measured using a modified version of the Pennebaker Inventory of Limbic Languidness (PILL; Pennebaker, 1982). The original PILL consists of 54 items that assess the frequency of the occurrence of a large number of common physical health symptoms. Four items were added to the PILL to more fully assess women-specific health problems, particularly gynecological problems. These items included (a) “painful or irregular menstrual periods”; (b) “vaginal infections such as yeast infection”;

(c) “monthly premenstrual problems such as severe abdominal bloating, headache, or breast tenderness”; and (d) “symptoms of menopause such as sudden sweats or hot flashes.” Participants endorsed the frequency of each symptom on a scale ranging from 1 (*have never or almost never experienced the symptom*) to 5 (*more than once every week*). As advocated by Pennebaker (1982), overall scores were computed by summing the total number of items for which the participant endorsed a 3 (*every month or so*) or higher. The internal consistency reliability estimate for the modified PILL was .96.

Procedure

Participants were recruited from residential shelters and nonresidential community agencies serving battered women that offered legal, casework, and/or counseling services. All women receiving services at these agencies were informed of this study by agency staff at intake unless such staff deemed that it was not appropriate. Potential participants contacted study personnel and were screened for eligibility via telephone based on the aforementioned inclusion–exclusion criteria. Eligible participants who agreed to participate were scheduled for two visits at the research site, the Center for Trauma recovery in Saint Louis, Missouri. These visits were scheduled approximately 2 weeks following the initial screening and typically occurred within several days of each other. On the 1st day, written informed consent was obtained from participants by a project staff member, and all women were provided with an opportunity to discuss questions or concerns. Next, participants completed several symptom-based measures programmed onto a laptop in order to reduce the likelihood that symptom scores would be elevated as a consequence of discussing traumatic material. They were then interviewed regarding relationship aggression victimization and relationship history by trained clinicians with extensive experience dealing with traumatized populations. The 2nd day consisted of non-symptom-based self-report instruments that were programmed onto a laptop.

Participant debriefings were conducted following completion of all instruments. Safety planning information and referrals for supportive services were provided. Interviewers spoke with the woman about her safety and assisted with referrals for residential or other services if appropriate. To further ensure safety, no phone messages were left for participants, no mail was sent to their homes, and security equipment was installed at the research site. Each woman also had an opportunity to discuss the impact of participating with her interviewer and completed rating forms assessing her participation experience. Participants were compensated up to \$40 for their participation. All study procedures received university Institutional Review Board approval.

Analyses

First, descriptive statistics and bivariate intercorrelations among study variables were computed. We then computed bivariate correlations between physical health symptoms and background factors that might be expected to be associated with physical health and thus might need to be considered in subsequent SEM analyses. Background factors included shelter status, minority racial–ethnic status, marital status, education, income, and age. None of these variables were significantly related to physical health symptoms, and all had corresponding correlation coefficient values less than .10. Thus, we next proceeded with our SEM analyses as planned to test the hypothesized interrelationships among study variables. A measurement model incorporating effect and causal indicators of latent variables was first specified and evaluated. We next specified several structural models to systematically evaluate overriding hypotheses concerning relationships among partner aggression, PTSD symptoms, negative affect variables, and physical health symptoms, and we specified a final model that included all accepted direct and indirect effects.

As recommended by Jaccard and Wan (1996), we evaluated the overall fit of the measurement and final structural model using at least one fit index from each of three categories: fit indices based on the comparison of predicted versus observed covariances (model chi-square, goodness-of-fit index; GFI); fit indices based on comparisons between the given model and the null model (comparative fit index; CFI); and fit indices based on the comparison of predicted versus observed covariances but penalizing for lack of parsimony (root-mean-square error of approximation; RMSEA). For all SEM analyses, matrices of covariances were submitted to the LISREL 8 program (Jöreskog & Sörbom, 1993). The Full Information Maximum Likelihood (FIML) estimator was used to accommodate missing data under the assumption that data were missing at random (Little & Reuben, 1987). Maximum-likelihood estimation was used. Covariances among residuals were always fixed at 0.

Results

Descriptive Statistics

Table 1 presents descriptive statistics for the study variables. Participants reported an estimated average of 85 acts of physical aggression and 106 acts of psychological aggression for the previous year. Mean health symptom reports were 23.63 ($SD = 15.26$) for the modified PILL. When only the original 54 PILL items were considered, mean symptom reports were 23.52 ($SD = 15.16$). Table 2 presents bivariate correlations between all study variables. The physical health symptom outcome was associated with each of the predictor variables, with the largest associations found for PTSD symptoms and anger/irritability. The relationship aggression variables were associated with all of the predictor variables other than anger/irritability. PTSD symptoms and the negative affect variables were all significantly intercorrelated.

SEM

Measurement model—A measurement model that included all variables used in study analyses was specified to determine whether measures were adequate to address the questions that were the focus of this study. The measurement model was composed of four latent variables along with their 10 effect indicators, as well as three variables represented by single causal indicators, for which error is not estimated. The choice to represent a variable with causal versus effect indicators depends on the conceptualization of the variable. Effect indicators are used for hypothetical constructs that are purported to cause the indicator. Within the current study, we conceptualized PTSD symptoms in this manner; if an individual has this condition, it is expected that he or she will exhibit certain behaviors (e.g., hyperarousal). In contrast, causal indicators are used to represent composite variables that have no meaning above and beyond the indicators that represent them (Bollen & Lennox, 1991; MacCallum & Browne, 1993; Reckase, 1996). In this case, physical and psychological aggression are best represented with causal indicators because it is more logical to assert that exposure to individual aggressive acts together composes the construct of exposure to aggression rather than to assert that individual aggressive acts are caused by total exposure to aggression. The same logic can be applied to the assessment of the number of health symptoms.

Consistent with this rationale, the physical and psychological aggression variables were composed of separate causal indicators representing the respective sums of the 12 Physical Assault items and 8 Psychological Aggression CTS2 items, and the physical health symptom variable was composed of a causal indicator representing the sum of scores on the 58 PILL items. The PTSD symptoms latent variable had three effect indicators obtained from the PDS reflecting the reexperiencing (5 items), avoidance and emotional numbing (7 items), and hyperarousal (5 items) PTSD symptom clusters. For the anxiety latent variable, two 10-item effect indicators derived from the STAI-S were rationally grouped to reflect somatic and nonsomatic anxiety symptoms. The depression severity latent variable was represented by two

effect indicators derived by rationally grouping the BDI-PC items to reflect cognitive (4 items) and affective (3 items) symptoms. For the anger/irritability latent variable, three 3-item causal indicators were rationally derived by grouping items from the TSI Anger/Irritability subscale to reflect anger control, angry mood, and irritable affect.

Indicators were specified to load on designated variables, and the model was fit to the data. The resulting measurement model, $\chi^2(47, N = 388) = 89.35, p < .001$, provided a good fit to the data, suggesting that the measurement of key variables was adequate. Although the chi-square value was significant, which might be interpreted as indicative of poor model-to-data fit, this statistic is based on the central chi-square distribution. The more relevant distribution is the noncentral chi-square (Browne & Cudeck, 1993), on which both the CFI (Bentler, 1990) and RMSEA are based. Steiger's (1990) corrected form of the GFI (Jöreskog & Sörbom, 1993) for this model was .97, exceeding the recommended minimum of .95. The CFI was .98, also exceeding the recommended minimum of .95. The RMSEA for this model (.05) met a well-recognized standard for good fit ($< .06$; Hu & Bentler, 1999). Moreover, as indicated in Figure 1, factor loadings for the variables that were conceptualized as latent variables were quite high, with values ranging from .68 to .93.

Structural model—We next turned our attention to examining the hypotheses that guided this study. We specified several structural models to systematically evaluate hypotheses concerning relationships among intimate partner aggression, PTSD symptoms, negative affect variables, and physical health symptoms. As recommended for tests of mediation (Baron & Kenny, 1986), our model testing sequence involved first verifying the existence of a significant direct relationship between the independent variable and the dependent variable in a model that excluded the proposed mediator, followed by verifying the absence, or significant reduction, of the direct relationship in the presence of the mediator. We followed these analyses with direct tests of mediational effects, as recommended in more contemporary guidelines for testing mediation (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Within LISREL, these tests are based on the Sobel test (Baron & Kenny, 1986; Sobel, 1982).

To test our hypothesis addressing associations between aggression variables, PTSD symptoms, and physical health symptoms, we first specified a model that included only direct effects from both forms of aggression to physical health symptoms. The proposed mediator (PTSD symptoms) was excluded from this model. As expected, findings revealed that both direct effects of physical and psychological aggression were significant ($\beta = .16, B = 0.01, z = 2.70$, and $\beta = .26, B = 0.02, z = 4.51$, respectively). We then specified a model that added indirect effects through PTSD symptoms to determine whether the direct effects diminished in the presence of the proposed mediator. As predicted, the direct effect of physical aggression on physical health symptoms dropped from significance ($\beta = .07, B = 0.01, z = 1.16$), suggesting that the effect of physical aggression on physical health symptoms was fully mediated via PTSD symptoms. Also as expected, the direct effect of psychological aggression dropped substantially and became nonsignificant ($\beta = .08, B = 0.03, z = 1.32$), again suggesting full mediation. Additional evidence for mediation was provided via Sobel test results, which revealed significant indirect effects of both physical and psychological aggression on physical health symptoms via PTSD symptoms ($\beta = .07, B = 0.01, z = 2.31$, and $\beta = .12, B = 0.04, z = 3.67$, respectively).

To test our second hypothesis, which addressed associations between PTSD symptoms, negative affect variables, and physical health symptoms, we next specified a model with direct effects from PTSD symptoms to physical health symptoms. Again, we omitted the proposed mediators from this model. As expected, findings revealed a significant direct effect ($\beta = .62, B = 1.34, z = 10.50$). Thus, we next specified a model that added the three proposed indirect effects via anxiety, depression severity, and anger/irritability. Although the direct effect was

reduced ($\beta = .27$, $B = 1.46$, $z = 2.67$), this effect maintained statistical significance, suggesting partial mediation via the proposed mediators. We next examined the significance of indirect effects for each of the proposed mediators. Sobel tests provided support for the role of anger/irritability as a mediator of the association between PTSD and physical health symptoms, $\beta = .13$, $B = 0.67$, $z = 3.65$. In contrast, indirect effects mediated via anxiety and depression severity did not achieve statistical significance ($\beta = -.01$, $B = -0.05$, $z = -.17$, and $\beta = .09$, $B = 0.48$, $z = 1.09$, respectively). Thus, we posited a model that excluded these two effects, and we used this model to compute final estimates of direct and indirect effects. Both the direct and indirect effect (mediated via anger/irritability) were significant in this final model ($\beta = .37$, $B = 1.95$, $z = 5.89$ and $\beta = .12$, $B = 0.66$, $z = 4.01$, respectively).

As a final step in this model testing sequence, we specified a model that included all supported paths from hypothesis testing. The resulting model, $\chi^2(57, N = 388) = 104.52$, $p < .05$, provided good fit to the data, as indicated by corrected GFI (Jöreskog & Sörbom, 1993; Steiger, 1990) and CFI values that exceeded recommended minimums (CFI = .98; GFI = .96) and an RMSEA (.046) that met a well-recognized standard for good fit (Hu & Bentler, 1999). Although the chi-square value for the resulting model was significant ($p < .05$), this is common in larger samples, and indices based on the noncentral chi-square (RMSEA and CFI) indicated good to very good fit of this measurement model. This model is depicted in Figure 1. As indicated in Table 3, all retained indirect and direct paths maintained significance in this larger model.

Discussion

Findings indicate that women seeking help for intimate partner aggression experience heightened levels of negative physical health symptoms. On average, participants endorsed experiencing 24 of the 58 (41%) symptoms on the modified PILL at least every month, and 22 of the 54 (41%) original PILL items. These rates are very high relative to other studies using the unmodified PILL. For example, Richards, Beal, Seagal, and Pennebaker (2000) reported a 27% symptom endorsement rate in their psychiatric sample, and Bennett, Smith, and Gallacher (1996) reported a 20% symptom endorsement rate among hospital patients admitted for myocardial infarction. Taken together with findings of associations between partner aggression measures and physical health symptoms, the data are consistent with previous studies demonstrating a strong link between relationship aggression and poorer physical health (Campbell, 2002).

Results of the SEM analyses supported the hypothesis that both physical and psychological aggression would be fully mediated by PTSD symptoms. Consistent with prior studies among other trauma groups (e.g., Taft et al., 1999), PTSD symptoms were strongly associated with physical health and served as an important variable with respect to explaining the effects of trauma on physical health. The data suggest that both physical and psychological aggression exert their damaging health effects primarily through their relationship to PTSD symptomatology.

For the most part, the negative affect variables did not mediate the PTSD–physical health relationship, with anger/irritability representing an exception to this pattern. These findings run counter to one study (Sutherland et al., 2002) in which depression severity partially accounted for the association between stress and physical health among a community sample of women, half of whom had experienced intimate partner physical aggression. Findings also appear at odds with the notion that depression and anxiety partially account for the association between PTSD symptoms and physical health (Schnurr & Green, 2004). However, little or no prior research has examined the indirect effect of PTSD symptoms on health through negative affect variables, and few studies have examined the three negative affect variables of interest together in the same model. Associations commonly found between anxiety, depression

severity, and physical health may be at least partially accounted for by PTSD symptoms and anger/irritability.

The mechanisms whereby anger/irritability may lead to poorer physical health among battered women deserve more careful study. One possible explanation for these findings derives from psychosocial vulnerability models that hypothesize lower levels of social support and more stressful life events among those experiencing problems with anger (Smith, 1992). Low social support has consistently been associated with higher PTSD symptoms among those exposed to trauma (King, King, Fairbank, Keane, & Adams, 1998) and poorer physical health (Kimerling & Calhoun, 1994). It is also plausible that those with anger dysregulation problems represent a group who experience more chronic, unremitting PTSD symptoms and therefore experience poorer health. Research among crime victims has shown that those with elevated levels of anger benefit less from PTSD treatment (e.g., Foa, Riggs, Massie, & Yarczower, 1995).

Results highlight the importance of health screening and patient education efforts in settings serving women who have experienced relationship aggression (Sutherland et al., 2002). The provision of information regarding the common health-related sequelae of trauma and PTSD and how to avoid such problems may ameliorate these negative consequences of victimization. Results further suggest that interventions targeting PTSD symptoms may lead to improved physical health among victims of relationship aggression. Some preliminary evidence from undergraduate samples indicates that the disclosure and processing of traumatic material is associated with long-term decreases in health problems (Pennebaker & Beall, 1986).

Several unexamined variables may help to explain the direct association found between PTSD symptoms and physical health. Many theoretical models hold that PTSD symptoms lead to health problems through health risk behaviors such as poor sleep and diet, lack of exercise, low health care utilization, poor adherence to medical regimens, and substance use (Schnurr & Green, 2004). Physiological reactivity, which accompanies PTSD (Carson et al., 2000), has also been hypothesized as a mechanism for poorer health (Sirois & Burg, 2003). Several other biological factors have been linked with PTSD and proposed to serve as mechanisms for poor health among those exposed to trauma, such as alterations in neurotransmitter and neuroendocrine activity in the adrenergic and hypothalamic–pituitary–adrenal systems, immune system activity abnormalities, and sleep dysregulation (Friedman & McEwen, 2004).

The use of cross-sectional data limits our ability to draw causal conclusions. It is possible that physical health symptoms influenced the reporting of psychological symptoms, possibly inflating obtained associations. It is also possible that the effects of some variables may only be evidenced when examined over time. Prospective studies are clearly needed to more fully understand the relationships among study variables. Another limitation was our reliance on self-reports of physical health and psychopathology. Factors such as symptom exaggeration, mislabeling of symptoms, and somatization may inflate associations between PTSD symptoms and physical health symptoms (Schnurr & Green, 2004). Our focus on health symptoms may have also affected associations among study variables, because symptom measures typically contain items that may reflect symptoms of anxiety or depression (e.g., dizziness, insomnia; Sutherland et al., 2002). Future research should supplement self-report symptom measures with objective measures of physical health functioning. Finally, participants experiencing less frequent and severe physical aggression were excluded from this study. Such exclusion may have led to the relatively higher levels of aggression victimization reported in this sample relative to prior research in this area (e.g., Sutherland et al., 2002). The degree to which current study findings can be generalized to those experiencing lower levels of physical aggression is

unknown. This exclusion may have also lead to reduced variability in the physical aggression variable and a deflation of obtained associations.

Despite these caveats, this investigation represents an important initial step in documenting the associations between intimate partner aggression, PTSD symptoms, and physical health symptoms among a sample of women seeking help for relationship aggression. Results suggest that PTSD symptoms operate as a mediator with respect to the association between relationship aggression and poorer health, and PTSD may exert its impact on health in part through its association with higher levels of anger/irritability. It is hoped that findings from this investigation will stimulate further research in this area of inquiry, and more complex theoretical models will be specified and empirically tested.

References

- Adams SH, Cartwright LK, Ostrove JM, Stewart AJ, Wink P. Psychological predictors of good health in three longitudinal samples of educated midlife women. *Health Psychology* 1998;17:412–420. [PubMed: 9775999]
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed.. Author; Washington, DC: 1994.
- Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 1986;51:1173–1182. [PubMed: 3806354]
- Beck AT, Steer RA, Ball R, Ciervo CA, Kabat M. Use of the Beck Anxiety and Depression Inventories for primary care with medical outpatients. *Assessment* 1997;4:211–219.
- Beck, AT.; Steer, RA.; Brown, GK. Manual for the Beck Depression Inventory. 2nd ed.. Psychological Corporation; San Antonio, TX: 1996.
- Bennett P, Smith P, Gallacher JEJ. Vital exhaustion, neuroticism and symptom reporting in patients with cardiac and non-cardiac chest pain. *British Journal of Health Psychology* 1996;1:309–313.
- Bentler PM. Comparative fit indexes in structural models. *Psychological Bulletin* 1990;107:238–246. [PubMed: 2320703]
- Bollen K, Lennox R. Conventional wisdom on measurement: A structural equations perspective. *Psychological Bulletin* 1991;110:305–314.
- Briere, J. The Trauma Symptom Inventory (TSI): Professional manual. Psychological Assessment Resources; Odessa, FL: 1995.
- Browne, MW.; Cudeck, R. Alternative ways of assessing model fit. In: Bollen, KA.; Long, JS., editors. *Testing structural equation models*. Sage; Newbury Park, CA: 1993. p. 136–162.
- Campbell JC. Health consequences of intimate partner violence. *Lancet* 2002;359:1331–1336. [PubMed: 11965295]
- Carson MA, Paulus LA, Lasko NB, Metzger LJ, Wolfe J, Orr SP, et al. Psychological assessment of posttraumatic stress disorder in Vietnam nurse veterans who witnessed injury or death. *Journal of Consulting and Clinical Psychology* 2000;68:890–897. [PubMed: 11068975]
- Coker AL, Davis KE, Arias I, Desai S, Sanderson M, Brandt H, et al. Physical and mental health effects of intimate partner violence for men and women. *American Journal of Preventative Medicine* 2002;23:260–268.
- Coker AL, Smith PH, Bethea L, King MR, McKeown E. Physical health consequences of physical and psychological intimate partner violence. *Archives of Family Medicine* 2000;9:451–457. [PubMed: 10810951]
- Connor TJ, Leonard BE. Depression, stress, and immunological activation: The role of cytokines in depressive disorders. *Life Sciences* 1998;62:583–606. [PubMed: 9472719]
- Erickson DJ, Wolfe J, King DW, King LA, Sharkansky EJ. Posttraumatic stress disorder and depression symptomatology in a sample of Gulf War veterans: A prospective analysis. *Journal of Consulting and Clinical Psychology* 2001;69:41–49. [PubMed: 11302276]
- Foa EB, Cashman L, Jaycox L, Perry K. The validation of a self-report measure of posttraumatic stress disorder: The Posttraumatic Diagnostic Scale. *Psychological Assessment* 1997;9:445–451.

- Foa EB, Riggs DS, Massie ED, Yarczower M. The impact of fear activation and anger on the efficacy of exposure treatment for posttraumatic stress disorder. *Behavior Therapy* 1995;26:487–499.
- Follingstad DR, Neckerman AP, Vormbrock J. Reactions to victimization and coping strategies of battered women: The ties that bind. *Clinical Psychology Review* 1988;8:373–390.
- Friedman, MJ.; McEwen, BS. Posttraumatic stress disorder, allostatic load, and medical illness. In: Schnurr, PP.; Green, BL., editors. *Trauma and health: Physical health consequences of exposure to extreme stress*. American Psychological Association; Washington, DC: 2004. p. 157–188.
- Golding JM. Intimate partner violence as a risk factor for mental disorders: A meta-analysis. *Journal of Family Violence* 1999;14:99–132.
- Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling* 1999;6:1–55.
- Jaccard, J.; Wan, CK. *LISREL approaches to interaction effects in multiple regression*. Sage; Thousand Oaks, CA: 1996.
- Jöreskog, KG.; Sörbom, D. *LISREL 8 user's reference guide*. Scientific Software; Chicago: 1993.
- Kimerling R, Calhoun KS. Somatic symptoms, social support, and treatment seeking among sexual assault victims. *Journal of Consulting and Clinical Psychology* 1994;62:333–340. [PubMed: 8201071]
- King LA, King DW, Fairbank JA, Keane TM, Adams GA. Resilience–recovery factors in post-traumatic stress disorder among female and male Vietnam veterans: Hardiness, postwar social support, and additional stressful life events. *Journal of Personality and Social Psychology* 1998;74:420–434. [PubMed: 9491585]
- Koss MP. The women's mental health research agenda: Violence against women. *American Psychologist* 1990;45:374–380. [PubMed: 2310085]
- Little, RA.; Reuben, DB. *Statistical analysis with missing data*. Wiley; New York: 1987.
- MacCallum RC, Browne MW. The use of causal indicators in covariance structure models: Some practice issues. *Psychological Bulletin* 1993;114:533–541. [PubMed: 8272469]
- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods* 2002;7:83–104. [PubMed: 11928892]
- Marshall LL. Psychological abuse of women: Six distinct clusters. *Journal of Family Violence* 1996;11:379–409.
- Miller TQ, Smith TW, Turner CW, Guijarro ML, Hallet AJ. A meta-analytic review of research on hostility and physical health. *Psychological Bulletin* 1996;119:322–348. [PubMed: 8851276]
- National Center for Injury Prevention and Control. *Costs of intimate partner violence against women in the United States*. Centers for Disease Control and Prevention; Atlanta, GA: 2003.
- Pennebaker, JW. *The psychology of physical symptoms*. Springer-Verlag; New York: 1982.
- Pennebaker JW, Beall SK. Confronting a traumatic event: Toward an understanding of inhibition of disease. *Journal of Abnormal Psychology* 1986;95:274–281. [PubMed: 3745650]
- Reckase MD. Test construction in the 1990s: Recent approaches every psychologist should know. *Psychological Assessment* 1996;8:354–359.
- Richards JM, Beal WE, Seagal JD, Pennebaker JW. Effects of disclosure of traumatic events on illness behavior among psychiatric prison inmates. *Journal of Abnormal Psychology* 2000;109:156–160. [PubMed: 10740948]
- Schnurr, PP.; Green, BL. Understanding relationships among trauma, posttraumatic stress disorder, and health outcomes. In: Schnurr, PP.; Green, BL., editors. *Trauma and health: Physical health consequences of exposure to extreme stress*. American Psychological Association; Washington, DC: 2004. p. 217–243.
- Sirois BC, Burg MM. Negative emotion and coronary heart disease: A review. *Behavior Modification* 2003;27:83–102. [PubMed: 12587262]
- Smith TW. Hostility and health: Current status of a psychosomatic hypothesis. *Health Psychology* 1992;11:139–150. [PubMed: 1618168]

- Sobel, ME. Asymptotic confidence intervals for indirect effects in structural equation models. In: Leinhardt, S., editor. *Sociological methodology*. American Sociological Association; Washington, DC: 1982. p. 290-312.
- Spielberger, CD.; Gorsuch, RL.; Lushene, RD. *STAI: Manual for the State-Trait Anxiety Inventory*. Consulting Psychologists Press; Palo Alto, CA: 1970.
- Steiger JH. Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research* 1990;25:173–180.
- Straight ES, Harper FWK, Arias I. The impact of partner psychological abuse on health behaviors and health status in college women. *Journal of Interpersonal Violence* 2003;18:1035–1054. [PubMed: 19771708]
- Straus MA. Measuring intrafamily conflict and violence: The Conflict Tactics (CT) Scales. *Journal of Marriage and the Family* 1979;41:75–88.
- Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The Revised Conflict Tactics Scales (CTS2): Development and preliminary psychometric data. *Journal of Family Issues* 1996;17:283–316.
- Surtees PG, Wainwright NWJ, Khaw KT, Day NE. Functional health status, chronic medical conditions, and disorders of mood. *British Journal of Psychiatry* 2003;183:299–303. [PubMed: 14519607]
- Sutherland C, Bybee D, Sullivan C. The long-term effects of battering on women's health. *Women's Health: Research on Gender, Behavior, and Policy* 1998;4:41–70.
- Sutherland CA, Bybee DI, Sullivan CM. Beyond bruises and broken bones: The joint effects of stress and injuries on battered women's health. *American Journal of Community Psychology* 2002;30:609–636. [PubMed: 12188053]
- Taft CT, Stern AS, King LA, King DW. Modeling physical health and functional health status: The role of combat exposure, posttraumatic stress disorder, and personal resource attributes. *Journal of Traumatic Stress* 1999;12:3–23. [PubMed: 10027139]
- Vogt DS, Pless AP, King LA, King DW. Deployment stressors, gender, and mental health outcomes among Gulf War I veterans. *Journal of Traumatic Stress* 2005;18:115–127. [PubMed: 16281203]
- Zoellner LA, Goodwin ML, Foa EB. PTSD severity and health perceptions in female victims of sexual assault. *Journal of Traumatic Stress* 2000;13:635–649. [PubMed: 11109236]

Figure 1.

Final model incorporating both measurement and structural modeling results. Standardized coefficients are provided. All represented paths among latent variables achieved statistical significance. Phys = physical; Psych = psychological; Reex = reexperiencing; Avoid = avoidance; Hyper = hyperarousal; PTSD = posttraumatic stress disorder; Affect = affective; Cog = cognitive; Symp = symptoms.

Table 1

Descriptive Statistics for Study Variables

Variable	<i>M</i>	<i>SD</i>	Range
Physical aggression	84.56	71.89	1–300
Psychological aggression	105.93	47.65	2–200
PTSD symptoms	28.81	10.96	1–51
Anxiety	54.97	10.81	22–80
Depression severity	7.72	3.85	0–19
Anger/irritability	15.81	6.63	0–27
Physical health symptoms	23.63	15.26	0–58

Note. PTSD = posttraumatic stress disorder.

Table 2

Intercorrelations Between Study Variables

Variable	1	2	3	4	5	6	7
1. Physical aggression	—						
2. Psychological aggression	.57*	—					
3. PTSD symptoms	.28*	.32*	—				
4. Anxiety	.19*	.22*	.58*	—			
5. Depression severity	.19*	.29*	.59*	.57*	—		
6. Anger/irritability	.08	.09†	.35*	.17*	.28*	—	
7. Physical health symptoms	.24*	.27*	.45*	.28*	.36*	.43*	—

Note. PTSD = posttraumatic stress disorder.

† $p < .10$.

* $p < .05$.

Table 3
Standardized Effects of Study Variables on Physical Health Symptoms in the Final Model

Variable	Direct effects		Indirect effects		Total effects	
	β	z	β	z	β	z
Physical aggression			.07	2.29	.07	2.20
Psychological aggression			.14	4.10	.14	4.10
PTSD symptoms	.38	6.16	.12	3.98	.50	8.65
Anger/irritability	.27	4.44			.27	4.44

Note. PTSD = posttraumatic stress disorder; z = critical ratio.