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# Posttraumatic Stress Disorder and Intimate Relationship Problems: A Meta-Analysis

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**Objective:** The authors conducted a meta-analysis of empirical studies investigating associations between indices of posttraumatic stress disorder (PTSD) and intimate relationship problems to empirically synthesize this literature. **Method:** A literature search using PsycINFO, Medline, Published International Literature on Traumatic Stress (PILOTS), and Dissertation Abstracts was performed. The authors identified 31 studies meeting inclusion criteria. **Results:** True score correlations ( $\rho$ ) revealed medium-sized associations between PTSD and intimate relationship discord ( $\rho = .38$ ,  $N = 7,973$ ,  $K = 21$ ), intimate relationship physical aggression perpetration ( $\rho = .42$ ,  $N = 4,630$ ,  $K = 19$ ), and intimate relationship psychological aggression perpetration ( $\rho = .36$ ,  $N = 1,501$ ,  $K = 10$ ). The strength of the association between PTSD and relationship discord was higher in military (vs. civilian) samples, and when the study was conducted in the United States (vs. other country), and the study represented a doctoral dissertation (vs. published article). The strength of the association between PTSD and physical aggression was higher in military (vs. civilian) samples, males (vs. females), community (vs. clinical) samples, studies examining PTSD symptom severity (vs. diagnosis), when the physical aggression measure focused exclusively on severe violence (vs. a more inclusive measure), and the study was published (vs. dissertation). For the PTSD–psychological aggression association, 98% of the variance was accounted for by methodological artifacts such as sampling and measurement error; consequently, no moderators were examined in this relationship. **Conclusions:** Findings highlight a need for the examination of models explaining the relationship difficulties associated with PTSD symptomatology and interventions designed to treat problems in both areas.

**Keywords:** PTSD, intimate relationships, couples, trauma

There has been an increasing focus on understanding the interpersonal correlates of posttraumatic stress disorder (PTSD) to inform theory and intervention efforts. There is particular interest in documenting intimate relationship and family problems among

those exposed to trauma and in designing interventions that address intimate relationship problems in this population (e.g., Darwin & Reich, 2006; Monson, Schnurr, Guthrie, & Stevens, & 2004). Empirical research in this area indicates that PTSD symptomatology is associated with more intimate relationship problems and higher levels of intimate relationship aggression (Galovski & Lyons, 2004; Monson, Fredman, & Dekel, in press). However, there has yet to be an empirical synthesis of this literature. We used meta-analytic techniques to document the collective strength of associations between PTSD symptomatology and three indices of intimate relationship problems: intimate relationship discord, intimate partner physical aggression perpetration, and intimate partner psychological aggression perpetration.

Most of the research and media attention focusing on the association between trauma and PTSD and intimate relationship problems has focused on male military Veterans. Thus, critical questions that remain largely unanswered are whether there are differences in associations between military and civilian popula-

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tions and between men and women. These variables were included in moderator analyses. It is possible that PTSD is more strongly associated with intimate relationship problems among those in military samples due, in part, to the nature of combat-related stressors and its impact on information processing and anger, as posited by Chemtob, Novaco, Hamada, Gross, and Smith (1997). These researchers theorized that combat Veterans with PTSD, by virtue of their exposure to severe life threat in the war zone over a period of time, are particularly likely to experience anger dyscontrol characterized by increased physiological arousal, hostile appraisals of events, and a lower threshold for responding to threatening social stimuli aggressively when out of the combat context. Consistent with this theory, a recent meta-analysis by Orth and Wieland (2006) indicated that PTSD was more strongly associated with anger and hostility among those experiencing military trauma relative to other forms of trauma. In addition, women may be relatively more likely than men to experience and express internalizing problems resulting from trauma, relative to externalizing problems (Kirz, Drescher, Klein, Gusman, & Schwartz, 2001; Miller & Resick, 2007), and thus PTSD may be more strongly associated with interpersonal aggression perpetration among men than women.

We also examined whether the overall associations of interest would differ with respect to other factors that are related to the source of the data. Specifically, we examined findings in studies using clinical versus community samples, and whether the sample was drawn from the United States or another country. Regarding the former moderator, it is possible that associations could be higher among clinical populations, because individuals seeking help are likely to experience more severe difficulties, which may include relationship problems such as intimate aggression. Recent meta-analyses examining different correlates of relationship aggression have found higher associations in clinical versus community samples (Foran & O'Leary, 2008; Stith, Green, Smith, & Ward, 2008). Alternatively, clinical samples could be associated with lower associations if there is a restriction of range in terms of psychopathology (e.g., in a PTSD clinical sample in which all patients are diagnosed with PTSD). Regarding geographical locale, associations could vary across countries due to differences in knowledge, beliefs, and cultural influences on the expression of PTSD, resources available for PTSD and relationship difficulties, levels of relationship conflict and dissolution, and/or extensiveness of trauma exposure and severity of PTSD symptomatology. A prior meta-analysis demonstrated higher associations between psychiatric diagnoses and suicide in American studies relative to studies of other geographical areas, which was partially ascribed to possible cultural biases in psychiatric diagnoses (Arsenault-Lapierre, Kim, & Turecki, 2004).

Considerable variability exists in the measurement of PTSD symptomatology in studies examining its association with intimate relationship factors. A reliance on PTSD diagnostic status may lead to an underestimate of such associations, because dichotomous PTSD variables may contain less information and variability relative to continuous PTSD symptom measures. This may be particularly relevant in light of a research base suggesting that PTSD symptomatology is best represented dimensionally rather than as a discrete clinical syndrome (Broman-Fulks et al., 2006; Ruscio, Ruscio, & Keane, 2002). However, recent meta-analytic

reviews examining risk factors for PTSD symptomatology have not generally found differences in effect sizes in studies examining PTSD as a diagnosis versus those examining a continuous PTSD symptom variable (Brewin, Andrews, & Valentine 2000; Ozer, Best, Lipsey, & Weiss, 2003).

Studies also differ with respect to how intimate relationship difficulties are assessed. The source of relationship problem reports is one factor that may affect the overall magnitude of associations. The use of self-reports (vs. collateral reports) in assessing relationship problem variables may lead to an inflation of associations with PTSD symptomatology due to an increased likelihood of single reporter bias. Specific to the assessment of intimate relationship physical aggression, studies differ on the basis of their use of variants of the Conflict Tactics Scales (CTS; Straus, 1979), the most widely used measure of relationship aggression, and other nonstandard measures of such aggression. Studies using standardized measures that have gone through the validation process tend to report larger associations than those using nonstandardized measures (e.g., Stith et al., 2008). Investigations also vary on the basis of their focus on a wider range of physically aggressive behaviors (ranging from mild to severe) to a more specific focus on severe aggression (e.g., choking, use of weapons). PTSD symptomatology may be particularly likely to be associated with more severe aggression because those with PTSD likely have more prior exposure to severe violence and may be more disinhibited when it comes to acting on impulses to engage in severe aggression due to information-processing factors (Chemtob et al., 1997).

The final moderator examined in this meta-analysis was publication status (published vs. unpublished studies). This moderator was examined to determine whether there was a "file-drawer" effect, such that unpublished investigations would evidence lower associations between PTSD and intimate relationship problems than published studies, inflating overall associations in the published literature. In our moderator analysis, we focused our comparison on published studies versus unpublished doctoral dissertations, because we were unable to locate other unpublished studies in our searches of conference programs.

In summary, our primary aim was to use meta-analytic techniques to document overall associations between PTSD symptomatology and intimate relationship discord, intimate partner physical aggression perpetration, and intimate partner psychological aggression perpetration, as well as identifying the potential effects of several moderator variables on these relationships. These moderators included those focusing on the nature of the sample (civilian vs. military, female vs. male, clinical vs. community, United States vs. other country), the measurement of PTSD (symptom severity vs. diagnosis) and intimate relationship problems (self-report vs. collateral report, CTS vs. other measure of aggression, inclusive vs. severe aggression), and publication type (dissertation vs. journal article). Stronger associations were expected for military samples, male samples, clinical samples, studies published in the United States, when PTSD severity measures were used, when relationship problem variables were assessed via self-report, when the CTS was used and intimate relationship physical aggression assessment was focused on severe violence, and for published journal articles relative to dissertations.

## Method

### Inclusion Criteria

The inclusion criteria were as follows: (a) The study included measurement of PTSD; (b) the study included measurement of relationship discord or relationship aggression perpetration; (c) the study included a quantifiable measure of the association between the PTSD diagnosis or symptom variable and a relationship problem or relationship aggression variable; and (d) all reports were based on five or more subjects to distinguish case studies from group designs.

For the purposes of this study, the PTSD variable could involve any measure that assessed either the diagnosis of PTSD or PTSD symptomatology. Studies were excluded if they looked only at trauma exposure. "Intimate relationship discord" could be assessed by any measure of the quality of the relationship or relationship difficulties (e.g., marital satisfaction, dyadic adjustment, relationship distress, dyadic problems, etc.). Studies were excluded if a broader family functioning measure was used instead of an intimate relationship discord measure. "Intimate partner relationship aggression perpetration" could be assessed by any measure that focused on physical or psychological aggression displayed by one intimate relationship partner toward the other relationship partner.

### Literature Search Procedures

First, a literature search was conducted using PsycINFO, Medline, Published International Literature on Traumatic Stress

(PILOTS), and Dissertation Abstracts. The following search terms were used for PTSD terms, relationship terms, and relationship problem terms, respectively: *stress disorder, stress symptoms, trauma, and PTSD; relationship, intimate, couple, partner, marriage, and dating; and problems, satisfaction, adjustment, abuse, violence, aggression, batter, and assault*. Next, a search of reference sections of articles located during the primary search was conducted. A manual search of the following journals and conference programs for the previous 5 years was also made: *Journal of Consulting and Clinical Psychology, Journal of Traumatic Stress, Military Medicine, Military Psychology, Journal of Family Psychology, Journal of Family Violence, Journal of Marriage and the Family, the Association for Behavioral and Cognitive Therapies, and the International Society for Traumatic Stress Studies*.

The study selection process is illustrated in Figure 1. Seventy-four potentially relevant studies were identified from the searches. All abstracts were examined by the first author and one bachelor's-level research assistant. Eleven of these studies were eliminated because they were qualitative and did not report data for which an effect size could be calculated, they examined a broad family functioning variable, or they reported trauma exposure rather than PTSD symptom severity or diagnosis. The full text of the remaining 63 articles was obtained. After closer inspection of these studies, 32 additional studies were eliminated because they did not meet the study inclusion/exclusion criteria: 13 were eliminated because they examined a broad interpersonal functioning variable, five were eliminated because they examined trauma or combat exposure instead of PTSD symptom severity or diagnosis, and 11

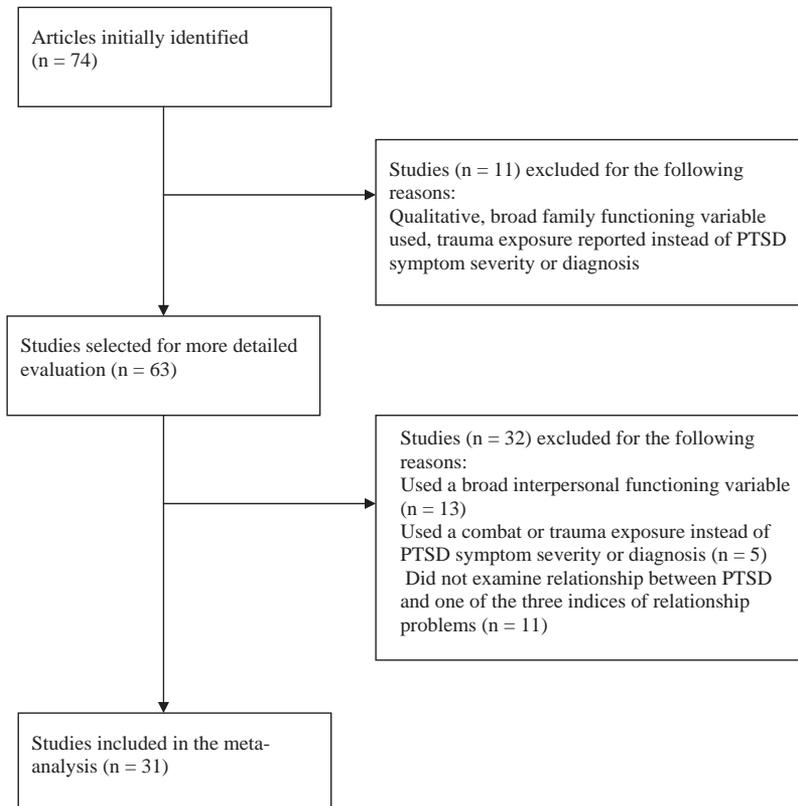


Figure 1. Flow diagram of the study selection process. PTSD = posttraumatic stress disorder.

were eliminated because they did not examine the relationship between PTSD and at least one of the three indices of relationship problems. If it was not possible to extract or calculate an effect size from the data reported in the article or dissertation, then the author was asked to provide an effect size, if possible. If the author could not or did not provide an effect size, then the study was excluded from the meta-analysis. Three studies were excluded for this reason. The final analyses included 31 studies written or published between 1984 and 2009. Six of these studies were unpublished dissertations; the remaining 25 studies were published in peer-reviewed journals.

### Coding Procedure

After selecting the studies, the first author and bachelor's-level research assistant coded each study for the outcome variable examined, the sample size, and the effect size. In addition, the following variables were coded to examine as potential moderators of the associations of interest: population type (i.e., civilian vs. military); gender of person with PTSD symptomatology or diagnosis; sample type (i.e., clinical vs. community vs. mixed sample); location where the study was conducted (i.e., United States vs. other country); PTSD measurement (i.e., symptom severity vs. diagnosis); who reported on the relationship discord and/or relationship aggression (i.e., self-report vs. collateral report); measure of intimate relationship aggression (i.e., CTS vs. other measure); severity of intimate relationship aggression (i.e., inclusive measurement of physical aggression vs. measurement of severe violence behaviors only); and type of publication (i.e., dissertation vs. journal article). If both collateral- and self-reported relationship discord were reported, the self-report data were used in analyses, as the primary interest was in participants' own perceptions of relationship adjustment. If collateral- and self-reported relationship aggression were reported, collateral reports were used in the primary analyses given that such reports are less prone to underestimation due to social desirability biases (Arias & Beach, 1987).

If any discrepancies were found between the two coders, the coders discussed the discrepancy, and in all cases a unanimous verdict was reached. Overall, coder level of agreement was 97%.

### Description of Studies

Nineteen studies examined a military sample, and 12 examined a civilian sample. Twenty of the studies reported on males' PTSD symptoms or diagnosis, seven reported on females' symptoms or diagnosis, and four reported on both genders. Eighteen studies involved a community sample, nine involved a clinical sample, and four had a mixed sample. Twenty-six studies were conducted in the United States, and five were conducted outside of the United States. Seven studies examined PTSD diagnosis, and 24 studies examined PTSD symptom severity. Fourteen studies used self-report measures of marital discord, and eight studies used collateral reports. Regarding physical aggression, 16 studies used self-report data and two studies used collateral data. Sixteen studies used the CTS to measure physical aggression, and two studies used other measures. Finally, two studies used measures of only severe physical aggression, and 16 studies used more inclusive measures of aggression.

Sample sizes ranged from 40 to 1,476 ( $M = 265.76$ ,  $SD = 384.07$ ). The mean age of participants was 38.89. When two

articles used the same sample but reported different outcomes (e.g., one reported a relationship discord effect size, and one reported a physical aggression effect size), they were included as one study.

A variety of measures were used in the studies. PTSD symptom severity was assessed by the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) in seven studies, the Mississippi Scale (Keane, Caddell, & Taylor, 1988) in six studies, and a number of other measures were used less often in 18 studies. Relationship discord was assessed with the Dyadic Adjustment Scale (Spanier, 1976) in 13 studies and other measures in eight studies. Intimate relationship physical aggression was measured by the CTS (Straus, 1979) or the Revised CTS (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996) in 16 studies, and other measures in three studies. Intimate relationship psychological aggression was measured by the CTS (Straus, 1979) in nine studies and the Active Expression of Hostility scale (Egendorf, Kaduschin, Laufer, Rothbart, & Sloan, 1981) in one study.

### Meta-Analytic Methods Used

The calculation procedure used was the interactive procedure for artifact distribution meta-analysis (Hunter & Schmidt, 2004; Schmidt & Le, 2004). Using this procedure, the meta-analysis is conducted in three stages: First, the studies are used to compile information on four distributions (observed correlations, reliability of the independent variable, reliability of the dependent variable, range departure); next, the distribution of correlations is corrected for sampling error; and finally, this corrected distribution is further corrected for the other available artifacts (e.g., measurement error). Thus, the variance due to sampling error and other artifacts is subtracted out, and what is left is an estimate of the population variance.

The estimate of measurement error used in the present study was alpha coefficients, as they were the most frequently available estimates reported in the original articles.<sup>1</sup> There were 15 reliability values available for the predictor variable (or PTSD;  $M = 0.93$ ,  $SD = 0.03$ ), 12 for relationship discord ( $M = 0.89$ ,  $SD = 0.09$ ), 10 for intimate relationship physical aggression ( $M = 0.81$ ,  $SD = 0.07$ ), and five for intimate relationship psychological aggression ( $M = 0.80$ ,  $SD = 0.07$ ).

Given that the size of a correlation is dependent on the degree of variation within each of the variables, when restriction of range exists in either variable, the correlation will be attenuated. It appeared that range restriction was present in at least some of the measures in the included studies (i.e., the standard deviations were smaller than population standard deviations) for the present meta-analysis; consequently, this was an additional artifact for which we

<sup>1</sup> There are a minimum of three types of measurement error with response data, the type of data in the present meta-analysis: random response error, specific error, and transient error. With such data, the coefficient of equivalence and stability (CES; Cronbach, 1947) should be used for full correction of measurement error. This reliability estimate is determined with a design that combines parallel forms and test-retest methodology. Given that the CES was not available for the retrieved studies, the results reported are considered conservative. However, as Hunter and Schmidt (2004) noted, incomplete correction for measurement error is much more accurate than no correction for this type of error at all.

were able to correct. Several measures of PTSD in the studies included in the meta-analysis (e.g., the PCL and Mississippi Scale) reported a standard deviation within the sample that was smaller than the standard deviation identified in a population study. To correct for attenuation due to indirect range restriction, ratios of the sample standard deviation over a population standard deviation are included in the formula for calculating the mean true score correlation, or  $\rho$ .

### Estimation of Effect Sizes

The correlation coefficient  $r$  was used as the effect size estimate given that we were attempting to determine the strength of the relationship between PTSD and relationship discord, physical aggression and psychological aggression, and that correlation coefficients were the most frequently reported statistic in the studies included in the meta-analysis. If an effect size was not reported as a correlation, it was converted via procedures recommended by Rosenthal (1991). Some of the  $r$  values involving relationship discord were negative and some were positive due to the scaling of the different relationship discord measures used, although the association between PTSD and relationship discord was always in the expected direction. Thus, the absolute values were used for all associations. No outliers were removed prior to conducting the meta-analysis in an effort to avoid overcorrection for sampling error and underestimation of  $SD_p$ , as recommended by Hunter and Schmidt (2004) when sample sizes are small to moderate.

### Moderator Analyses

Hunter and Schmidt (2004) suggested that potential moderators be tested through a multistep process. First, studies in the meta-

analysis are subgrouped on the basis of the moderator hypothesis (e.g., studies conducted on individuals in the military vs. civilians). Second, meta-analyses are conducted on each subgroup. Third, confidence intervals, determined using the standard error of the mean true score correlation, are placed around the two subgroup  $\rho$ s. If the confidence intervals do not overlap, the particular variable in question is considered a moderator. Moderation was tested for when there were at least two samples for each subset, thus seven of the potential moderators identified for intimate relationship discord and eight of the potential moderators for intimate partner physical aggression were examined (see Tables 1 and 2). Moderation was not examined for intimate partner psychological aggression because 98% of the variance among the correlations was accounted for by methodological artifacts such as sampling and measurement error, indicating that there was little true variability. In other words, there was so little between-study variance in the correlations after accounting for these artifacts that there was no indication that moderators of PTSD and psychological aggression exist. It is worth noting that the observed variance among correlations may be smaller than the variance predicted from sampling error. In such cases, the computed percentage of variance accounted for by sampling error would then be greater than 100%.

### Results

PTSD had a positive association with all three relationship problem variables in that all 90% credibility values exceeded zero. The true score correlations ( $\rho$ ) were of similar magnitude for all three associations: intimate relationship discord ( $\rho = .38$ ), intimate relationship physical aggression ( $\rho = .31$ ), and intimate relationship psychological aggression ( $\rho = .36$ ) (see Tables 1–3). Using Cohen's (1988) framework, all three of these effect sizes are in the

Table 1  
*Relationship Discord*

Dependent variable	Total sample size	No. of $r$ s	Mean observed $r^a$	Observed $SD^a$	% variance accounted for <sup>b</sup>	90% CV <sup>c</sup>	$\rho^d$	$SD_p$
Relationship problems	7,973	21	.35	.12	23	.24	.39	.12
Population*								
Civilian	1,941	4	.27	.06	49	.23	.31	.06
Military	3,494	16	.36	.16	20	.21	.41	.16
Gender								
Female	3,181	5	.35	.09	34	.34	.40	.08
Male	4,612	17	.30	.17	14	.11	.34	.18
Sample								
Clinical	517	4	.45	.26	10	.14	.50	.27
Community	7,357	15	.33	.08	37	.28	.38	.09
Location*								
United States	5,347	17	.37	.13	24	.27	.43	.12
Other	2,626	4	.29	.00	40	.25	.33	.06
PTSD measurement								
Symptom severity	4,189	16	.36	.14	24	.24	.41	.13
Diagnosis	3,784	5	.34	.10	19	.24	.37	.10
Report								
Self	7,485	14	.35	.11	23	.26	.40	.11
Collateral	577	8	.29	.19	37	.12	.32	.16
Publication*								
Dissertation	500	5	.65	.10	50	.61	.71	.07
Journal article	7,473	16	.33	.09	36	.27	.38	.08

Note. CV = credibility value; PTSD = posttraumatic stress disorder. Asterisks indicate moderation.

<sup>a</sup> Sample size weighted. <sup>b</sup> Percentage of variance accounted for by all artifacts, which includes sampling error, independent and dependent measurement error, and range restriction. <sup>c</sup> 90% CV = 10th-percentile credibility value. <sup>d</sup> Mean true score correlation (mean  $\rho$ ).

Table 2  
Physical Aggression

Dependent variable	Total sample size	No. of <i>r</i> s	Mean observed <i>r</i> <sup>a</sup>	Observed <i>SD</i> <sup>a</sup>	% variance accounted for <sup>b</sup>	90% CV <sup>c</sup>	$\rho^d$	<i>SD</i> <sub><math>\rho</math></sub>
Physical aggression	4,630	19	.36	.24	8	.08	.42	.27
Population*								
Civilian	1,212	8	.22	.07	120	.26	.26	.00
Military	3,418	11	.41	.26	4	.09	.46	.29
Gender*								
Female	691	5	.16	.09	88	.14	.19	.04
Male	3,939	14	.39	.25	7	.11	.44	.26
Sample*								
Clinical	893	7	.22	.13	45	.12	.26	.12
Community	3,427	9	.40	.26	5	.10	.46	.28
PTSD measurement*								
Symptom severity	3,110	14	.44	.25	8	.16	.51	.27
Diagnosis	1,520	5	.19	.07	67	.15	.21	.05
Report								
Self	4,422	16	.36	.24	7	.08	.43	.27
Collateral	149	2	.27	.23	25	-.02	.27	.23
Measure								
CTS	4,400	16	.36	.25	7	.07	.42	.28
Other	230	3	.38	.11	96	.43	.46	.03
Severity of violence*								
Inclusive	3,105	16	.20	.08	92	.21	.24	.03
Severe only	1,465	2	.68	.12	11	.62	.79	.13
Publication*								
Dissertation	245	2	.19	.09	113	.23	.23	0
Journal article	4,385	17	.37	.25	7	.06	.44	.27

Note. CV = credibility value; PTSD = posttraumatic stress disorder; CTS = Conflict Tactics Scale. Asterisks indicate moderation.

<sup>a</sup> Sample size weighted. <sup>b</sup> Percentage of variance accounted for by all artifacts, which includes sampling error, independent and dependent measurement error, and range restriction. <sup>c</sup> 90% CV = 10th-percentile credibility value. <sup>d</sup> Mean true score correlation (mean  $\rho$ ).

medium range of magnitude. The range of correlations was .11–.73 (intimate relationship discord), .03–.72 (physical aggression), and .20–.52 (psychological aggression).

Although we conducted an exhaustive search, there remains the possibility that there were studies that were unavailable and thus not included in our analyses that could alter our findings (availability bias or the file-drawer effect). A test of fail-safe *N* provides a quantitative assessment of this threat (Orwin, 1983; Rosenthal, 1979). Using the criterion of  $r = .1$  (an effect size that we would consider to be inconsequential), we calculated that there would need to be 52 studies of relationship discord, 49 studies of physical aggression, and 22 studies of psychological aggression with null results that were not identified for this meta-analysis to lower our mean observed correlations to .1.

### Moderator Analyses

Only 23% of the variance among the intimate relationship discord and PTSD correlations was accounted for by artifacts, suggesting that there may be moderating variables that are influencing effect sizes. Using Hunter and Schmidt's (2004) method, described above, we determined that three of the seven variables substantially moderated the association between PTSD symptomatology and intimate relationship discord: (a) population type (military,  $\rho = .41$  [95% CIs: .28, .34] vs. civilian,  $\rho = .31$  [95% CIs: .36, .46]); (b) location where the study was conducted (United States,  $\rho = .43$  [95% CIs: .39, .47] vs. other,  $\rho = .33$  [95% CIs: .33, .33]); and (c) type of publication (dissertation,  $\rho = .71$  [95% CIs: .66, .76] vs. journal article,  $\rho = .38$  [95% CIs: .35, .41]).

Table 3  
Psychological Aggression

Dependent variable	Total sample size	No. of <i>r</i> s	Mean observed <i>r</i> <sup>a</sup>	Observed <i>SD</i> <sup>a</sup>	% variance accounted for <sup>b</sup>	90% CV <sup>c</sup>	$\rho^d$	<i>SD</i> <sub><math>\rho</math></sub>
Psychological aggression	1,501	10	.32	.08	98	.36	.37	.01

Note. CV = credibility value.

<sup>a</sup> Sample size weighted. <sup>b</sup> Percentage of variance accounted for by all artifacts, which includes sampling error, independent and dependent measurement error, and range restriction. <sup>c</sup> 90% CV = 10th-percentile credibility value. <sup>d</sup> Mean true score correlation (mean  $\rho$ ).

There was even less variability (8%) accounted for by artifacts among the physical aggression and PTSD correlations, again indicating potential moderators. Six of the eight variables examined substantially moderated the relationship between PTSD and intimate relationship physical aggression: (a) population type (military,  $\rho = .46$  [95% CIs: .37, .55] vs. civilian,  $\rho = .26$  [95% CIs: .23, .29]); (b) gender of person with reported PTSD symptomatology (male,  $\rho = .44$  [95% CIs: .36, .53] vs. female,  $\rho = .19$  [95% CIs: .14, .24]); (c) sample type (community,  $\rho = .46$  [95% CIs: .36, .56] vs. clinical sample,  $\rho = .26$  [95% CIs: .20, .32]); (d) PTSD measurement (symptom severity,  $\rho = .51$  [95% CIs: .43, .59] vs. diagnosis,  $\rho = .21$  [95% CIs: .18, .24]); (e) severity of violence (the measurement of physical aggression was inclusive,  $\rho = .24$  [95% CIs: .22, .26] vs. the measurement of physical aggression focused exclusively on severe violence,  $\rho = .79$  [95% CIs: .69, .89]); and (f) type of publication (dissertation,  $\rho = .23$  [95% CIs: .15, .31] vs. journal article,  $\rho = .44$  [95% CIs: .37, .51]).

As stated previously, due to little between-study variation in the correlations, we did not test potential moderators of the PTSD–psychological aggression association.

### Discussion

This is the first meta-analysis to quantify the associations between PTSD and intimate relationship problems and to examine potential moderators of these associations. Medium-sized associations between PTSD symptomatology and each index of intimate relationship problems were found, with true score correlations ( $\rho$ ) of .38 for intimate relationship discord, .31 for intimate relationship physical aggression, and .36 for intimate relationship psychological aggression. As predicted, for both the relationship discord and physical aggression outcomes, higher associations were found for military samples (relative to civilian samples). Also as hypothesized, higher associations were obtained when intimate relationship physical aggression assessment focused on severe violence. Hypotheses for gender and PTSD assessment were partially supported, with stronger associations for men (relative to women) and PTSD symptom severity (relative to PTSD diagnosis) for the PTSD–physical aggression perpetration association only. Interestingly, differential findings were obtained for the publication type moderator; higher associations were found for unpublished dissertations for the relationship discord outcome, and higher associations were found for published journal articles for the physical aggression outcome. Other significant moderators included higher associations for community (relative to clinical) samples for the physical aggression outcome, and higher associations for studies conducted in the United States (vs. other countries) for the relationship discord outcome.

Findings of relatively higher associations for military samples would seem to support the research and media focus on examining the impact of PTSD on intimate relationships in Veterans and active duty military. However, associations for civilian samples, falling in the small to medium range of magnitude, suggest that the impact of PTSD on intimate relationships and the family outside of the military context should not be ignored. As suggested, differences between military and civilian samples may be due to the unique nature of military stressors, in which military members may be exposed to life-threatening situations over prolonged periods of time, which can lead to deficits in the processing of social infor-

mation and anger dyscontrol problems (Chemtob et al., 1997). Military culture and training experiences may also serve to inhibit aggressive behavior and reinforce more aggressive responses to difficult situations that contribute to dysfunctional problem-solving abilities and conflict resolution skills when the military member returns home to her or his intimate partner. It is also possible that differences between military and civilian populations could be accounted for by predeployment differences between these groups or military selection variables. Present findings are consistent with the meta-analysis by Orth and Wieland (2006), in which PTSD was more strongly associated with anger and hostility among those experiencing military trauma relative to other forms of trauma.

Findings of higher associations for men with respect to the physical aggression outcome are also generally consistent with (nonsignificant) findings reported in Orth and Wieland (2006), suggesting that PTSD may be more strongly associated with anger and hostility in men than women. Particularly in light of present findings of no significant differences between genders on the PTSD–relationship discord association, with a slightly higher association found for women, results may suggest a pattern whereby women are more likely to experience and express internalizing posttraumatic psychopathology resulting from trauma, whereas men may be more likely to exhibit externalizing psychopathology (Miller & Resick, 2007). Whisman's (1999) examination of National Comorbidity Study data further supports the notion that PTSD is associated with poor overall relationship adjustment in women. In this investigation, it was reported that among women, when controlling for age, education, and 12 other psychiatric disorders, PTSD remained a significant predictor of marital dissatisfaction, and was the strongest correlate among all of the diagnoses. For men, however, only dysthymia remained a significant predictor among all of the psychiatric diagnoses. Thus, it may be that women's experience of PTSD symptomatology is less likely to manifest itself in the form of relationship aggression relative to men, but may have a particularly damaging impact on overall relationship satisfaction.

Other variables reflecting the nature of the sample appeared to moderate the magnitude of obtained associations. Findings of higher associations in community versus clinical samples for the physical aggression outcome were surprising given other meta-analyses showing higher associations involving partner aggression in clinical samples (Foran & O'Leary, 2008; Stith et al., 2008). Present findings may reflect greater variability in PTSD symptomatology among nonclinical samples. It is also possible that those in community samples reported more openly about their aggression, as some have suggested that social desirability biases play less of a role outside of the treatment context where anonymity is more likely (Moffitt et al., 1997). Findings of higher associations for the relationship discord outcome in studies conducted in the United States versus other countries could result from a number of cultural differences in the nature, understanding, definition, and treatment of PTSD and relationship difficulties. It would appear that further work is needed to understand cultural factors in this association.

Results suggest that the manner in which intimate partner physical aggression was assessed impacted the magnitude of obtained associations. Specifically, higher associations with severe physical violence relative to broader violence measures is consistent with the notion that those with PTSD are at greater risk for severe

aggression. Although only two samples were used in this analysis and findings should be interpreted cautiously, results suggest that PTSD symptomatology may be an important factor in determining whether violent behavior crosses the threshold into severe violence or escalates in severity, perhaps due to prior exposure to severe violence and/or information-processing factors (Chemtob et al., 1997). Consistent with a prior meta-analysis examining the association between alcohol use/abuse and physical partner aggression (Foran & O'Leary, 2008), present findings did not indicate that the source of the relationship problem report moderated overall associations. These results suggest that response biases (e.g., single reporter bias for relationship adjustment and social desirability bias for partner aggression) did not substantially impact the relationships of interest, which may be heartening to researchers in this area of investigation.

PTSD symptom severity measures evidenced higher associations with physical aggression perpetration in the present study, and may be preferable to the use of PTSD diagnosis variables in light of present findings and those suggesting that PTSD may be best viewed dimensionally (Broman-Fulks et al., 2006; Ruscio et al., 2002). Examination of dichotomous variables that may be better represented continuously leads to a loss of information and lower overall associations (Hunter & Schmidt, 1990). However, our findings must be interpreted in light of the fact that most studies examining PTSD symptoms did not assess for the traumatic nature of the stressor (Criterion A), and thus associations may have been inflated because PTSD symptom measures not keyed to specific traumas may be capturing other nonspecific distress in addition to true PTSD symptoms. Nonspecific distress may be particularly strongly associated with relationship problem outcomes, which may help explain differences between present results and those reported in meta-analyses examining risk factors for PTSD symptomatology that have not found differences in studies examining diagnosis versus continuous PTSD symptom variables (Brewin et al., 2000; Ozer et al., 2003).

Differential findings for the publication type moderator were unexpected and are difficult to interpret. Findings of higher associations for dissertations for the relationship discord variable suggest that positive associations between PTSD and relationship discord in the published literature may actually represent an underestimate, whereas findings of higher associations for published studies for the physical aggression outcome suggest the possibility of a file-drawer effect such that the association between PTSD and physical aggression in the published literature may be inflated. Given the equivocal nature of these divergent findings and the relatively small number of dissertations included in these analyses, it may be prudent to focus on the associations in the published literature that have undergone the peer-review process.

We did not test for moderation of the relationship between PTSD and intimate relationship psychological aggression given that 98% of the variance among the correlations was accounted for by artifacts such as sampling and measurement error. When such a large percentage of the variability is accounted for by such artifacts, results suggest that there are no factors significantly impacting this relationship. Not only did the artifacts account for almost all of the variance, but there was also less variability among the studies that examined psychological aggression in comparison with intimate relationship discord and physical aggression. This can be seen by examination of the sample size-weighted observed

standard deviations: relationship discord,  $SD = 0.12$ , physical aggression,  $SD = 0.24$ , and psychological aggression,  $SD = 0.08$ . Additional research is needed to confirm the homogeneity of variance found among these 10 studies. If this finding persists, then one explanation is that psychological aggression may be more socially acceptable than physical aggression. Therefore, other factors, such as being male and military involvement, do not moderate the relationship between PTSD symptomatology and psychological aggression as they do with physical aggression. For example, civilians may exhibit psychological aggression to a similar degree as those in the military when faced with PTSD symptomatology.

It is important to note that researchers have yet to demonstrate the causal directionality of the PTSD–relationship problems link. Although PTSD may lead to more relationship discord and aggression perpetration, intimate relationship problems also may place individuals at risk for PTSD or PTSD symptom exacerbation. Longitudinal work is needed to better understand the likely complex associations between indices of PTSD and family functioning over the course of time following trauma exposure.

Regardless of directionality, results suggest that relationship-based approaches for those who experience PTSD symptomatology are indicated (Glynn et al., 1999; Monson, Fredman, & Adair, 2008; Monson et al., 2004). Relationship difficulties are associated with a range of negative outcomes, such as increased physical and mental health problems and disability (Whisman & Uebelacker, 2003). In the military context, in addition to the negative impact of relationship and family problems on morale, motivation, readiness, and retention (Bowen & Orthner, 1989; Pierce, 1998; Schumm, Bell, & Resnick, 2001; Segal, Rohall, Jones, & Manos, 1999), service members experiencing relationship distress may be more likely to exhibit concentration problems and deficits in cognitive acuity that may compromise mission safety (Raschmann, Patterson, & Schofield, 1990). Thus, interventions that work to improve intimate relationships may have a myriad of positive benefits beyond improved intimate relationships.

As we have indicated, some analyses suffered from a relatively small number of available studies. As the research literature on the association between PTSD and intimate relationship problems continues to develop, it is hoped that future meta analyses will be conducted to attempt to replicate present findings and lend more confidence to the moderator findings in particular. Additional research is also needed to better understand the mechanisms through which PTSD may lead to relationship discord and increased relationship aggression and vice versa. Attachment-oriented and cognitive behavioral theories have been put forth to account for the association between PTSD and relationship problems more generally (Johnson, 2002; Monson et al., in press). Some research highlights physiological reactivity, anger, social problem-solving deficits, and other psychiatric problems reflecting negative affect and substance use as possible etiological factors explaining the role of PTSD in aggression perpetration (Taft, Kaloupek et al., 2007; Taft et al., 2008; Taft, Street et al., 2008). Other research investigating the components of PTSD that confer risk for relationship problems may assist in understanding the associations obtained in the present study. There were not enough data on associations involving specific PTSD symptom groupings to be included in the present meta-analysis. Some preliminary work suggests that avoidance and numbing PTSD symptoms are particularly strongly associated with poor relationship satisfaction

(Cook, Riggs, Thompson, Coyne, & Sheikh, 2004), and hyperarousal symptoms are particularly predictive of aggression perpetration (Taft, Kaloupek, et al., 2007).

It is heartening that researchers, clinicians, and policy makers alike are beginning to recognize the importance of family functioning in conferring risk for PTSD and the role of PTSD in affecting the family. With these associations between measures of PTSD and intimate relationship discord and aggression quantified, researchers can turn their attention to developing and empirically evaluating more complex explanatory models testing mechanisms for the associations of interest, and for evaluating interventions that may assist in relieving the suffering of those exposed to trauma and their intimate partners.

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## Appendix

### QUOROM Statement Checklist

Heading	Subheading	Descriptor	Reported? (Y/N)	Page number
Title		Identify the report as a systematic review	Y	1
Abstract		Use a structured format	Y	2
	Objectives	The clinical question explicitly	Y	2
	Data sources	The databases (i.e., list) and other information sources	Y	2
	Review methods	The selection criteria (i.e., population, intervention, outcome, and study design); methods for validity assessment, data abstraction, and study characteristics, and quantitative data synthesis in sufficient detail to permit replication	Y	2
	Results	Characteristics of the RCTs included and excluded; qualitative and quantitative findings (i.e., point estimates and confidence intervals); and subgroup analyses	Y	2
	Conclusion	The main results	Y	2
Describe				
Introduction		The explicit clinical problem, biological rationale for the intervention, and rationale for review	Y	3–7
Method	Searching	The information sources, in detail (e.g., databases, registers, personal files, expert informants, agencies, hand-searching), and any restrictions (years considered, publication status, language of publication)	Y	7–8
	Selection	The inclusion and exclusion criteria (defining population, intervention, principal outcomes, and study design)	Y	7
	Validity assessment	The criteria and process used (e.g., masked conditions, quality assessment, and their findings)	Y	13–14
	Data abstraction	The process or processes used (e.g., completed independently, in duplicate)	Y	9
	Study characteristics	The type of study design, participants' characteristics, details of intervention, outcome definitions, and how clinical heterogeneity was assessed	Y	10
	Quantitative data synthesis	The principal measures of effect (e.g., relative risk), method of combining results (statistical testing and confidence intervals), handling of missing data; how statistical heterogeneity was assessed; a rationale for any a priori sensitivity and subgroup analyses; and any assessment of publication bias	Y	11

(Appendix continues)

Appendix (*continued*)

Heading	Subheading	Descriptor	Reported? (Y/N)	Page number
Results	Trial flow	Provide a meta-analysis profile summarizing trial flow (see figure)	Y	38
	Study characteristics	Present descriptive data for each trial (e.g., age, sample size, intervention, dose, duration, follow-up period)	Y	10
	Quantitative data synthesis	Report agreement on the selection and validity assessment; present simple summary results (for each treatment group in each trial, for each primary outcome); present data needed to calculate effect sizes and confidence intervals in intention-to-treat analyses (e.g., 2 × 2 tables of counts, means and SDs, proportions)	Y	13–14
Discussion		Summarize key findings; discuss clinical inferences based on internal and external validity; interpret the results in light of the totality of available evidence; describe potential biases in the review process (e.g., publication bias); and suggest a future research agenda	Y	15–21

*Note.* RCT = randomized control trial.

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