

# Associations Between Psychological Trauma and Physical Illness in Primary Care

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*Psychological trauma is associated with poor physical health. We examined whether specific trauma types (assaultive, sexual, any) are associated with specific medical illnesses and whether posttraumatic stress disorder (PTSD) mediated these relationships in 680 primary care patients. For men, trauma history was associated with arthritis and diabetes; PTSD mediated the association between trauma and arthritis but not diabetes. Among women, trauma was associated with digestive diseases and cancer; PTSD did not mediate these relationships. Awareness of the presence of the physical illnesses examined here may help with the identification and treatment of primary care patients with trauma histories.*

There is growing evidence that a history of psychological trauma places individuals at risk for the occurrence of physical illness. Physical and sexual abuse has been associated with numerous physical illnesses in adulthood (Arnow, 2004; Dickinson, DeGruy, Dickinson, & Candib, 1999; Walker et al., 1999). These include liver disease (Dong et al., 2003), migraines, and peptic ulcer disease (Goodwin, Hoven, Murison, & Hotopf, 2003), as well as

other gastrointestinal, respiratory, musculoskeletal, neurological, and gynecological problems (Farley & Patsalides, 2001; Lechner et al., 1993). Women victimized by intimate partner violence report increased rates of pain, and digestive, gynecological, and musculoskeletal problems (Campbell, 2002).

Little is known about whether particular trauma types may be associated with particular types of illnesses

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(Green et al., 2000), although there is some evidence that this may be the case (e.g., Goodwin & Stein, 2004). In a study with older adults, Stein and Barrett-Connor (2000) found a higher prevalence of thyroid disease in men who had been sexually assaulted in their lifetime, whereas women who had been sexually assaulted were more likely to have arthritis and breast cancer. These relationships were evident even in light of age-related factors such as other physical health problems and the number of years that had passed since the sexual assault occurred.

The most common psychiatric consequence of trauma exposure is posttraumatic stress disorder (PTSD; Breslau, 2001). Like trauma exposure, PTSD has been linked to numerous negative health outcomes including increased risk for certain physical illnesses including arthritis, respiratory, nervous, and digestive diseases (e.g., Boscarino, 1997; Goodwin & Davidson, 2005; Schnurr, Spiro, & Paris, 2000), and cardiac disease (e.g., Boscarino & Chang, 1999). This relationship remains evident even after controlling for other factors commonly associated with PTSD and physical illness such as substance abuse and smoking (Beckham et al., 1998), physical injury (McFarlane, Atchison, Rafolowicz, & Papay, 1994), age, ethnicity, and other health-related factors (Boscarino & Chang, 1999) as well as other psychiatric disorders such as depression (Asmundson, Stein, & McCreary, 2002; Schnurr & Spiro, 1999). In fact, PTSD appears to be associated with increased risk for the presence of a physical illness more than any other anxiety disorder (Schonfeld et al., 1997; Weissberg et al., 2002; Wolfe et al., 1999). In light of these relationships, it is not surprising that trauma history and PTSD are both prevalent in primary care (Stein et al., 2000) and that both trauma exposure and PTSD are associated with greater healthcare utilization and somatic symptoms (Newman et al., 2000; Schnurr et al., 2000; Stein et al., 2004).

A review of the literature on trauma, PTSD, and physical health showed that PTSD mediates the relationship between trauma and physical health consistently across studies (Green & Kimerling, 2004). Schnurr and Green (2004) propose a model where PTSD mediates this relationship through multiple pathways. These include biolog-

ical alterations brought on by PTSD (e.g., changes in the hypothalamic-pituitary-adrenal [HPA] axis, noradrenergic function, and immune function), engagement in risky behaviors associated with PTSD (e.g., smoking, poor diet), altered attentional responses to physiological processes, and other psychological alterations (e.g., poor coping). They propose that these changes are associated with increased allostatic load, which is defined as the cumulative cost to an organism of going through repeated cycles of adaptation to stress (McEwen & Stellar, 1993). Allostatic load leads to an increase in susceptibility to illness.

Most of the studies examining trauma, PTSD, and physical health have used symptoms, health perception, or physical functioning as measures of physical health (Green & Kimerling, 2004). Few studies have looked specifically at physical disorders. Weissberg et al. (2002) found PTSD to be better than trauma history at predicting physical illness while Cloitre, Cohen, Edelman, and Han (2001) showed that trauma history was a stronger predictor of medical problems than were PTSD symptoms. In addition, most studies have used continuous measures of PTSD symptoms rather than PTSD diagnosis (Green & Kimerling, 2004). Thus, the relationship between trauma and PTSD in physical illness is in need of further examination.

The goals of the present study were twofold. First, we examined the relationships between specific types of trauma exposure (assaultive, sexual, or any trauma) on reports of specific physical illnesses in primary care. Then, we examined whether PTSD mediated the relationship between trauma and physical illness. There are documented differences among the types of trauma experienced and rates of PTSD between men and women. Men more than women are more likely to have experienced natural disasters, accidents, combat traumas, and physical attacks, whereas women are more likely to report having been sexually traumatized. On the other hand, women are more likely to develop PTSD following trauma exposure in all instances except sexual trauma (Kessler et al., 1995). Similarly, rates of some physical illnesses differ by gender. For example, women are more likely to suffer from arthritis and cancer, while men and women are equally likely to suffer from diabetes (Centers for Disease Control [CDC], 2005). In

light of these differences, we examined the relationship between trauma and physical illness separately for men and women.

## METHOD

Data are from the baseline phase of the Collaborative Care for Anxiety and Panic (CCAP) Study, a randomized, controlled trial of pharmacotherapy and cognitive-behavioral therapy for patients with panic disorder in primary care that included patients from university-affiliated primary care clinics in Seattle and southern California (Craske et al., 2003; Roy-Byrne et al., 2003, 2005). Eligible subjects were patients at these clinics who (a) were between 18 and 79 years old, (b) were English speaking, and (c) had access to a telephone. The study was approved by the Institutional Review Boards of all three universities (University of Washington, University of California-Los Angeles, and University of California-San Diego) and all subjects provided written, informed consent to participate.

An undergraduate research assistant screened 8,315 patients during a clinic visit. Screening took place at various days and times over a 25-month period. Patients were asked to fill out a short self-report questionnaire regarding demographics, chronic medical illness, and anxiety and depressive symptoms. Approximately one in five patients were determined to be eligible for the interview portion of the study by virtue of screening positively for panic disorder, social phobia, or PTSD. In addition to patients screening positively for anxiety disorders, a random sample of patients who screened negative for all anxiety disorders was also considered eligible. The 680 patients (421 women and 259 men) who were selected for, and actually completed, the interview are the subject of this report.

Patients who agreed to participate were contacted to complete the telephone interview portion of the study, which consisted of the computerized version of the Composite International Diagnostic Interview (CIDI-Auto; Reed, Gander, Pfister, & Wittchen, 1998; World Health Organization [WHO], 1997). Patients were paid \$20 for the telephone interview.

## Measures

**Diagnostic interview.** The telephone-validated World Health Organization's 12-Month Composite International Diagnostic Interview (CIDI-Auto) PTSD module was administered by trained lay-interviewers (Reed et al., 1998; WHO, 1997). Participants were labeled 1 if they had a current PTSD diagnosis according to the CIDI and 0 if they did not.

## Trauma History

The CIDI lists nine trauma types (combat experience, life-threatening accident, natural disaster, witnessing someone badly injured or killed, rape, sexual molestation, physical attack or assault, threatened with a weapon or held captive, tortured, or the victim of terrorists). Participants were coded as having "any trauma" if they endorsed having experienced any of the above trauma types. If participants endorsed rape or sexual molestation, they were coded as having sexual trauma. If they endorsed physical attack or assault, threatened with a weapon or held captive, were tortured, or were the victim of terrorist attacks, they were coded as having assaultive trauma.

**Physical illness and demographics.** Participants filled out a questionnaire when first recruited into the study in which they completed demographic information and were presented with a list of physical illnesses (cancer, arthritis, neurological problems, diabetes, hypertension, asthma, heart disease, digestive diseases, thyroid disease) to which they responded (through self-report) in a yes/no format. The item was worded "Has a doctor ever said you have any of the following?"

## Analyses

SPSS 12.0 software was used to analyze the data. We ran frequencies and descriptive statistics to understand the characteristics of our sample and the prevalence rates for physical illnesses, traumas, and PTSD. Logistic regression analysis

was used to examine associations between trauma types and chronic physical illnesses. Analyses were conducted separately for men and women. For each illness, three separate equations were computed to determine if the presence of (a) any trauma, (b) assaultive trauma, or (c) sexual trauma affected the odds of reporting the illness. The equations included age ( $> 50$  years old vs.  $\leq 50$  years old), poverty status (above vs. below or at the poverty threshold), and ethnicity (White vs. non-White) as covariates. We included these covariates because older age, poverty, and being non-White are associated with poorer health (CDC, 2004). To account for multiple comparisons, significance was set at .01. When a trauma type increased the odds of a physical illness, data were further analyzed to examine the mediating effects of PTSD on illness.

## RESULTS

Approximately 62% of the sample was female. Patients ranged in age from 18 to 79 ( $M = 41.7$ ;  $SD = 12.4$ ). Patients identified themselves as African American (15%), Asian (4%), Pacific Islander (2%), White (66%), Hispanic (10%), Native American (3%), or other (4%). Five percent had less than a high school education, 16% completed high school, 36% completed some college, 27% completed college, and 16% completed graduate school. The median household income was \$30,000 per year, with 23% at or below the poverty line. Approximately 74% of the sample rated their general health as good to excellent, 19% as fair, and 7% as poor.

Slightly over half of the final sample (53%) had an anxiety disorder, whereas 47% did not. Patients with an anxiety disorder were slightly younger ( $M = 40$ ,  $SD = 11.26$ ) than participants without an anxiety disorder ( $M = 42$ ,  $SD = 13.73$ ),  $t(675) = 2.06$ ,  $p < .05$ , more likely to be female (64.2%), had slightly fewer years of education ( $M = 14.3$ ,  $SD = 2.76$  vs.  $M = 15.1$ ,  $SD = 3.09$ ),  $t(677) = 3.72$ ,  $ns$ , reported poorer general health,  $t(676) = 7.73$ ,  $p < .001$ , and were more likely to have arthritis ( $OR = 1.54$ ,  $CI: 1.13-2.10$ ) and stomach diseases ( $OR = 1.95$ ,  $CI = 1.26-3.02$ ).

Prevalence rates for physical illnesses, traumas, and PTSD are presented in Table 1. Approximately two-thirds of the sample reported one or more chronic physical illnesses, with approximately 29% reporting one physical illness, 16% reporting two, 11% reporting three, and 8% reporting four or more physical illnesses. Approximately three quarters of the sample reported experiencing one or more of the traumas listed, with 20% reporting one trauma, 17% reporting two, 14% reporting three, 10% reporting four, and 14% reporting five or more traumas. Approximately one third of the sample reported that they had experienced a sexual trauma and 46% of the sample reported that they had experienced an assaultive trauma. These prevalence rates are qualified by the fact that a portion of our sample was selected for having anxiety symptoms.

Demographic characteristics of those who had experienced a trauma were compared with those who had not. Women were more likely than men to have experienced at least one trauma ( $OR = 1.51$ ,  $CI: 1.07-2.14$ ) and were more likely to have experienced a sexual trauma ( $OR = 3.57$ ,  $CI = 2.47-5.16$ ). Men were more likely than women to have experienced an assaultive trauma ( $OR = 1.98$ ,  $CI: 1.46-2.69$ ). With regard to ethnicity, Asians in this sample were less likely to have experienced assaultive trauma than those who were not Asian ( $OR = 0.49$ ,  $CI: 0.25-0.97$ ), African Americans were more likely to have experienced an assaultive trauma than those who were not African American ( $OR = 1.27$ ,  $CI = 1.06-1.53$ ), and Native Americans were more likely to have experienced a sexual trauma than those who were not Native American ( $OR = 1.77$ ,  $CI = 1.17-2.67$ ).

There were no differences in education level for victims of sexual trauma compared to those without a history of sexual trauma. However, patients with a high school education or less were more likely to have experienced an assaultive trauma than patients with some college or more ( $OR = 1.94$ ,  $CI = 1.17-3.22$ ). Patients below the poverty line were more likely to have experienced at least one trauma ( $OR = 1.97$ ,  $CI = 1.35-2.88$ ), a sexual trauma ( $OR = 1.30$ ,  $CI = 1.11-1.51$ ), or an assaultive

**Table 1.** Prevalence Rates of Physical Illnesses, Traumas, and Posttraumatic Stress Disorder (PTSD)

Variable	Total <i>N</i>	Frequency	%
<b>Physical illness</b>			
Cancer	660	16	2.4
Arthritis	664	258	38.8
Neurological problems	660	39	5.9
Diabetes	660	88	13.3
Hypertension	666	169	25.4
Asthma	662	125	18.9
Heart disease	658	40	6.1
Diseases of the stomach	661	107	16.2
Thyroid disease	662	51	7.7
<b>Traumas</b>			
Combat experience	679	14	2.1
Life-threatening accident	679	232	34.2
Fire, flood, natural disaster	679	175	25.8
Witnessing someone injured/killed	679	277	40.8
Rape	679	133	19.6
Molestation	679	167	24.6
Physical assault	679	226	33.3
Threatened with weapon /kidnapped	679	225	33.1
Tortured /terrorized	679	23	3.4
Posttraumatic stress disorder	679	122	18.0

trauma (OR = 1.63, CI = 1.31–2.03). These differences persisted after controlling for education (some college or less vs. college graduate or more). There were no differences in trauma experiences by age.

### Likelihood of Reporting Illnesses in Men Versus Women

Odds ratios adjusted for age, poverty, and ethnicity for the various types of trauma are reported in Table 2. For men, the experience of trauma was associated with significant increases in the odds for arthritis and diabetes. For women, trauma was associated with increased odds of digestive disease and cancer.

### Posttraumatic Stress Disorder as a Mediator of Trauma and Physical Health

Baron and Kenny (1986) require the following conditions to be met to test mediation:

1. The predictor (A) and outcome (C) must be related;
2. the mediator (B) must be related to (A); and
3. the mediator must be related to (C).

If these conditions hold, then one can test whether the relationship between A and C is eliminated or substantially diminished when B is added as a predictor. Table 2 shows that the relationships between trauma history (the predictor) and physical illness (the outcome) were significant (step 1). Because trauma exposure is a necessary step to developing PTSD and both of these were dichotomous variables in our data set, we did not run correlations between these two variables. Rather, we made a logical assumption that trauma exposure and PTSD are related (step 2). In men, PTSD (the mediator) was related to arthritis,  $\chi^2(3, N = 251) = 17.66, p < .001$ ; OR = 3.52, CI = 1.92–6.44, but not diabetes,  $\chi^2(3, N = 251) = 1.01, ns$ ; OR = 1.54, CI = .67–3.56, (step 3). Therefore, we did not proceed to test whether PTSD mediated the relationship between trauma exposure and diabetes in men.

**Table 2.** Adjusted<sup>a</sup> Odds Ratio Associated With Trauma Type and Physical Illness

Trauma type	Illness	Men				Women			
		<i>N</i>	Odds ratio	95% CI	<i>R</i> <sup>2</sup>	<i>N</i>	Odds ratio	95% CI	<i>R</i> <sup>2</sup>
Any trauma	Cancer	251	— <sup>b</sup>		.23	407	2.44	0.49–11.95	.28
	Arthritis	251	2.22**	1.07–4.64	.17	412	1.64*	1.01–2.67	.20
	Neurological problems	253	5.70	0.73–44.49	.16	405	2.14	0.59–7.71	.10
	Diabetes	251	4.75*	1.08–20.86	.10	407	1.77	0.86–3.65	.17
	Hypertension	252	2.34*	1.06–5.17	.17	411	1.25	0.73–2.14	.17
	Asthma	251	1.29	0.51–3.25	.07	409	1.43	0.83–2.44	.03
	Heart disease	250	0.81	0.29–0.22	.06	406	0.72	0.26–1.96	.14
	Digestive disease	253	1.13	0.45–2.83	.08	407	2.38**	1.15–4.92	.10
	Thyroid diseases	250	— <sup>b</sup>		.17	410	1.08	0.55–2.14	.06
Sexual trauma	Cancer	251	1.71	0.15–19.19	.17	407	5.21**	1.31–20.74	.33
	Arthritis	251	2.57**	1.22–5.43	.16	412	1.61*	1.03–2.52	.20
	Neurological problems	251	2.73	0.97–7.73	.15	405	2.95*	1.06–8.27	.12
	Diabetes	251	1.43	0.55–3.72	.07	407	1.72	0.93–3.21	.17
	Hypertension	252	1.39	0.62–3.14	.15	411	1.53	0.93–2.52	.18
	Asthma	251	2.17	0.85–5.54	.09	409	1.53	0.94–2.47	.04
	Heart disease	250	2.08	0.67–6.42	.07	406	1.07	0.40–2.83	.14
	Digestive disease	251	1.88	0.77–4.58	.10	406	2.21**	1.29–3.80	.10
	Thyroid disease	251	1.54	0.14–16.09	.12	410	2.09*	1.10–3.95	.08
Assaultive trauma	Cancer	251	2.17	0.20–23.59	.18	407	1.79	0.52–6.12	.28
	Arthritis	251	2.62***	1.46–4.67	.19	412	1.23	0.79–1.92	.19
	Neurological problems	253	2.85	0.89–9.08	.15	405	1.31	0.50–3.43	.09
	Diabetes	251	3.33**	1.35–8.20	.13	407	1.69	0.91–3.13	.17
	Hypertension	252	1.88*	1.00–3.52	.17	411	1.71*	1.04–2.81	.18
	Asthma	251	0.94	0.43–2.05	.08	409	1.18	0.73–1.91	.03
	Heart disease	250	0.91	0.36–2.30	.06	406	0.55	0.19–1.57	.15
	Digestive disease	253	1.43	0.65–3.11	.09	406	1.91**	1.12–3.27	.09
	Thyroid disease	250	0.12	0.09–5.75	.02	410	1.54	0.82–2.89	.07

<sup>a</sup>Logistic regression analyses controlling for age, poverty, and ethnicity. <sup>b</sup>Too few cases to calculate odds ratio.

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

In women, PTSD was not significantly related to either digestive diseases,  $\chi^2(3, N = 406) = 3.04, ns$ ; OR = 1.79, CI = .95–3.10, or cancer,  $\chi^2(3, N = 407) = .29, ns$ ; OR = 1.46, CI = .38–5.53, so we did not proceed to test mediation.

Because arthritis in men met Baron and Kenny's conditions for testing mediation, we regressed arthritis in men on both trauma history and PTSD to assess whether (a) the model was still statistically significant, and (b) PTSD was significant while the variance accounted for by trauma history was reduced or nonsignificant. We ran logistic regressions where our control variables were entered in the first block, trauma history (any, sexual, or

assaultive) was entered in the second block, and PTSD was added in the third block. Table 3 shows that PTSD partially mediated the relationship between all trauma types and arthritis in men.

## DISCUSSION

Using logistic regression analyses adjusted for age, poverty, and ethnicity, trauma history was significantly associated in two of nine illnesses in both men and women. Different trauma types contributed differently to the prediction of illnesses for men and women. For men, the experience of trauma significantly increased the odds of arthritis and

**Table 3.** Hierarchical Logistic Regressions Predicting Arthritis in Men

Variable	Odds ratio	CI	Model $R^2$
Any trauma	2.34**	1.16–4.72	.17
Any trauma plus PTSD	1.77	.85–3.65	.22
Sexual trauma	2.57*	1.21–5.43	.17
Sexual trauma plus PTSD	1.99	.91–4.35	.23
Assault trauma	2.62**	1.46–4.67	.19
Assault trauma plus PTSD	1.91*	1.02–3.55	.23

Note. PTSD = Posttraumatic stress disorder.

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

diabetes. For women, trauma was associated with increased odds for digestive disorders and cancer. Our overall models explained a small to moderate portion of the variance in physical illness. It is likely that other variables not in the model, such as genetics, would add further to the variance explained.

Although sexual trauma was associated with more illnesses in women, assaultive trauma was associated with more illnesses in men. It is not clear why different traumas are linked to different illnesses. Schnurr and Green (2004) propose a model whereby PTSD mediates the relationship between trauma exposure and physical health outcomes. Posttraumatic stress disorder effects changes in a variety of physiological and behavioral pathways, all of which contribute to allostatic load, which increases susceptibility to illness. Our results suggest that it may be worthwhile to assess whether changes in the proposed pathways occur differently in response to different trauma types and among men and women. Future research is needed to better understand the mechanisms by which different traumas may be associated with different illnesses.

Schnurr and Green's (2004) model is based on accumulated evidence that PTSD mediates the relationship between trauma and physical health (Green & Kimerling, 2004). It is important to note, however, that most of the studies up to now have measured PTSD using continuous measures of PTSD symptoms (Green & Kimerling, 2004). Ours is among the first studies to use a dichoto-

mous (yes/no) diagnostic classification based on a standard diagnostic interview. We found that PTSD generally did not mediate the relationship between trauma and physical illness, with the exception of arthritis in men. We may infer from these observations, in the context of other studies, that posttraumatic symptoms, rather than PTSD diagnosis, may mediate the relationship between trauma and health. This is an important distinction for future research. It also highlights the importance of broadly assessing sequelae of psychological trauma, as current diagnoses from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (American Psychiatric Association, 1994) may be inadequate for certain purposes, where dimensional measures may be more appropriate. Rather than viewing PTSD as a discrete psychiatric illness, it may be helpful to view PTSD as the upper end of a stress response continuum (Ruscio, Ruscio, & Keene, 2002). Trauma exposure, then, would be expected to elicit some stress response, thus increasing allostatic load, although it may not reach the level required for PTSD. However, the allostatic load may still be high enough to place the individual at increased risk for other medical illnesses, including those examined in this study.

Sexual trauma was associated with arthritis in men and with cancer and digestive problems in women. These results partially replicated those of Stein and Barrett-Connor (2000) for women, but not for men. Women who had been sexually assaulted in their study also had an increased occurrence of breast cancer. Men had an increased occurrence of thyroid disease. These differences may be due to differences in sampling between an older adult community sample and an adult primary care sample, as well as the differential duration of follow-up. However, these discrepancies highlight the need for future longitudinal studies with additional cohorts.

A number of study limitations should be considered. First, we do not know the timing of onset of physical health problems relative to trauma exposure and PTSD onset. However, our findings are similar to studies in which trauma predated illness (Arnow, 2004; Arnow et al., 2000). Weisberg et al. (2002) examined whether preexisting medical illness increases vulnerability to trauma exposure and

found that participants with PTSD did not have a higher rate of physical illness before trauma exposure than those without PTSD. We conclude that trauma is likely to have predated physical illness in most cases. However, future prospective studies are necessary to confirm this.

Although screening was systematic, it was not randomized and there may be biases in terms of who agreed to be interviewed or the likelihood of being asked to participate (i.e., persons with more severe mental and/or physical illness, who might be expected to be higher users of medical care, might have been more likely to be present at screening). If more severely impacted patients participated, then the study may have a more seriously ill sample than would otherwise be expected, which may be the case in any primary care sample. Because we included all eligible anxiety-disordered patients and only a random subsample of nonanxious comparison subjects, the sample is enriched for anxiety disorders. Traumatized individuals have a high frequency of seeking medical care; therefore, we may have encountered an upwardly biased estimate of the number physically ill people who have been exposed to trauma (Green & Kimerling, 2004). It is difficult to know how these factors might have biased these results. We do know that PTSD appears to be the most physically impairing of all anxiety disorders and has the strongest association with physical illness (Schonfeld et al., 1997), and it may be that our sample was especially well suited for detecting such relationships.

We assessed only current PTSD, thus it is possible that some of our traumatized sample may have met criteria for PTSD in the past. Power for some of the analyses was low because of the small number of participants with certain illnesses (e.g., cancer, neurological problems, and heart disease). This limitation is important to note because we may have failed to find relationships between trauma and physical illness that actually exist. Finally, data on physical illness were collected through self-report. But patients have been shown to be fairly accurate self-reporters of medical conditions in previous studies (Kehoe, Wu, Leske, & Chylack, 1994; Newman et al., 2000).

This study adds to the literature on the deleterious relationship between trauma exposure and physical health by

showing that trauma exposure is related to some specific physical illnesses (two of nine examined here). The picture is complex, with varying relationships depending on gender, trauma type, and the specific type of physical illness. The results highlight the need to look at PTSD and possibly other trauma-related symptoms in assessing the role of trauma on physical health. Future studies are needed to understand whether treating negative trauma sequelae, whether they are PTSD or other, improves health functioning related to physical illness. Others have suggested that treating PTSD may be a method by which allostatic load can be reduced and therefore positively influence the course of illness (Friedman & McEwen, 2004). Future research is also needed to understand the implications of gender differences on medical treatment and healthcare utilization in traumatized samples. For example, the effects of gender differences on health care utilization may be moderated by trauma history, which may increase or decrease treatment seeking and compliance to treatment. These findings also underscore the need for integrated care (Schnurr & Green, 2004), where trauma and physical health are assessed and treated in a collaborative, multidisciplinary environment.

## REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Arnou, B. A. (2004). Relationships between childhood maltreatment, adult health and psychiatric outcomes, and medical utilization. *Journal of Clinical Psychiatry*, *12*, 10–15.
- Arnou, B. A., Hart, S., Scott, S., Dea, R., O'Connell, L., & Taylor, B. C. (2000). Childhood sexual abuse, psychological distress, medical use among women. *Psychosomatic Medicine*, *61*, 762–770.
- Asmundson, G. J. G., Stein, M. B., & McCreary, D. R. (2002). Posttraumatic stress disorder symptoms influence health status of deployed peacekeepers and nondeployed military personnel. *Journal of Nervous Mental Disorders*, *190*, 807–815.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173–1182.

- Beckham, J. C., Moore, S. D., Feldman, M. E., Hertzberg, M. A., Kirby, A. C., & Fairbank, J. A. (1998). Health status, somatization, and severity of posttraumatic stress disorder in Vietnam combat veterans with posttraumatic stress disorder. *American Journal of Psychiatry*, *155*, 1565–1569.
- Boscarino, J. A. (1997). Diseases among men 20 years after exposure to severe stress: Implications for clinical research and medical care. *Psychosomatic Medicine*, *59*, 605–614.
- Boscarino, J. A., & Chang, J. (1999). Electrocardiogram abnormalities among men with stress-related psychiatric disorders: Implications for coronary heart disease and clinical research. *Annals of Behavioral Medicine*, *21*, 227–234.
- Breslau, N. (2001). Outcomes of posttraumatic stress disorder. *Journal of Clinical Psychiatry*, *62*, 55–59.
- Campbell, J. C. (2002). Health consequences of intimate partner violence. *Lancet*, *359*, 1331–1336.
- Center for Disease Control (CDC). (2004). Health, United States, 2004. Retrieved November 3, 2005, from <http://www.cdc.gov/nchs/hus.htm>
- Center for Disease Control (CDC). (2005). Vital and Health Statistics Report Series 10(225). Retrieved November 17, 2005, from [http://www.cdc.gov/nchs/data/series/sr\\_10/sr10\\_225.pdf](http://www.cdc.gov/nchs/data/series/sr_10/sr10_225.pdf)
- Cloitre, M., Cohen, L. R., Edelman, R. E., & Han, H. (2001). Posttraumatic stress disorder and extent of trauma exposure as correlates of medical problems and perceived health among women with childhood abuse. *Women & Health*, *34*, 1–17.
- Craske, M. G., Roy-Byrne, P., Stein, M. B., Donald-Sherbourne, C., Bystritsky, A., Katon, W., et al. (2003). Treating panic disorder in primary care: A collaborative care intervention. *General Hospital Psychiatry*, *24*, 148–155.
- Dickinson, L. M., deGruy, F. V., Dickinson, W. P., & Candib, L. M. (1999). Health-related quality of life and symptom profiles of female survivors of sexual abuse. *Archives of Family Medicine*, *8*, 35–43.
- Dong, M., Dube, S. R., Felitti, V. J., Giles, W. H., & Anda, R. F. (2003). Adverse childhood experiences and self-reported liver disease. *Archives of Internal Medicine*, *163*, 1949–1956.
- Farley, M., & Patsalides, B. M. (2001). Physical symptoms, posttraumatic stress disorder, and healthcare utilization of women with and without childhood physical and sexual abuse. *Psychological Reports*, *89*, 595–606.
- Friedman, M. J., & McEwen, B. S. (2004). Posttraumatic stress disorder, allostatic load, and medical illness. In P. P. Schnurr & B. L. Green (Eds.), *Physical health consequences of exposure to extreme stress* (pp. 157–189). Washington, DC: American Psychological Association.
- Goodwin, R. D., & Davidson, J. R. (2005). Self-reported diabetes and posttraumatic stress disorder among adults in the community. *Preventive Medicine*, *40*, 570–575.
- Goodwin, R. D., Hoven, C. W., Murison, R., & Hotopf, M. (2003). Association between childhood physical abuse and gastrointestinal disorders and migraine in adulthood. *American Journal of Public Health*, *93*, 1065–1067.
- Goodwin, R. D., & Stein, M. B. (2004). Association between childhood trauma and physical disorders among adults in the United States. *Psychological Medicine*, *34*, 509–520.
- Green, B. L., Goodman, L. A., Krupnik, J. L., Corcoran, C. B., Petty, R. M., Stockton, P. E., et al. (2000). Outcomes of a single versus multiple trauma exposure in a screening sample. *Journal of Traumatic Stress*, *13*, 271–286.
- Green, B. L., & Kimerling, R. (2004). Trauma, PTSD, and health status. In P. P. Schnurr & B. L. Green (Eds.), *Physical health consequences of exposure to extreme stress* (pp. 13–42). Washington, DC: American Psychological Association.
- Kehoe, R., Wu, S. Y., Leske, M. C., & Chylack, L. T. (1994). Comparing self-reported and physical-reported medical history. *American Journal of Epidemiology*, *15*, 813–818.
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, *52*, 1048–1060.
- Lechner, M. E., Vogel, M. E., Garcia-Shelton, L. M., Leichter, J. L., & Steibel, K. R. (1993). Self-reported medical problems of adult female survivors of childhood sexual abuse. *Journal of Family Practice*, *36*, 633–638.
- McEwen, B. S., & Stellar, E. (1993). Stress and the individual: Mechanisms leading to disease. *Archives of Internal Medicine*, *153*, 2093–2101.
- McFarlane, A. C., Atchison, M., Rafalowicz, E., & Papay, P. (1994). Physical symptoms in post-traumatic stress disorder. *Journal of Psychosomatic Research*, *38*, 715–726.
- Newman, M. G., Clayton, L., Zuellig, A., Cashman, L., Arnow, B., Dea, R., et al. (2000). The relationship of childhood sexual abuse and depression with somatic symptoms and medical utilization. *Psychological Medicine*, *30*, 1063–1077.
- Reed, V., Gander, F., Pfister, H., & Wittchen, H. U. To what degree does the Composite International Diagnostic Interview (CIDI) correctly identify DSM-IV disorders? Testing validity issues in a clinical sample. *International Journal of Methods in Psychiatric Research*, *7*, 142–155.
- Roy-Byrne, P. P., Craske, M. G., Stein, M. B., Sullivan, G., Bystritsky, A., Katon, W. J., et al. (2005). A randomized effectiveness trial of cognitive behavior therapy and medication for primary

- care panic disorder. *Archives of General Psychiatry*, 62, 290–298.
- Roy-Byrne, P. P., Sherbourne, C. D., Craske, M. G., Stein, M. B., Katon, W., Sullivan, G., et al. (2003). Moving treatment research from clinical trials to the real world. *Psychiatric Services*, 54, 327–332.
- Ruscio, A. M., Ruscio, J., & Keane, T. M. (2002). The latent structure of posttraumatic stress disorder: A taxometric investigation of reactions to extreme stress. *Journal of Abnormal Psychology*, 111, 290–301.
- Schonfeld, W. H., Verboncoeur, C. J., Fifer, S. K., Lipschutz, R. C., Lubeck, D. P., & Buesching, D. P. (1997). The functioning and well-being of patients with unrecognized anxiety disorders and major depressive disorder. *Journal of Affective Disorders*, 43, 105–119.
- Schnurr, P. P., Friedman, M. J., Sengupta, A., Jankowski, M. K., & Holmes, T. (2000). PTSD and utilization of medical treatment services among male Vietnam veterans. *Journal of Nervous Mental Disease*, 188, 496–504.
- Schnurr, P. P., & Green, B. L. (2004). Understanding relationships among trauma, posttraumatic stress disorder, and health outcomes. In P. P. Schnurr & B. L. Green (Eds.), *Physical health consequences of exposure to extreme stress* (pp. 150–159). Washington, DC: American Psychological Association.
- Schnurr, P. P. & Spiro III, A. (1999). Combat exposure, PTSD symptoms, and health behaviors as predictors of self-reported physical health in older veterans. *Journal of Nervous Mental Disease*, 187, 353–359.
- Schnurr, P. P., Spiro III, A., & Paris, A. H. (2000). Physician-diagnosed medical disorders in relation to PTSD symptoms in older male military veterans. *Health Psychology*, 19, 91–97.
- Stein, M. B., & Barrett-Connor, E. (2000). Sexual assault and physical health: Findings from a population-based study of older adults. *Psychosomatic Medicine*, 62, 838–843.
- Stein, M. B., Lang, A. J., Laffaye, C., Satz, L. E., Lenox, R. J., & Dresselhaus, T. R. (2004). Relationship of sexual assault history to somatic symptoms and health anxiety in women. *General Hospital Psychiatry*, 26, 178–183.
- Stein, M. B., McQuaid, J. R., Pedrelli, P., Lenox, R., & McCahill, M. E. (2000). Posttraumatic stress disorder in the primary care medical setting. *General Hospital Psychiatry*, 22, 261–269.
- Weisberg, R. B., Bruce, S. E., Machan, J. T., Kessler, R. C., Culpepper, L., & Keller, M. B. (2002). Nonpsychiatric illness among primary care patients with trauma histories and posttraumatic stress disorder. *Psychiatric Services*, 53, 848–854.
- Walker, E. A., Gelfand, A. N., Katon, W. J., Koss, M. P., Von Korff, M., Bernstein, D., et al. (1999). Adult health status of women with histories of childhood abuse and neglect. *American Journal of Medicine*, 107, 332–339.
- Wolfe, J., Proctor, S. P., Erickson, D. J., Heeren, T., Friedman, M. J., Huang, M. T., et al. (1999). Relationship of psychiatric status to Gulf War veterans' health problems. *Psychosomatic Medicine*, 61, 532–540.
- World Health Organization (WHO). (1997). *CIDI-Auto, Version 2.1: Administrator's guide*. Sydney, Australia: Author.