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Impact of childhood maltreatment on physical health-related quality of life in U.S. active duty military personnel and combat veterans[☆]

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ABSTRACT

Previous studies have found an association between childhood maltreatment (CM) and health-related quality of life (HRQoL), and to a lesser extent have considered whether psychiatric symptoms may explain the relationship. This study aimed to further our understanding of the link between CM and HRQoL by testing whether posttraumatic stress disorder (PTSD) or depressive symptoms mediate the relationship between childhood maltreatment and physical HRQoL. Mediation models were examined in a sample of male Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) active duty and combat veterans ($n = 249$). PTSD and depressive symptoms mediated the relationship between CM and overall physical HRQoL, as well as participation in daily activities due to physical health, bodily pain, and social functioning. Mediation of the relationship between childhood maltreatment and physical and social functioning by depression and PTSD symptoms may lend support to neurobiological hypotheses that childhood maltreatment sensitizes the nervous system and after repeated trauma may lead to the development of psychiatric symptoms, which have a major impact on morbidity and mortality.

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Introduction

The World Health Organization (WHO) defines child maltreatment as encompassing a number of trauma subtypes, including physical abuse, emotional maltreatment, sexual abuse, neglect, negligence and exploitation (WHO, 2010). Individuals who experience childhood maltreatment are more likely to experience psychopathology including PTSD, depression, suicidality, sexually inappropriate behaviors, substance abuse problems, and conduct disorders (Perepletchikova & Kaufman, 2010). Consequently, victims of childhood maltreatment (CM) and associated psychological sequelae have shown neurobiological changes in the HPA-axis, specifically related to stress hormone dysregulation, which increases the risk of physical

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illness, especially inflammatory and cardiac conditions (De Bellis, 2003). Individuals with a CM history also report poorer perception of physical health, conceptually measured as health-related quality of life (HRQoL; Moeller, Bachmann, & Moeller, 1993; Walker et al., 1999). Poor perceived health, measured as poor HRQoL, is associated with greater morbidity and mortality risk independent of physical health status (Chen, Li, & Kochen, 2005; Mossey & Shapiro, 1982).

History of childhood maltreatment in veteran populations has shown detrimental psychological effects, and has been shown to be a direct risk factor in the development of combat-related PTSD (Bremner, Southwick, Johnson, Yehuda, & Charney, 1993; Dedert et al., 2009). A recent study in a sample of Iraq/Afghanistan veterans noted that 40% of the sample reported experience of one instance of childhood maltreatment and 31% reported more than one instance (Van Voorhees et al., 2012). Childhood abuse, particularly non-sexual abuse including physical abuse, psychological abuse, and the cumulative amount of abuse, has been found to be related to poor physical HRQoL in a community sample and in a group of female veterans (Afifi et al., 2007; Lang et al., 2008).

Given the high levels of childhood maltreatment documented in veterans and active duty service members of the US Armed Forces (Merrill, Hervig, & Milner, 1996; Van Voorhees et al., 2012), and the long-term deleterious effects on mental health, perception of health and physical health status (Kendall-Tackett, 2002; Springer, Sheridan, Kuo, & Carnes, 2007), our study aimed to further understand the effect of childhood trauma, PTSD, and depression on physical HRQoL in an all-male sample of US military veterans and active duty servicemen. Previous studies have examined the relationship between childhood maltreatment, physical HRQoL, depression and PTSD in all-female samples of veterans and active duty service members or community male and female samples, and it appears the interrelation of these variables has received limited attention in male military samples.

Specifically, our study aimed to examine whether PTSD or depressive symptoms mediate the relationship between childhood maltreatment and physical HRQoL, as PTSD was found to mediate the relationship between CM and physical HRQoL in a sample of female veterans (Lang et al., 2006). Understanding the relationship between childhood maltreatment and adult physical and mental sequelae in individuals who are exposed to combat is an important consideration in terms of informing readiness programs, fitness-for-duty assessment, and post-deployment physical and mental healthcare.

Methods

Participants

Participants were 389 male and female OEF/OIF active duty and combat veterans who volunteered to participate in a research study examining genetic risk factors associated with PTSD. Drawn from a general military and veteran population, the sample included both individuals with diagnostic levels of depression and PTSD and those with sub-threshold or absence of symptoms. Recruitment criteria for the initial study required combat exposure including engagement with the enemy and threat or fear of loss of life or injury as determined by the Combat Exposure Scale (CES; Keane et al., 1989) and that participants had returned from deployment at least 6 months prior to study assessment. In addition, participants were excluded for current alcohol dependence, current drug use, and meeting criteria for a pre-deployment Axis I disorder.

For the purposes of our study, of the initial $N=389$, 137 were missing data on the measures of interest including duty status (active vs. veteran), combat exposure total score, childhood maltreatment total score, depression total score, PTSD total score, and HRQoL composite and subscale scores. The three female participants with complete data were excluded in order to examine a homogeneous male sample, leaving a study sample of 249. A comparison of those included versus excluded revealed no clinically significant differences across the variables of interest except for the Physical Functioning subscale; individuals who were excluded had lower scores, indicative of poorer physical functioning than those included ($F=5.75, p=.02$).

Procedures

Participants were recruited through direct clinician referrals from Veterans Affairs (VA) and Naval Medical Center providers as the study included a comprehensive mental health assessment, as well as from flyers posted at local VA medical centers and military bases. After providing written informed consent, participants completed a clinical interview and a battery of self-report measures. The University of California, San Diego, Naval Medical Center San Diego, and VA San Diego Healthcare System institutional review boards approved all study-related materials and procedures.

Measures

Demographic information was collected with investigator-created, self-report questionnaires. Participant's level of combat exposure was assessed with the Combat Exposure Scale (Keane et al., 1989), a seven-item self-report measure that uses a 5-point Likert scale to measure the severity of combat experiences with total scores ranging from 0 to 41, a higher score indicating higher severity of combat exposure including greater frequency of exposure, witnessing atrocity, threat of injury/loss of life. The measure has demonstrated good internal consistency ($\alpha=0.85$) and test-retest reliability ($r=0.97$) in a clinical sample of Vietnam veterans.

The 34-item Child Trauma Questionnaire (CTQ; Bernstein et al., 1994) was used to assess for a history of child maltreatment. Although the 34-item CTQ was utilized, scoring is based on the 28-item version and scored per recommendation by the author (D.P. Bernstein, personal communication, Feb 4, 2005). Items are summed to produce five subscale scores for childhood emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect (range 5–25) and a weighted total score (range 25–105). The CTQ has demonstrated strong internal consistency, $\alpha = 0.91$ for total score, with subscale reliability coefficients ranging from 0.66 for physical neglect to 0.92 for sexual abuse, and test–retest reliability of 0.86 for the total score and 0.79–0.81 for the subscale scores across clinical and community samples (Bernstein, Ahluvalia, Pogge, & Handelman, 1997; Bernstein et al., 1994; Bernstein et al., 2003; Paivio & Cramer, 2004; Scher, Stein, Asmundson, McCreary, & Forde, 2001).

Health-related quality of life was evaluated with the Medical Outcomes Study Short-Form-36 (SF-36; Ware & Sherbourne, 1992), a generic measure of functional health and perceived well-being, made up of two composite summary scores, physical and mental health, and eight subscale scores, physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. Our study examined the Physical Component Summary (PCS) and six subscales that load highest on the aggregate PCS. The Physical Functioning subscale measures mobility and the ability to perform physically demanding tasks (i.e., walking a mile, walking a block, bending or stooping, and bathing). Bodily pain measures experience of pain in terms of severity and functional limitation. Vitality is a measure of fatigue and energy level. General health captures perceptions of overall health, self-ratings of health compared to others, and expectations about one's health in the future. And role limitations, both emotional and physical, refer to inability to perform daily activities due to physical or emotional problems; similarly, Social Functioning measures social impairments due to physical and mental health problems. The measure has demonstrated strong internal consistency, greater than or equal to 0.80, in more than 25 studies for all subscales except Social Functioning ($\alpha = 0.76$; Ware, Kosinski, & Gandek, 2005).

Both depression and PTSD symptoms were assessed with clinician-administered measures. The 17-item Hamilton Depression Rating Scale (HAM-D; Hamilton, 1960) is a structured interview used to measure depressive symptom severity. The items are summed to produce a total score (range 0–54) with scores of 7–17 indicative of mild depressive symptoms, 18–24 indicative of moderate depressive symptoms, and scores of over 24 indicative of severe level of depressive symptoms. The HAM-D has extensive empirical support for both its internal consistency ($\alpha = 0.83$) and test–retest reliability ($\alpha = 0.81$; Bagby, Ryder, Schuller, & Marshall, 2004; Trajkovic et al., 2011). The Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995) was used to assess the frequency and intensity of the 17 DSM-IV PTSD symptoms. The CAPS provides a continuous measure of symptom severity with scores ranging from 0 to 136 with a cutoff score of 65 for DSM-IV diagnostic criteria for PTSD (F.W. Weathers, Ruscio, & Keane, 1999). Internal consistency and test–retest reliability for the total score ranged from 0.93 to 0.95 for frequency and intensity severity in a sample of Vietnam veterans (Weathers, Keane, & Davidson, 2001).

Statistical analyses

Descriptive statistics were calculated to characterize the sample: frequencies and percents for dichotomous variables, or means and standard deviations for continuous variables. Multiple regression was employed to estimate the relation of PTSD symptoms, depressive symptoms, childhood maltreatment to the Physical Component Summary (PCS) of the SF-36 and its six subscales: Physical Functioning, Role-Physical Functioning, Bodily Pain, General Health, Vitality, and Social Functioning. Each regression controlled for the effects of duty status (active duty vs. veteran) and combat exposure. Assumptions of normality, linearity, and independence of observation were met for all continuous predictors. Multicollinearity was assessed using a VIF < 5. Mediation was tested using the criteria that the independent variable must predict the mediator, the mediator must predict the dependent variable, and the independent variable must predict the dependent variable in the absence of the mediator (Baron & Kenny, 1986). A Sobel test was conducted to determine statistical significance of the mediation effect. Analyses were conducted using SPSS 19.0.

Results

Sample characteristics

The study sample ($n = 249$) was all male with an average age of 29 ($SD = 7.1$). There was an even representation of active duty (45%) and veteran (55%) participants. The majority of participants identified as Caucasian (77%) though 23% identified as non-white. The majority of participants reported attending some college (57.5%). On average, participants were exposed to a moderate level of combat as measured by the Combat Exposure Scale ($M = 26.4$, $SD = 9.6$; Spiro, Schnurr, & Aldwin, 1994). Duty status and combat exposure both had a statistically significant correlation with either some of the predictor variables and the outcome variable, thus were controlled for in each model. Neither age, ethnicity, nor years of education were correlated with the predictor and outcome variables. All predictor variables were correlated with physical HRQoL. Table 1 shows the predictor and outcome variable correlations. Participants had an average CTQ total score of $M = 40.7$, $SD = 14.7$; a CTQ score of 39 ranked in the 90th percentile for males ages 25–44 in a community sample (Scher et al., 2001), indicating a higher than average level of childhood maltreatment in the study sample compared to rates in a community sample. Average HAM-D and CAPS total scores ($M = 10.0$, $SD = 7.3$ and $M = 53.9$, $SD = 32.2$, respectively) were indicative of non-clinically significant levels of depression on average (Williams, 1988) and sub-threshold levels of PTSD (Weathers et al.,

Table 1
 Pearson bivariate correlations and descriptives for study variables.

Variable	1	2	3	4	5	M	SD
1. Posttraumatic stress disorder (PTSD)	–	–	–	–	–	53.93	32.16
2. Depression	.78***	–	–	–	–	10.02	7.37
3. Combat exposure	.43***	.26***	–	–	–	22.02	8.62
4. Childhood maltreatment	.22***	.18**	.11	–	–	40.72	14.73
5. Duty status	–.33***	–.33***	–.13	–.06	–	0.45	0.50
6. Physical health quality of life	–.27***	–.35***	–.09	–.13*	.19*	51.68	9.72
7. Physical functioning	–.45***	–.50***	–.19**	–.14*	.22***	82.85	23.33
8. Role-physical	–.42***	–.48***	–.19**	–.22**	.19*	71.39	39.12
9. Bodily pain	–.47***	–.51***	–.21**	–.22**	.24***	63.0	24.91
10. General health	–.49***	–.52***	–.17**	–.12	.25***	68.15	21.61
11. Vitality	–.59***	–.62***	–.28***	–.15*	.20**	45.86	22.35
12. Social functioning	–.73***	–.70***	–.34***	–.26***	.32***	62.90	31.98

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

1999). The SF-36 Physical Component Summary ($M = 51.7$ $SD = 9.7$) was below the 25th percentile compared to age matched population norms (Ware et al., 2005).

Mediation models

Both PTSD and depression mediated the relationship between childhood maltreatment and the overall physical HRQoL summary score (Sobel $t = -2.14$, $p = .03$ for PTSD; $t = -2.14$, $p = .03$ for depression). For the physical HRQoL subscales, CTQ total score was not a significant predictor of Physical Functioning, General Health, or Vitality. Therefore, mediation models were not tested for these three subscales. PTSD and depression significantly mediated the relationship between childhood maltreatment and Bodily Pain (Sobel $t = -2.75$, $p = .006$ for PTSD; $t = -2.29$, $p = .02$ for depression), Role Physical Functioning (Sobel $t = -2.66$, $p = .007$ for PTSD; $t = -2.28$, $p = .02$ for depression), and Social Functioning (Sobel $t = -2.99$, $p = .003$ for PTSD; $t = -2.37$, $p = .02$ for depression). Mediation model results are displayed in Table 2. We examined all three variables in an omnibus model in the prediction of overall physical HRQoL and depression was the strongest predictor variable. The results of the combined model are presented in Table 3.

Discussion

Our study aimed to examine PTSD and depression as mediators of the relationship between childhood maltreatment and physical HRQoL. Childhood abuse, particularly non-sexual abuse including physical abuse, psychological abuse, and the cumulative amount of abuse, has been found to be related to physical HRQoL (Affi et al., 2007; Lang et al., 2008) and chronic pain (Kelly, Skelton, Patel, & Bradley, 2011). In our study PTSD and depression both mediated the relationship between overall physical HRQoL and childhood maltreatment, and at the level of the subscales, PTSD and depression mediated the relationship between childhood maltreatment and Bodily Pain, Role-Physical Functioning, and Social Functioning. Previous studies have examined PTSD as a mediator between childhood maltreatment and physical HRQoL, but there has been less focus on depression as a mediator (Lang et al., 2006). Additionally, we examined a sample of all-male veterans and active duty service members, and found similar impairment in overall physical HRQoL, bodily pain, physical role functioning, and social functioning as has been demonstrated in all-female and community samples (Kendall-Tackett, 2002). The meditational relationship is important, and may lend further support to neurobiological research that early adverse experiences can sensitize the central nervous system and lead to increased risk for anxiety and depressive disorders (Heim & Nemeroff, 2001). Participants in this sample all had combat exposure and denied pre-deployment Axis I diagnosis, though these data were self-reported and participants may have had undiagnosed mental health conditions. Nonetheless, the association may lend support to epigenetic research on the cumulative impact of trauma on physical and mental health (Dinan, Cryan, Shanahan, Keeling, & Quigley, 2010; Nelson et al., 2009).

Additionally, our study lends further support to previously published findings that identified depression as a factor with a large effect on physical HRQoL (Aversa et al., 2012; Harder et al., 2011). In the omnibus model with childhood maltreatment, PTSD, and depression predicting physical HRQoL, only depression explained a significant proportion of the variance in HRQoL, 10% of the unique variance. Future studies may further understanding by using dismantling analyses to examine specific components of PTSD and depression that explain impairment in physical HRQoL in a sample of adults who report childhood maltreatment as depression and PTSD are commonly co-morbid (Breslau, Davis, Peterson, & Schultz, 2000) and may have some common underlying neurobiological and genetic mechanisms (Newport & Nemeroff, 2000).

Our study has several limitations. The study design was cross-sectional and retrospective in nature. Examining the relationships between childhood maltreatment, PTSD, depression, and physical health-related quality of life in a prospective sample, perhaps pre- versus post-deployment, would be beneficial in examining causality. The sample was a young OEF/OIF

Table 2
 PTSD and depression as mediators of the relationship between childhood maltreatment and physical HRQoL.

Models	R ²	β	p
<i>PCS</i>			
Model 1	.057		
CTQ Total		-.128	.04
Model 2	.091		
CTQ Total		-.092	.14
CAPS Total		-.219	.003
Model 3	.134		
CTQ Total		-.085	.16
HAM-D Total		-.305	<.001
<i>Role-physical</i>			
Model 1	.101		
CTQ Total		-.191	.002
Model 2	.196		
CTQ Total		-.130	.03
CAPS Total		-.366	<.001
Model 3	.255		
CTQ Total		-.130	.02
HAM-D Total		-.431	<.001
<i>Bodily pain</i>			
Model 1	.128		
CTQ Total		-.186	.002
Model 2	.246		
CTQ Total		-.118	.04
CAPS Total		-.409	<.001
Model 3	.285		
CTQ Total		-.125	.02
HAM-D Total		-.437	<.001
<i>Social functioning</i>			
Model 1	.241		
CTQ Total		-.206	<.001
Model 2	.556		
CTQ Total		-.096	.03
CAPS Total		-.667	<.001
Model 3	.538		
CTQ Total		-.122	.006
HAM-D Total		-.600	<.001

cohort who all had war-zone exposure, but not necessarily psychiatric impairment. Therefore, findings may not generalize to other military or veteran samples or non-military, non-veteran samples with greater psychiatric impairment. The number of participants excluded from the study was sizeable. Participants that had complete data on the measures in our study had higher Physical Functioning scores on average than those who had incomplete data, and this may limit the generalizability of our findings.

Few prior studies have looked at the role of PTSD and depression as mediators of the relationship between childhood maltreatment and physical HRQoL. These relationships are important to further examine and dismantle as we aim to understand broader implications such as risk versus resiliency and neurobiological and genetic vulnerability. Future research may

Table 3
 Hierarchical multiple regression predicting physical composite summary.

Variable	B	SE B	Beta	t	R ²	F for ΔR ²
Step 1:					0.04	5.29**
Constant	51.92	1.82				
Duty Status	3.53	1.23	0.18	2.88**		
Combat Exposure (CES)	-1.07	0.22	-0.07	-1.17		
Step 2:					0.14	8.79***
Constant	57.20	2.33				
Duty Status	1.72	1.24	0.09	1.38		
Combat Exposure (CES)	-0.01	0.08	-.01	-0.15		
Childhood Trauma (CTQ)	-0.06	0.04	-0.09	-1.46		
PTSD (CAPS)	0.16	0.03	0.05	0.50		
Depression (HAM-D)	-0.45	0.13	-0.34	-3.50***		

* p ≤ .05.
 ** p ≤ .01.
 *** p ≤ .001.

further knowledge by taking into account how biopsychosocial risk and resilience for psychiatric impairment following childhood trauma and subsequent trauma (i.e., war-zone exposure) may change the trajectory of health-related quality of life, which has been closely related to morbidity and mortality risk.

Conflict of interest

The authors have no competing interests to report.

References

- Afifi, T. O., Enns, M. W., Cox, B. J., de Graaf, R., ten Have, M., & Sareen, J. (2007). Child abuse and health-related quality of life in adulthood. *Journal of Nervous and Mental Disease, 195*(10), 797–804.
- Aversa, L. H., Stoddard, J. A., Doran, N. M., Au, S., Chow, B., McFall, M., Saxon, A., & Baker, D. G. (2012). PTSD and depression as predictors of physical health-related quality of life in tobacco-dependent veterans. *Journal of Psychosomatic Research, 73*(3), 185–190.
- Bagby, R. M., Ryder, A. G., Schuller, D. R., & Marshall, M. B. (2004). The Hamilton Depression Rating Scale: Has the gold standard become a lead weight? *American Journal of Psychiatry, 161*(12), 2163–2177.
- 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*(6), 1173–1182.
- Bernstein, D. P., Ahluvalia, T., Pogge, D., & Handelsman, L. (1997). Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*(3), 340–348.
- Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., Sapareto, E., & Ruggiero, J. (1994). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *American Journal of Psychiatry, 151*(8), 1132–1136.
- Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse and Neglect, 27*(2), 169–190.
- Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., & Keane, T. M. (1995). The development of a Clinician-Administered PTSD Scale. *Journal of Traumatic Stress, 8*(1), 75–90.
- Bremner, J. D., Southwick, S. M., Johnson, D. R., Yehuda, R., & Charney, D. S. (1993). Childhood physical abuse and combat-related posttraumatic stress disorder in Vietnam veterans. *American Journal of Psychiatry, 150*(2), 235–239.
- Breslau, N., Davis, G. C., Peterson, E. L., & Schultz, L. R. (2000). A second look at comorbidity in victims of trauma: The posttraumatic stress disorder–major depression connection. *Biological Psychiatry, 48*(9), 902–909.
- Chen, T. H., Li, L., & Kochen, M. M. (2005). A systematic review: How to choose appropriate health-related quality of life (HRQOL) measures in routine general practice? *Journal of Zhejiang University Science B, 6*(9), 936–940.
- De Bellis, M. T., & Thomas, L. A. (2003). Biologic findings of post-traumatic stress disorder and child maltreatment. *Current Psychiatry Reports, 5*(2), 108–117.
- Dedert, E. A., Green, K. T., Calhoun, P. S., Yoash-Gantz, R., Taber, K. H., Mumford, M. M., Tupler, L. A., Morey, R. A., Marx, C. E., Weiner, R. D., & Beckham, J. C. (2009). Association of trauma exposure with psychiatric morbidity in military veterans who have served since September 11, 2001. *Journal of Psychiatric Research, 43*(9), 830–836.
- Dinan, T. G., Cryan, J., Shanahan, F., Keeling, P. W., & Quigley, E. M. (2010). IBS: An epigenetic perspective. *Nature Reviews Gastroenterology & Hepatology, 7*(8), 465–471.
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry, 23*, 56–62.
- Harder, L. H., Chen, S., Baker, D. G., Chow, B., McFall, M., Saxon, A., & Smith, M. W. (2011). The influence of posttraumatic stress disorder numbing and hyperarousal symptom clusters in the prediction of physical health status in veterans with chronic tobacco dependence and posttraumatic stress disorder. *Journal of Nervous and Mental Disease, 199*(12), 940–945.
- Heim, C., & Nemeroff, C. B. (2001). The role of childhood trauma in the neurobiology of mood and anxiety disorders: Preclinical and clinical studies. *Biological Psychiatry, 49*(12), 1023–1039.
- Keane, T. M., Fairbank, J. A., Caddell, J. M., Zimering, R. T., Taylor, K. L., & Mora, C. A. (1989). Clinical evaluation of a measure to assess combat exposure. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 1*(1), 53–55.
- Kelly, U. A., Skelton, K., Patel, M., & Bradley, B. (2011). More than military sexual trauma: Interpersonal violence, PTSD, and mental health in women veterans. *Research in Nursing and Health, 34*(6), 457–467.
- Kendall-Tackett, K. (2002). The health effects of childhood abuse: Four pathways by which abuse can influence health. *Child Abuse and Neglect, 26*(6–7), 715–729.
- Lang, A. J., Aarons, G. A., Gearing, J., Laffaye, C., Satz, L., Dresselhaus, T. R., & Stein, M. B. (2008). Direct and indirect links between childhood maltreatment, posttraumatic stress disorder, and women's health. *Behavioral Medicine, 33*(4), 125–135.
- Lang, A. J., Laffaye, C., Satz, L. E., McQuaid, J. R., Malcarne, V. L., Dresselhaus, T. R., & Stein, M. B. (2006). Relationships among childhood maltreatment, PTSD, and health in female veterans in primary care. *Child Abuse and Neglect, 30*(11), 1281–1292.
- Merrill, L. L., Hervis, L. K., & Milner, J. S. (1996). Childhood parenting experiences, intimate partner conflict resolution, and adult risk for child physical abuse. *Child Abuse and Neglect, 20*(11), 1049–1065.
- Moeller, T. P., Bachmann, G. A., & Moeller, J. R. (1993). The combined effects of physical, sexual, and emotional abuse during childhood: Long-term health consequences for women. *Child Abuse and Neglect, 17*(5), 623–640.
- Mossey, J. M., & Shapiro, E. (1982). Self-rated health: A predictor of mortality among the elderly. *American Journal of Public Health, 72*(8), 800–808.
- Nelson, E. C., Agrawal, A., Pergadia, M. L., Lynskey, M. T., Todorov, A. A., Wang, J. C., Todd, R. D., Martin, N. G., Heath, A. C., Goate, A. M., Montgomery, G. W., & Madden, P. A. (2009). Association of childhood trauma exposure and GABRA2 polymorphisms with risk of posttraumatic stress disorder in adults. *Molecular Psychiatry, 14*(3), 234–235.
- Newport, D. J., & Nemeroff, C. B. (2000). Neurobiology of posttraumatic stress disorder. *Current Opinion in Neurobiology, 10*(2), 211–218.
- Paivio, S. C., & Cramer, K. M. (2004). Factor structure and reliability of the Childhood Trauma Questionnaire in a Canadian undergraduate student sample. *Child Abuse and Neglect, 28*(8), 889–904.
- Perepletchikova, F., & Kaufman, J. (2010). Emotional and behavioral sequelae of childhood maltreatment. *Current Opinion in Pediatrics, 22*(5), 610–615.
- Scher, C. D., Stein, M. B., Asmundson, G. J., McCreary, D. R., & Forde, D. R. (2001). The childhood trauma questionnaire in a community sample: Psychometric properties and normative data. *Journal of Traumatic Stress, 14*(4), 843–857.
- Spiro, A., 3rd, Schnurr, P. P., & Aldwin, C. M. (1994). Combat-related posttraumatic stress disorder symptoms in older men. *Psychology and Aging, 9*(1), 17–26.
- Springer, K. W., Sheridan, J., Kuo, D., & Carnes, M. (2007). Long-term physical and mental health consequences of childhood physical abuse: Results from a large population-based sample of men and women. *Child Abuse and Neglect, 31*(5), 517–530.
- Trajkovic, G., Starcevic, V., Latas, M., Lestarevic, M., Ille, T., Bukumiric, Z., & Marinkovic, J. (2011). Reliability of the Hamilton Rating Scale for Depression: A meta-analysis over a period of 49 years. *Psychiatry Research, 189*(1), 1–9.
- Van Voorhees, E. E., Dedert, E. A., Calhoun, P. S., Brancu, M., Runnals, J., & Beckham, J. C. (2012). Childhood trauma exposure in Iraq and Afghanistan war era veterans: Implications for posttraumatic stress disorder symptoms and adult functional social support. *Child Abuse and Neglect, 36*(5), 423–432.

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- Walker, E. A., Gelfand, A., Katon, W. J., Koss, M. P., Von Korff, M., Bernstein, D., & Russo, J. (1999). Adult health status of women with histories of childhood abuse and neglect. *American Journal of Medicine*, *107*(4), 332–339.
- Ware, J. E., Jr., Kosinski, M., & Gandek, B. (2005). *SF-36 health survey: Manual and interpretation guide*. Lincoln, RI: QualityMetric Incorporated.
- Ware, J. E., Jr., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical Care*, *30*(6), 473–483.
- Weathers, F. W., Keane, T. M., & Davidson, J. R. (2001). Clinician-administered PTSD scale: A review of the first ten years of research. *Depression and Anxiety*, *13*(3), 132–156.
- Weathers, F. W., Ruscio, A. M., & Keane, T. M. (1999). Psychometric properties of nine scoring rules for the clinician-administered posttraumatic stress disorder scale. *Psychological Assessment*, *11*(2), 124–133.
- WHO. (2010). Child maltreatment. from <http://www.who.int/mediacentre/factsheets/fs150/en/index.html>
- Williams, J. B. (1988). A structured interview guide for the Hamilton Depression Rating Scale. *Archives of General Psychiatry*, *45*(8), 742–747.