Published in final edited form as:

Clin Psychol Rev. 2005 September ; 25(6): 813–823. doi:10.1016/j.cpr.2005.05.006.

Is traumatic stress a vulnerability factor for women with substance use disorders?

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Abstract

The primary goal of this paper is to review existing findings from trauma, addictions and developmental research in order to delineate salient and outstanding questions for future research in this field. Toward this aim, our manuscript will provide an overview of the extant body of knowledge of trauma/PTSD comorbidity with substance use disorders and draw attention to converging developmental and neurobiological literature on the consequences of trauma on self-regulation. We conclude with suggestions for future research in these areas.

Keywords

Posttraumatic stress disorder (PTSD); Substance use disorders (SUD); Violence; Women

1. Introduction

Nearly two decades of epidemiological and clinical studies have documented the staggering rates of interpersonal violence in the lives of women with substance use disorders. Based upon this research, it has been posited that chronic traumatic stress arising from childhood interpersonal violence and adult revictimization has maturational consequences, which lead to increased vulnerability for addictive disorders. Although current research has identified strong associations between traumatic stress exposure and substance use disorders, many questions remain regarding the conditions necessary for the development of substance use disorders and the degree to which traumatic exposure and/or stress may be considered a risk factor.

Toward the aim of identifying areas for further research on traumatic stress as a vulnerability factor for developing substance use disorders, our manuscript will provide an overview of the extant body of knowledge of trauma/PTSD comorbidity with substance use disorders, as well as specific questions for the field. We will then draw attention to converging developmental and neurobiological literature on the consequences of trauma on self-regulation in order to identify possible models for understanding the complex pathways between traumatic stress and addiction.

2. Trauma, PTSD and substance use disorders

Over the past two decades, the significant co-occurrence of trauma exposure posttraumatic stress (PTSD) and substance use disorders (SUD) among women has become increasingly apparent. Although men are, overall, more likely to be exposed to trauma in their lives, women are more often exposed to chronic high impact trauma such as childhood sexual

violence, physical abuse, and neglect (Stewart, Ouimette, & Brown, 2002). In addition, once exposed to trauma, women are more vulnerable to developing PTSD than men (Breslau, Davis, Andreski, Peterson, & Schultz, 1997; Cottler, Nishith, & Compton, 2001). Findings from a large-scale epidemiological survey highlight these gender differences showing that, in the U.S. population, approximately 61% of men are exposed to trauma and 51% of women, yet 5% of men meet criteria for PTSD compared to 10% of women (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

The relevance of trauma and trauma-related disorders to understanding the clinical presentation of women with addictions has also become more evident with studies documenting the frequent co-occurrence of PTSD and SUD, particularly among female patients.¹ For example, rates of PTSD among substance abusers range from 14 to 60% (Brady, Dansky, Back, Foa, & Carroll, 2001; Donovan, Padin-Rivera, & Kowaliw, 2001; Najavits, Weiss, & Shaw, 1997; Triffleman, 2003). Substance-dependent women who have been exposed to interpersonal trauma and violence represent a particularly high-risk group. The majority of women dually diagnosed with PTSD and SUD are not only victims of childhood abuse (Brown & Wolfe, 1994; Polusny & Follete, 1995) but are also more vulnerable to repeated interpersonal traumas throughout their lives (Dansky, Brady, & Saladin, 1998; Fullilove et al., 1993). These women tend to present to treatment with high rates of other comorbid disorders and marked interpersonal, behavioral and affect regulation deficits that significantly complicate treatment and prognosis (Brady, Dansky, Sonne, & Saladin, 1998).

To date, the majority of information on the associations between trauma exposure, PTSD and substance abuse among women comes from retrospective studies. These studies on trauma and addiction comorbidity have consistently shown that disproportionately large numbers of women with alcohol and drug problems report having been sexually or physically abused in childhood (Miller, Downs, Gondoli, & Keil, 1987; Miller, Downs, & Testa, 1990). Specifically, prevalence estimates indicate that as many as 80% of women seeking treatment for SUDs report lifetime histories of sexual and/or physical assault (Brady, Killeen, Saladin, Dansky, & Becker, 1994; Dansky, Saladin, Brady, Kilpatrick, & Resnick, 1995; Fullilove et al., 1993; Hien & Scheier, 1996; Miller, Downs, & Testa, 1993). Multiple studies with female substance abusers also demonstrate high rates of revictimization in the form of partner violence, as well as stranger rape and physical assault in adulthood (Hien, Nunes, & Levin, 1995; Hien & Scheier, 1996). Comorbid PTSD rates in this population range from 30% to 59% (Dansky et al., 1995; Najavits et al., 1997), and lifetime PTSD rates are even higher.

Findings from cross-sectional studies demonstrate that women with both PTSD and substance use disorders have more severe clinical profiles than those with just one of these disorders (Najavits, Weiss, & Shaw, 1999). They tend to abuse more severe substances such as cocaine and opiates (Cottler et al., 2001; Najavits et al., 1997) and, as mentioned previously, have extremely high rates of psychiatric comorbidity in the form of additional DSM-IV disorders such as depression (Brady, 1997). These women are also likely to present with a variety of other problems, including interpersonal deficits, medical problems, maltreatment of their children, custody battles, homelessness, HIV risk, and domestic violence (Brady et al., 1998; Triffelman, Marmer, & Delvechi, 1989), and they consistently demonstrate poorer treatment retention and outcomes than women with only one of these disorders (Zweben, Clark, & Smith, 1994).

¹The same mechanism may occur for men exposed to interpersonal trauma, but since women more frequently experience such types of trauma compared with men, the comorbidity rates are higher among substance-using women than substance-using men (Cottler et al., 2001).

However, although it is clear from existing epidemiological literature that substance abuse and trauma co-occur, the field has yet to address the question of what role childhood exposure plays, and whether it is adulthood revictimization – a frequent consequence of childhood trauma – that is the main risk factor for development of substance use disorder. Revictimization in adulthood may also act as a mediator or moderator between childhood exposure/childhood traumatic stress and subsequent addictive behavior; the specific nature of these relationships also remains ambiguous to date.

Further, it is important to take into account that retrospective and cross-sectional designs have significant limitations as they rely on the current state of mind of the participant when recalling traumatic childhood events (Horwitz, Widom, McLaughlin, & White, 2001). Although retrospective recall of information on objective, specific events is typically quite good, recalling details of childhood abuse can be difficult and is often quite controversial (Horwitz et al., 2001). For these reasons, alternative research designs, such as prospective studies that can examine the effects of childhood trauma on subsequent substance use and mental health, are needed in order to disentangle these complex relationships.

3. Prospective studies

Unfortunately, few prospective studies exist, though there are some notable exceptions. Two recent prospective studies attempt to address the question of whether childhood abuse exposure is a vulnerability factor for developing a substance use disorder. An epidemiologic study by Kendler et al. (2000), in a population-based sample of 1411 female adult twins, provides early, yet compelling support for the link between childhood sexual abuse (CSA) and the development of psychopathology and addictive disorders in particular. In a rigorous co-twin design that evaluated two possible confounding variables (family dysfunction and parental psychopathology), findings supported a causal interpretation of the association between self-reported CSA and psychiatric and substance use disorders. Despite being raised in the same family environment, the twin exposed to CSA had consistently elevated risk for psychopathologic disorders, most notably bulimia and drug and alcohol abuse, when compared with her unexposed co-twin. Although other confounds cannot be excluded, these results support the hypothesis that childhood exposure to trauma may place individuals at higher risk for developing psychiatric and substance use disorders.

Jasinski, Williams, and Siegel (2000) conducted a prospective study with a sample of 113 primarily African American women who were seen as children in a city hospital emergency room and subsequently documented as victims of physical or sexual abuse. Participants were re-interviewed 20 years later and evidenced increased rates of alcohol consumption (22% had more than 5 drinks on a typical drinking day) as compared to other general population surveys of African American women (15% categorized as high quantity drinkers). After controlling for parental drinking behavior and negative parental relationships, multiple victimizations and youngest age at first assault emerged as significant predictors of heavy drinking in adulthood; child physical abuse emerged as a significant predictor of binge drinking. These two studies present the first prospective findings linking early trauma exposure to later substance use disorders. These findings thereby support the existing cross-sectional and retrospective research, taking another systematic step to demonstrate that, at least in some cases, early trauma exposure temporally precedes substance use.

Another prospective study conducted by Widom and colleagues examined documented cases of childhood abuse and the relationship to adult problems (Widom, Weiler, & Cottler, 1999). Approximately 676 adults (50% female) with court documented physical, sexual, and neglect abuse cases were interviewed and compared to a control comparison group of similar age, gender, race/ethnicity, and social class. Using this design, the researchers were

able to examine data prospectively and retrospectively, as well as comparing the findings from each perspective. Prospective findings showed that abused/neglected individuals did not differ from controls with respect to lifetime drug abuse diagnosis, but had a slightly greater degree of current drug abuse. It was revealed that abused/neglected women were significantly more likely to have abuse diagnoses specifically for cocaine and stimulants. Conversely, retrospective findings demonstrated that participants who self-reported childhood abuse were significantly more likely to meet lifetime and current diagnoses of substance abuse or dependence. Researchers discovered that the occurrence of PTSD was significantly higher in the abused/neglected cohort, about 1.75 times higher than in the control comparison cohort (Widom et al., 1999). Although these findings exhibit some evidence for the association between early trauma and substance abuse, they also highlight the complexities of studying impact of childhood abuse upon subsequent adult psychiatric problems and caution against assuming a causal link between the two.

Again, despite the abundant data now available regarding the strong robust relationships between trauma exposure, PTSD and substance use disorders, the exact nature of these associations, and the factors which may mediate or moderate the effects of traumatic stress on development, remain unknown. The three prospective studies described above reveal evidence to suggest that for some individuals, childhood trauma exposure may indeed lead to later substance use disorders. For others, however, the findings do not support such a linkage, indicating a multi-pathway model. Also, although prospective studies are designed to test causality, interpretations may still be limited since childhood trauma often remains a hidden factor only to be revealed later in adulthood.

Given that there may be added susceptibility to developing SUDs in at least some proportion of those exposed to interpersonal trauma during childhood, studies are called for which can determine the extent to which trauma is a risk factor for addictive disorders. In the effort to identify potential mediating and moderating factors, we turn to advances in a converging field, developmental psychology, which has begun to demonstrate that traumatic stress has a specific impact upon self-regulatory functions. Here, we will highlight some of the emerging developmental findings and models which may offer further insight for addiction researchers into potential pathways between childhood trauma, adulthood revictimization and substance use.

4. Self-regulatory deficits and psychological functioning

Findings from a body of developmental literature on self-regulatory systems from a neurobehavioral and clinical perspective provide one potential lens through which to consider the mechanisms by which trauma exposure and traumatic stress may be linked to substance use/abuse. The potential serious short-and long-term consequences of childhood exposure to interpersonal trauma have come into sharper focus due to the recent work of developmental researchers. There are now intriguing developmental findings of relevance to the drug abuse field, which suggest that childhood victimization and associated traumatic stress may influence maturing self-regulatory systems. We posit that these systems may mediate or moderate the relationship between early traumatic stress and later substance use in women.

The lack or loss of self-regulatory abilities overlaps with a wide spectrum of other adverse consequences of abuse and is considered by some experts to be the most far-reaching effect of psychological trauma in both children and adults (van der Kolk, 1996). Self-regulatory processes are internal organizing functions that filter, coordinate, and temporally organize experience (Dodge, 1989). These functions are essential for a range of subsequent capacities including development of cognitive problem solving, information processing, and

emotional, interpersonal, and communication skills. Given the central role of self-regulation in managing, controlling and coordinating emotion, cognition, and behavior, problems in self-regulation cut across multiple diagnostic domains and reflect broad classes of maladaptive psychosocial functioning. Specific higher-order cognitive abilities subsumed under the construct of self-regulation include attentional control, strategic planning, initiation and regulation of goal directed behavior, self and social monitoring, abstract reasoning, cognitive flexibility, and the ability to organize and adaptively utilize information contained in working memory (Kimberg & Farah, 1993; Lezak, 1995; Milner & Petrides, 1984).

Findings demonstrate that childhood trauma exposure disrupts many of these functions and is associated with cognitive and behavioral dysregulation (Shields, Ryan, & Cicchetti, 1994), hypervigilance (Reider & Cicchetti, 1989), biased information processing and cognitive problem solving (Crick & Dodge, 1994; Dodge, 1989). Emotion regulation also includes the ability to modulate and tolerate emotional experience with deficits evidenced by affect lability, poor affect tolerance and expression, and maladaptive emotion-focused coping. Childhood traumatic stress exposure challenges maturing emotional regulation mechanisms at multiple developmental points by interfering with the pre-school tasks of differentiating affective states, with the school-age child's developing capacity to elaborate on affective expression, and with the adolescent's task of achieving an understanding of the origin and consequences of emotions (Parens, 1991). The developmental achievement of self-regulation rests on successful acquisition of these skills and has consequences for self and social development. Appropriate self-regulation is critical to successful family, peer, and social functioning (Pynoos, Steinberg, & Goenjian, 1996).

The ability to control and modulate emotional stimulation is thought to provide the foundation for capacity to form social relationships (Calkins, 1994; Cicchetti, Ganiban, & Barnett, 1991; Snyder, Schrepferman, & St. Peter, 1997). For example, Cole and Putnam (1992) have proposed that core self-concepts are in large part defined by the capacity to regulate internal states and by behavioral responses to stress. Some have argued that the problems of emotion regulation and interpersonal functioning are a relatively distinct feature of childhood trauma and derive from the trauma's disruptive impact on the achievement of the developmental goals of affect regulation and interpersonal relatedness (van der Kolk, 1996).

Recent studies indicate that problems with emotion regulation in trauma-exposed children are already apparent in pre- and early teen years, notably a critical time period for the development of substance use disorders. For example, a study comparing the emotion management skills of abused girls to non-abused healthy controls, ages 6 to 12, found that the abused girls were more likely to hide their feelings and to have extreme emotional reactions (Shipman, Zeman, Penza, & Champion, 2000). The abused girls in this study also had fewer adaptive coping strategies and they expected less support and more conflict in situations where anger was expressed. Thus, even at an early age, childhood abuse is associated with insufficient coping skills, problems in handling strong emotions (particularly anger), and limited expectations of others as resources in emotionally difficult situations. Studies examining the specific role of emotional dysregulation in reactive aggression among children provide further support for the link between a child's inability to self-soothe and to modulate negative feelings during social interactions and aggressive behavior (Shields & Cicchetti, 1998; Snyder et al., 1997).

Recent findings from the PTSD literature provide evidence confirming that trauma has the most profound impact when onset occurs during early childhood or adolescence, while the effects are less pervasive in individuals who are older at first traumatic exposure (van der

Kolk, Roth, & Pelcovitz, 1993). In contrast, the younger the victims are at the time of the trauma exposure and the longer the duration of the trauma, the more likely they are to have problems in adulthood in a variety of areas, in addition to PTSD symptoms such as behavioral impulsivity, affective lability, and aggression (Roth, Newman, Pelcovitz, van der Kolk, & Mandel, 1997). Clearly adult revictimization also plays a role. Studies comparing individuals with childhood trauma-only and individuals with childhood trauma and subsequent victimization in adulthood show that the revictimized individuals are consistently more troubled, particularly in the domains of affect modulation, anger management and interpersonal relationships (Cloitre, Scarvalone, & Difede, 1997; van der Kolk et al., 1993; Zlotnick et al., 1996).

These and other similar findings resulted in the identification of a syndrome of psychological problems in adulthood shown to be frequently associated with histories of prolonged and severe interpersonal abuse (Herman, 1992; Pelkovitz et al., 1997). This cluster of symptoms, called “Complex PTSD” or “Disorders of Extreme Stress Not Otherwise Specified,” includes alterations in self-regulatory systems described above: regulation of affective impulses (e.g., difficulty modulating anger), cognitive processes (e.g., disruptions in attention, memory and consciousness), and relationship to others (e.g., problems with intimacy and trust).

5. Self-regulatory deficits and neurobiological functioning

Although a thorough review of the neurobiological literature is beyond the scope of this manuscript, there is relevant empirical evidence demonstrating that self-regulatory deficits may have neurobiological correlates. Neurobiological research on trauma and the stress response, largely derived from studies of war veterans with PTSD (i.e., Yehuda, Pittman, etc.), has documented that adults with PTSD demonstrate neurobiological changes to the volume and activity levels of major structures in the limbic system including the amygdala and hippocampus (Sapolsky, 2000; Teicher, 2002), hypersensitivity of the HPA axis to cortisol (Yehuda, 2000), and release of neurotransmitters leading to dysregulation of arousal systems and the endogenous opioid systems (Friedman, 1993; Pitman, van der Kolk, Orr, & Greenberg, 1990; Southwick et al., 1999). The main cluster symptoms of PTSD correspond to these documented neurobiological changes; all involve self-regulatory functions. Thus, a possible vulnerability to substance use could be viewed on a neurobiological level as an effort to address related self-regulatory deficits. For example, individuals may use alcohol and other drugs to dampen the biological effects of dysregulated stress response systems (Higley, Hasert, Suomi, & Linnola, 1991) increasing the probability of alcoholism and substance dependence.

There are also some preliminary findings from developmental neurobiology studies suggesting that the consequences of early childhood maltreatment may produce negative effects on developing self-regulatory functions (De Bellis, 2002; Liu, Diorio, Day, Francis, & Meaney, 2000; Teicher, 2002). Although this body of childhood trauma research is still nascent, the hypothesized links between childhood trauma and neurobiological consequences are thought to involve over programming of the neurotransmitters involved in the stress response in order to augment the stress response. These neurochemical responses may then produce negative effects on critical cellular (i.e., neuron) growth, even leading to cell death, during specific sensitive periods of childhood development (see De Bellis, 2002 and Teicher, 2002 for a full review of this literature). However, we caution against drawing more than a rationale for further research from these early findings due to the host of methodological limitations that make inferential statements from this literature premature. Despite advances, neurobiological findings have not yet been able to disentangle the relative

risk of childhood versus adulthood trauma exposure to the neurobiological changes documented thus far.

6. Self-medication model

The symptoms of complex trauma — encompassing self-regulatory affective and cognitive systems — represent developmental domains, which have also been implicated in the clinical addictions literature as vulnerability factors for substance use disorders. The most well-known addictions model that can be applied to understanding how trauma exposure may operate as a risk factor for development of subsequent SUD is the “self-medication” hypothesis (Khantzian, 1997). This hypothesis posits that some individuals with trauma histories and related PTSD use substances in an effort to manage or avoid distressing symptoms (e.g., intrusive memories and flashbacks) and to relieve painful emotions (e.g., anger and sadness) or physical sensations (hyperarousal).

This model is consistent with the developmental findings reviewed earlier which suggested that exposure to childhood trauma disrupts the self-regulatory processes, in turn leading to long-term difficulties in these areas. Self-regulation deficits have also been implicated in the initiation and maintenance of substance use disorders (Horowitz, Overton, Rosenstein, & Steidl, 1992; Khantzian & Schneider, 1986; Krystal, 1997) and thus, may play an important mediating role between trauma exposure and subsequent substance abuse. For example, findings from the addictions literature show that difficulty in emotional regulation and tolerance of painful feelings, inability to self-soothe, and instability of behavioral control is typical of adolescent and adult substance abusers (Horowitz et al., 1992; Khantzian & Schneider, 1986; Krystal, 1997). Self-medicating with alcohol and drugs can lessen the effects of hyperarousal and numbing symptoms in individuals with posttraumatic stress. The hyperarousal symptoms would be diminished or masked by alcohol or other depressants, thereby providing temporary relief from the dysregulated feeling states that go along with PTSD.

Other potential pathways between PTSD and SUD have been proposed, including the high-risk and susceptibility hypotheses (e.g., Chilcoat & Breslau, 1998a, 1998b). The high-risk hypothesis speculates that substance use and associated high-risk activities increase the risk to traumatic exposure thereby indirectly increasing the likelihood of PTSD. The susceptibility hypothesis posits that substance use may play a causal role, in that substance users may be more susceptible to PTSD following a traumatic event due to impaired psychological or neurochemical systems resulting from extensive substance use.

The self-medication model, however, is the only model with empirical support. Chilcoat and Breslau (1998a, 1998b) conducted a study testing causal pathways between PTSD and SUD in a random sample of 1007 young adults (ages 21–30) who were members of a large HMO. Participants completed baseline interviews and two follow-up interviews over a 5-year period. Using this prospective design and analytical strategies testing for causal inference, Chilcoat and Breslau were able to elaborate on findings from cross-sectional design studies. Authors found support for the plausibility of the self-medication hypothesis but not for the alternative causal models. As the authors note, these results are an important step in understanding the causal relationship between PTSD and SUD, but clearly further research testing specific pathways is needed.

7. Conclusion and future directions

In sum, although strong associations between interpersonal trauma exposure, PTSD, and SUD have been well established in the addictions research literature, a number of important questions continue to challenge the field. In this paper, we have presented a brief review of

developmental and related neurobiological findings from the trauma literature on self-regulatory deficits that are of relevance for substance abuse researcher. Recent evidence regarding the developmental impact of trauma on self-regulatory domains has been presented in order to further our understanding of potential pathways from early childhood trauma to the subsequent development of substance use disorders. Finally, we present an empirically-supported model of PTSD and SUD comorbidity, the self-medication model, which provides a framework for link for linking the findings of trauma-related developmental consequences with the addictions literature.

Our review of these research domains, along with findings that substance-dependent women with comorbid PTSD have more severe symptoms, higher rates of additional disorders, interpersonal and medical problems, and poorer treatment outcomes than those without PTSD, highlights the need for prevention and early intervention efforts.

At this stage of the science, the following areas should be highlighted. First, questions remain over the distinctions between trauma exposure and its consequences – such as traumatic stress disorders and revictimization – in determining vulnerability factors for subsequent substance use and abuse. Likewise, the extent to which childhood versus adulthood trauma serve as risk factors for later substance use disorders also remains an unanswered question. Further identification of other contextual risk factors, and potential mediator/moderators in the paths between trauma, traumatic stress and later addictive behavior, is also needed. Interdisciplinary efforts which aim to disentangle the multiple negative outcomes of trauma and their effect on developmental and neurobiological systems will serve to further refine existing models of trauma and addiction comorbidity. Finally, the successful accomplishment of these aims will rely upon programmatic research designs that can test direct and indirect causal relationships among the most salient, empirically-derived risk factors.

References

- Brady KT. Posttraumatic stress disorder and comorbidity: Recognizing the many faces of PTSD. *Journal of Clinical Psychiatry*. 1997; 58:12–15. [PubMed: 9329446]
- Brady KT, Dansky BS, Back SE, Foa EB, Carroll KM. Exposure therapy in the treatment of PTSD among cocaine-dependent individuals: Preliminary findings. *Journal of Substance Abuse Treatment*. 2001; 21:47–54. [PubMed: 11516926]
- Brady KT, Dansky BS, Sonne SC, Saladin ME. Posttraumatic stress disorder and cocaine dependence. *American Journal on Addictions*. 1998; 7:128–135. [PubMed: 9598216]
- Brady KT, Killeen T, Saladin ME, Dansky B, Becker S. Comorbid substance abuse and posttraumatic stress disorder: Characteristics of women in treatment. *American Journal on Addictions*. 1994; 3:160–163.
- Breslau N, Davis G, Andreski P, Peterson E, Schultz L. Sex differences in posttraumatic stress disorder. *Archives of General Psychiatry*. 1997; 54:1044–1048. [PubMed: 9366662]
- Brown PJ, Wolfe J. Substance abuse and post-traumatic stress disorder comorbidity. *Drug and Alcohol Dependence*. 1994; 35:51–59. [PubMed: 8082556]
- Calkins SD. Origins and outcomes of individual differences in emotion regulation. In N. A. Fox (Ed.). *The development of emotion regulation*. Monographs of the society for research in child development; Serial. No. 240. 1994; 59(2–3):53–72.
- Chilcoat HD, Breslau N. Investigations of causal pathways between PTSD and drug use disorders. *Addictive Behaviors*. 1998; 23:827–840. [PubMed: 9801719]
- Chilcoat HD, Breslau N. Posttraumatic stress disorder and drug disorders: Testing causal pathways. *Archives of General Psychiatry*. 1998; 55:913–917. [PubMed: 9783562]
- Cicchetti, D.; Ganiban, J.; Barnett, D. The development of emotion regulation and dysregulation. New York: Cambridge University Press; 1991. Contributions from the study of high risk populations to understanding the development of emotion regulation. In J. Garber, & K. Dodge (Eds.); p. 15–49.

- Cloitre M, Scarvalone P, Difede J. Posttraumatic stress disorder, self and interpersonal dysfunction among sexually retraumatized women. *Journal of Traumatic Stress*. 1997; 10:435–450.
- Cole P, Putnam FW. Effect of incest on self and social functioning: A developmental psychopathology perspective. *Journal of Consulting and Clinical Psychology*. 1992; 60:174–184. [PubMed: 1592946]
- Cottler LB, Nishith P, Compton W. Gender differences in risk factors for trauma exposure and post-traumatic stress disorder among inner-city drug abusers in and out of treatment. *Comprehensive Psychiatry*. 2001; 42:111–117. [PubMed: 11244146]
- Crick NR, Dodge KA. A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*. 1994; 115:74–101.
- Dansky BS, Brady KT, Saladin ME. Untreated symptoms of PTSD among cocaine-dependent individuals: Changes over time. *Journal of Substance Abuse Treatment*. 1998; 15:499–504. [PubMed: 9845863]
- Dansky BS, Saladin ME, Brady KT, Kilpatrick DG, Resnick HS. Prevalence of victimization and posttraumatic stress disorder among women with substance use disorders: Comparison of telephone and in-person assessment samples. *The International Journal of the Addictions*. 1995; 30:1079–1099. [PubMed: 7591350]
- De Bellis MD. Developmental traumatology: A contributory mechanism for alcohol and substance use disorders. *Psychoneuroendocrinology*. 2002; 27:155–170. [PubMed: 11750776]
- Dodge KA. Coordinating responses to aversive stimuli: Introduction to a special section on the development of emotion regulation. *Developmental Psychology*. 1989; 25:339–342.
- Donovan B, Padin-Rivera E, Kowaliw S. bTranscendQ: Initial outcomes from a posttraumatic stress disorder/substance abuse treatment program. *Journal of Traumatic Stress*. 2001; 14(4):757–772. [PubMed: 11776422]
- Friedman, MJ. Psychobiological and pharmacological approaches to treatment. In: Wilson, JP.; Raphael, B., editors. *International handbook of traumatic stress syndromes*. New York: Plenum Press; 1993. p. 785–794.
- Fullilove MT, Fullilove RE, Smith M, Winkler K, Michael C, Panzer PG, et al. Violence, trauma and posttraumatic stress disorder among women drug users. *Journal of Traumatic Stress*. 1993; 6:85–96.
- Herman JL. Complex PTSD: A syndrome in survivors of prolonged and repeated trauma. *Journal of Traumatic Stress*. 1992; 5:377–391.
- Hien, DA.; Nunes, EV.; Levin, FB. Violence, psychiatric comorbidity and gender: Predictors of outcome in methadone patients. presented at the 57th Annual College on Problems of Drug Dependence; Arizona. 1995.
- Hien DA, Scheier J. Short term predictors of outcome for drug-abusing women in detox: A follow up study. *Journal of Substance Abuse Treatment*. 1996; 13:227–231. [PubMed: 9017565]
- Higley JD, Hasert MF, Suomi SJ, Linniola M. A nonhuman primate model of alcohol abuse: Effects of early experience, personality, and stress on alcohol consumption. *Proceedings of the National Academy of Sciences of the United States of America*. 1991; 88:7261–7265. [PubMed: 1871131]
- Horowitz HA, Overton WF, Rosenstein D, Steidl JH. Comorbid adolescent substance abuse: A maladaptive pattern on self-regulation. *Adolescent Psychiatry: Developmental and Clinical Studies*. 1992; 18:465–483.
- Horwitz AV, Widom CS, McLaughlin J, White HR. The impact of childhood abuse and neglect on adult mental health: A prospective study. *Journal of Health and Social Behavior*. 2001; 42:184–201. [PubMed: 11467252]
- Jasinski JL, Williams LM, Siegel J. Childhood physical and sexual abuse as risk factors for heavy drinking among African-American women: A prospective study. *Child Abuse and Neglect*. 2000; 24:1061–1071. [PubMed: 10983816]
- Kendler KS, Bulik CM, Silberg J, Hettema JM, Myers J, Prescott CA. Childhood sexual abuse and adult psychiatric and substance use disorders in women: An epidemiological and co-twin control analysis. *Archives of General Psychiatry*. 2000; 57:953–959. [PubMed: 11015813]
- Kessler R, Sonnega A, Bromet E, Hughes M, Nelson C. Posttraumatic stress disorder in the national comorbidity study. *Archives of General Psychiatry*. 1995; 52:1048–1060. [PubMed: 7492257]

- Khantzian E. The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harvard Review of Psychiatry*. 1997; 4:231–244. [PubMed: 9385000]
- Khantzian, EJ.; Schneider, RJ. Treatment implications of a psychodynamic understanding of opioid addicts. In: Meyer, RE., editor. *Psychopathology and addictive disorders*. New York: Guilford; 1986.
- Kimberg D, Farah M. A unified account of cognitive impairments following frontal lobe damage: The role of working memory in complex, organized behavior. *Journal of Experimental Psychology General*. 1993; 122:411–428. [PubMed: 8263463]
- Krystal, HD. Self representation and the capacity for self care. In: Yasilove, DL., editor. *Essential papers on addiction (essential papers in psychoanalysis series)*. New York: New York University Press; 1997.
- Lezak, MD. *Neuropsychological assessment*. 3. New York: Oxford University Press; 1995.
- Liu D, Diorio J, Day JC, Francis DD, Meaney MJ. Maternal care, hippocampal synaptogenesis and cognitive development in rats. *Nature Neuroscience*. 2000; 3:799–806.
- Miller B, Downs WR, Testa M. Interrelationships between victimization experiences and women's alcohol use. *Journal of Studies on Alcohol*. 1993; 11:109–117.
- Miller BA, Downs WR, Gondoli DM, Keil A. The role of childhood sexual abuse in the development of alcoholism in women. *Violence and Victims*. 1987; 2:157–172. [PubMed: 3154163]
- Miller, BA.; Downs, WR.; Testa, M. Relationship between women's alcohol problems and experiences of childhood violence. Paper presented at American Psychological Association; Boston, MA. 1990.
- Milner B, Petrides M. Behavioural effects of frontal-lobe lesions in man. *Trends in Neurosciences*. 1984 Nov.; 403–407.
- Najavits LM, Weiss RD, Shaw SR. The link between substance abuse and posttraumatic stress disorder in women: A research review. *American Journal on Addictions*. 1997; 6:273–283. [PubMed: 9398925]
- Najavits LM, Weiss RD, Shaw SR. A clinical profile of women with PTSD and substance dependence. *Psychology of Addictive Behaviors*. 1999; 13:98–104.
- Parens H. A view of the development of hostility in early life. *Journal of the American Psychoanalytic Association*. 1991; 39:75–108.
- Pelcovitz D, van der Kolk BA, Roth S, Mandel F, Kaplan S, Resnick P. Development and validation of the structured interview for disorders of extreme stress. *Journal of Traumatic Stress*. 1997; 10:3–16. [PubMed: 9018674]
- Pitman, van der Kolk, Orr, Greenberg. Naloxone-reversible analgesic response to combat related stimuli in posttraumatic stress disorder: A pilot study. *Archives of General Psychiatry*. 1990; 47:541–544. [PubMed: 2350206]
- Polusny M, Follete V. Long-term correlates of child sexual abuse: Theory and review of the empirical literature. *Applied and Preventive Psychology*. 1995; 4:143–166.
- Pynoos, RS.; Steinberg, AM.; Goenjian, A. Traumatic stress in childhood and adolescence: Recent developments and current controversies. In: van der Kolk, BA.; McFarlane, AC.; Weisaeth, L., editors. *Traumatic stress: The effects of overwhelming experience on mind, body, and society*. New York: Guilford Press; 1996. p. 331–358.
- Reider C, Cicchetti D. An organizational perspective on cognitive control functioning and cognitive–affective balance in maltreated children. *Developmental Psychology*. 1989; 25:382–393.
- Roth S, Newman E, Pelcovitz D, van der Kolk B, Mandel F. Complex PTSD in victims exposed to sexual and physical abuse: Results from the DSM-IV field trial for post traumatic stress disorder. *Journal of Traumatic Stress*. 1997; 10:539–555. [PubMed: 9391940]
- Sapolsky RM. Glucocorticoids and hippocampal atrophy in neuropsychiatric disorders. *Archives of General Psychiatry*. 2000; 57:925–935. [PubMed: 11015810]
- Shields A, Cicchetti D. Reactive aggression among maltreated children: The contributions of attention and emotion dysregulation. *Journal of Clinical Child Psychology*. 1998; 27:381–395. [PubMed: 9866075]

- Shields AM, Ryan RM, Cicchetti D. The development of emotional and behavioral self regulation and social competence among maltreated school-age children. *Developmental Psychology*. 1994; 6:57–75.
- Shipman K, Zeman J, Penza S, Champion K. Emotion management skills in sexually maltreated and nonmaltreated girls: A developmental psychopathology perspective. *Development and Psychopathology*. 2000; 12:47–62. [PubMed: 10774595]
- Snyder J, Schrepferman L, St Peter C. Origins of antisocial behavior: Negative reinforcement and affect dysregulation of behavior as socialization mechanisms in family interaction. *Behavior Modification*. 1997; 21:187–215. [PubMed: 9086866]
- Southwick SM, Bremner JD, Rasmusson A, Morgan CA, Arnsten A, Charney DS. Role of norepinephrine in the pathophysiology and treatment of posttraumatic stress disorder. *Biological Psychiatry*. 1999; 46:1192–1204. [PubMed: 10560025]
- Stewart, SH.; Ouimette, P.; Brown, PJ. Gender and the comorbidity of PTSD with substance use disorders. In: Kimerling, R.; Ouimette, P., editors. *Gender and PTSD*. New York, NY: Guilford Press; 2002. p. 232-270.
- Teicher MH. Scars that won't heal: The neurobiology of child abuse. *Scientific American*. 2002:68–75. [PubMed: 11857902]
- Triffleman, E. Issues in implementing posttraumatic stress disorder treatment outcome research in community-based treatment programs. In: Sorensen, JL.; Rawson, RA.; Guydish, J.; Zweben, JE., editors. *Drug abuse treatment through collaboration: Practice and research partnerships that work*. Washington, DC: American Psychological Association; 2003. p. 227-247.
- Triffelman, E.; Marmer, C.; Delvechi, K. Proceedings of the Annual College on Problem Drug Dependence. Colorado: Keystone; 1989. Childhood trauma and PTSD in substance abuse inpatients; p. 227-247.
- van der Kolk, BA. The complexity of adaptation to trauma: Self-regulation, stimulus, discrimination, and characterological development. In: van der Kolk, BA.; McFarlane, AC.; Weisaeth, L., editors. *Traumatic stress: The effects of overwhelming experience on mind, body and society*. New York: Guilford Press; 1996. p. 182-213.
- van der Kolk, BA.; Roth, S.; Pelcovitz, D. *Complex PTSD: Results of the PTSD field trials for DSM-IV*. Washington, DC: American Psychiatric Association; 1993.
- Widom CS, Weiler BL, Cottler LB. Childhood victimization and drug abuse: A comparison of prospective and retrospective findings. *Journal of Consulting and Clinical Psychology*. 1999; 67:867–880. [PubMed: 10596509]
- Yehuda, R. Cortisol alterations in PTSD. In: Shalev, R.; Yehuda; McFarlane, AC., editors. *International handbook of human response to trauma*. New York: Plenum Press; 2000. p. 268
- Zlotnick C, Zakriski AL, Shea MT, Costello E, Begin A, Pearlstein T, et al. The long-term sequelae of sexual abuse: Support for a complex posttraumatic stress disorder. *Journal of Traumatic Stress*. 1996; 9:195–205. [PubMed: 8731542]
- Zweben JE, Clark WH, Smith DE. Traumatic experiences and substance abuse: Mapping the territory. *Journal of Psychoactive Drugs*. 1994; 26:327–344. [PubMed: 7884595]