

PARENTING AFTER WAR: SERVICE MEMBER PTSD SYMPTOMATOLOGY AND
ANXIETY AND DEPRESSION IN CHILDREN

A Thesis

Presented to

The Faculty of the Department

of Psychology

University of Houston

In Partial Fulfillment of

The Requirements for the Degree of

Master of Arts

By

Simon Lau

December, 2017

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ANXIETY AND DEPRESSION IN CHILDREN

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ABSTRACT

Background: As the Global War on Terror (GWOT) continues, there is deep concern about the effects of repeated parental deployments on the well-being of America's military-family children. While many military families have demonstrated remarkable adaptability and resilience during these stressful times, other families have fared much worse. A growing body of research details these struggles showing higher rates of family conflict, child mental health problems, and child maltreatment in relation to increases in service member total months deployed to a combat zone. The current study examined whether GWOT service members' overall PTSD symptoms and the four PTSD symptom clusters (re-experiencing, avoidance, numbing, and hyperarousal) influenced anxiety and depression symptoms in dependent children. We also examined the role of two salient and potentially modifiable explanatory variables of this relationship – service members' sleep disturbance and use of corporal punishment - expecting both to account for partial variance in the parent PTSD-child anxiety/depression relationship.

Methods: Data from 48 military families (48 veteran/service members; 78 children) participated in this study. The average age of participating service member parents at the time of the study was 39.13 (SD = 6.28). The majority of service member participants were active duty (n = 36; 75%), enlisted (n = 33; 68.8%), and completed an average of 2.42 (SD = 1.05) deployments in support of GWOT. The average age of children participating were 11.74 (SD = 3.21) with a slight majority of females (n = 41; 52.6%). Service member participants completed self-report measures measuring severity of PTSD symptomology and sleep disturbances. Child participants completed self-report measures measuring anxiety, depression, and parenting practices.

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Results: Hierarchical linear regressions revealed overall PTSD symptoms did significantly predict greater levels of child anxiety and child depression. However, there was insufficient evidence individual PTSD symptom clusters (re-experiencing, avoidance, numbing, and hyperarousal) predicted greater levels of child anxiety and child depression. Multivariate regressions revealed overall PTSD symptoms, as well as each PTSD symptom cluster, significantly predicted increased levels of sleep disturbance in service members. However, we did not find evidence parental sleep disturbances directly impacted child anxiety or depression. Multivariate regressions also revealed overall PTSD symptoms predicted greater use of corporal punishment when disciplining children, which in turn partially mediated the association with greater anxiety in children, but not depression. When individual symptom clusters were analyzed, re-experiencing and numbing symptom clusters specifically predicted greater use of corporal punishment, which in turn partially mediated the effect on child anxiety. No evidence of indirect effects were found for child depression.

Discussion: The results of this study has been largely consistent with past findings of a relationship between PTSD symptoms in service members and higher levels of internalizing symptoms in children. The use of corporal punishment by service member parents partially accounted for this relationship. While military families are often found to be resilient, service member PTSD symptoms poses significant risk to family members including children. Military family access to mental health care during and after deployments continues to be of vital importance.

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Introduction

The United States involvement in conflicts throughout the world and primarily the Middle East to support the Global War on Terror (GWOT) has extended into its 16th year, the longest war in the history of the United States. Since 2001, over 2.7 million U.S. service members have deployed in support of GWOT, with at least 48% of those who have deployed serving two or more deployments (The Watson Institute, 2015; Department of Defense (DoD), 2010). Additionally, an estimated 73% of total active duty soldiers have deployed in support of GWOT combat operations, with the majority on their 2nd, 3rd, or 4th deployment (Baiocchi, 2013, DoD, 2010).

The U.S. service members who have served during the GWOT are likely to be married and have children (Deputy Assistant Secretary of Defense, 2016). Of the current 2.4 million service members, 54.3% are married, 36.5% of those married have at least one child, and 4.5% are single with children (Deputy Assistant Secretary of Defense, 2016). These service members and their families have supported numerous recent missions as part of Operation Inherent Resolve (OIR; Iraq and Syria), Operation Freedom's Sentinel (OFS; Afghanistan), as well as the recently-ended missions of Operation Enduring Freedom (OEF; Afghanistan), Operation New Dawn (OND; Iraq), and Operation Iraqi Freedom (OIF; Iraq).

As the GWOT continues, and new conflicts arise regularly, there is deep concern about the effects of repeated parental deployments on the well-being of America's military-family children. A constant schedule of deployments, repeated separations due to training, frequent relocations of duty stations due to the needs of the military, upheaval of family routines, and intra-family role changes create a range of challenges for military families. While many families have demonstrated remarkable adaptability and resilience during these

stressful times (MacDermid, Swamper, Schwarz, Nishida & Nyaronga, 2008; The White House, 2011), other families have fared much worse. A growing body of research details these struggles showing higher rates of family conflict, mental health problems, employment and academic difficulties, and child maltreatment in relation to increases in service member total months deployed to a combat zone (Chartrand, Frank, White, & Shope, 2008; Gibbs, Martin, Kupper, & Johnson, 2007; Huebner, Mancini, Wilcox, Grass, & Grass, 2007; Lester et al., 2010). Additionally, many service members returning from deployments are diagnosed with post-traumatic stress disorder (PTSD; National Center for PTSD, 2016). PTSD can be a lifelong disorder permeating all parts of a service member's life, causing severe strain at work, decrements in physical health and well-being, and negatively impacting relationships with family and friends (American Psychological Association (APA), 2013). An estimated 17% of active duty service members and 24% of National Guard and Reserve service members returning from deployments in support of recent conflicts are deemed high risk for developing PTSD during their post-deployment health assessment (Milliken, Auchterlonie, & Hoge, 2007) and overall, an estimated 11 – 20 % of service members who deployed in support of GWOT will be diagnosed with PTSD in a given year (National Center for PTSD, 2016). Additionally, an estimated 14% of active duty Army soldiers and 21% of Army National Guard/Reserve soldiers are deemed high risk for interpersonal conflicts after returning from a deployment and an overall estimate of 20.3% to 42.4% of all military service members required some type of mental health treatment after returning from a deployment (Milliken, Auchterlonie, & Hoge, 2007).

The current study aims to expand current knowledge of relationships between GWOT deployment, service member PTSD symptomatology, and child mental health. Despite

elevated levels of risk in military families experiencing deployment, research examining such linkages is limited. Some studies have linked PTSD symptomatology in a military parent with child anxiety and depression (Ahmadzadeh & Malekian, 2004; Beckham et al., 1997; Lester et al., 2010; Lester et al., 2016), but the majority of this research was conducted among Vietnam War veterans, which limits the generalizability of studies to today's military families who face unique stressors. This study examined whether GWOT service members' overall PTSD symptoms and the four PTSD symptom clusters (re-experiencing, avoidance, numbing, and hyperarousal) influence anxiety and depression symptoms in dependent children. We also examined the role of two salient and potentially modifiable explanatory variables of this relationship – service members' sleep disturbance and use of corporal punishment - expecting both to account for partial variance in the parent PTSD symptomatology - child anxiety/depression relationship.

The GWOT and PTSD in Service Members

The GWOT has several unique characteristics that pose increased risk for service members developing PTSD symptoms. Unlike previous conflicts, which were conducted along the lines of traditional warfare, the current enemy utilizes an irregular warfare strategy. This strategy consists primarily of terrorism, guerilla warfare, and insurgency, challenges that have not been encountered to such an extent in the history of American Warfare (Belmont, Schoenfeld, & Goodman, 2010). Additionally, the advancement of personal body armor protection and advancements in medical technology have reduced service-member fatality rates to the lowest in history of large-scale military operations (Belmont et al., 2010). However, this low fatality rate does not reflect the number of service members returning

home with significant injuries, either physical or emotional, the highest percentage in military history (Stansbury et al., 2008).

The Department of Veteran Affairs estimates that 11-20% of all OIF and OEF veterans will be diagnosed with PTSD (U.S. Dept. of Veteran Affairs, 2016). According to the prior edition of the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV; American Psychological Association (APA, 1994), three distinct symptom clusters were included as criteria for PTSD: re-experiencing the event (Criterion B; e.g., intrusion symptoms, nightmares), avoidance (Criterion C; e.g., emotional numbing, detachment), and hyperarousal (Criterion D; e.g. exaggerated startle response, hypervigilance) (APA, 1994). The current study used the validated PTSD Checklist – Military Version (PCL-M; Weathers, Litz, Herman, Huska, & Keane, 1993) which is based on the DSM-IV's three symptom cluster model. Importantly however, our analysis were based on King and colleagues' (1998) four symptom cluster model following factor analytic studies suggesting a three cluster model inadequately represents PTSD pathology. Both Gordon et al. (2000) and King et al. (1998) found PTSD symptoms are better understood using a four cluster model of re-experiencing, avoidance, numbing, and hyperarousal symptoms. Although avoidance and emotional numbing represent overlapping constructs, important distinctions also exist. For example, Taylor and colleagues (2001) provided evidence that high levels of emotional numbing at baseline predicted a poorer response to cognitive behavioral therapy, but not high levels of avoidance (Taylor et al., 2001). Self-reported emotional numbing also correlates with depression more so than with avoidance (Asmundson et al., 2002). Separation of avoidance and emotional numbing is therefore reflected in current diagnostic criteria for PTSD in the DSM-5 (APA, 2013).

In addition to the impairing symptoms of PTSD, affected service members are at higher risks for suicidal behavior, high-risk behaviors (i.e., excessive alcohol, drug use), participation in dangerous life risking activities (i.e., driving at excessive speeds), hostile and/or physical outbursts, and developing other comorbid conditions (Marshall, Beebe, Oldham, & Zaninelli., 2001; Resnick & Rosenheck, 2008; Zatzick et al., 1997). Rytwinski and colleagues (2013) found that 52% of service members with a current PTSD diagnosis had co-occurring major depressive disorder, and Kornfield and colleagues (2012) found that 43.9% of GWOT veterans who had sub-syndromal PTSD had comorbid depression (Kornfield, Klaus, McKay, Helstrom, & Oslin, 2012).

PTSD and Sleep Disturbance

In addition to representing diagnostic criteria, sleep disturbances are among the most common and impairing problems reported by individuals diagnosed with PTSD (Ohayon and Shapiro, 2000; Germain et al., 2005), with rates as high as 70-87% (Maher, Rego, & Asnis, 2006). Sleep problems are often so impairing that service-seeking individuals with PTSD often prefer to address their insomnia and nightmares before other PTSD symptoms (Krakow et al., 2001). However, trauma-related sleep disturbances are inherently different from classic sleep disorders. Those with insomnia and other sleep disorders in the general community notably view sleep as a favorable goal, whereas trauma sufferers often view sleep as a ‘necessary evil’ (Ulmer, Edinger, & Calhoun, 2011) since a key feature of PTSD is hypervigilance (i.e., need to stay aware of your surroundings at all times) which is inherently incompatible with sleep. This leads many PTSD sufferers to avoid sleep, which is negatively reinforced by the avoidance of unpleasant nightmares and feelings of threat associated with reduced vigilance (Ulmer, Edinger, & Calhoun, 2011). In a large study of Vietnam veterans

(n=15,052), 44% of veterans with PTSD symptoms had difficulties initiating sleep compared to only 5.5% of veterans without PTSD symptoms and 5% of civilians without PTSD (Neylan et al., 1998). Additionally, 91% of veterans with PTSD symptoms reported difficulties maintaining sleep compared to 63% of veterans without PTSD symptom and 53% of civilians without PTSD (Neylan et al., 1998). Report of nightmares varies across studies, ranging from 18.8% (Ohayon & Shapiro, 2000) to 71% (Leskin et al, 2002).

Impaired sleep, either subjective or objectively measured, can have serious implications for physical health, mental health, and coping. Independent of PTSD symptomatology or other psychiatric disorders, sleep deprivation increases negative mood, irritability, hostility, anger, and stress vulnerability, while decreasing positive mood, cognitive functioning, and internal self-control (Altena et al., 2008; Saper, Cano, & Scammell, 2005; Stein, Belik, Jacobi, Sareen, 2008; Van Dongen & Dinges, 2003; Walker, 2008; Walker, 2009; Zohar et al., 2005). Inadequate sleep may be particularly deleterious for returning service members with PTSD symptoms because trauma-induced sleep loss might specifically impair the service member's ability to develop new memories to replace traumatic memories; better known as developing an "extinction memory" that helps inhibit the fear response (Pace-Schott, Germain, & Milad, 2015).

Returning Service Members and Parenting

Reintegration back into family life following extended duration deployments is both a time of celebration, but also of considerable stress. Reintegration requires service members (and their families) to readjust to old roles within the family and gradually transition back into normal routines, creating considerable stress (Military One Source, 2012). Returning service members also commonly face significant levels of parenting stress (Walsh et al.,

2014), potentially related to missed opportunities to participate in a child's development and a need to learn how to re-engage with children (Alfano, Lau, Balderas, Bunnell, & Beidel, 2016).

These challenges may be particularly difficult for service members with PTSD symptoms. Previous research indicates the presence of PTSD symptoms to be associated with reports of less satisfaction from and more problems related to parenting compared to service members without PTSD (Sayers, Farrow, Ross, & Oslin, 2009). Some traumatized GWOT veterans may have difficulty reconnecting with family members, becoming hypervigilant about family safety, and/or be excessively emotionally reactive, leading to reports of their children acting afraid or cold towards them after a deployment (Sayers, Farrow, Ross, & Oslin, 2009; Lester & Bursch, 2011).

Specific behavioral and/or emotional changes in parents from the time of pre-deployment can render the process of parenting itself to be difficult (Alfano, Lau, Balderas, Bunnell, & Beidel, 2016). Service members suffering with PTSD symptoms may go through periods of emotional numbing, limiting their ability to experience and express a range of feelings including empathy (Dekel & Monson, 2010). This emotional numbing may limit the parent's desire to interact with children in a meaningful way, and has been strongly related to relationship problems between the parent and children (DoD, 2010; Ruscio, Weathers, King, & King, 2002).

Parental PTSD and Child Anxiety/Depression

Figley (1989) coined the phrase "secondary traumatization" to describe how people close to individuals who have been victims of traumatic events can themselves become indirect victims of trauma (Figley, 1989). Children of parents with PTSD symptoms have

indeed been found to experience excessive worrying about their parent's overall welfare (Guttman, 1989; Newman, 2003), parental hospitalization, and their own risk for developing mental illness (Pitman & Matthey, 2004). When a parent is mentally ill or traumatized, secondary traumatization can result from the child learning about the parent's traumatizing experience and feeling an overwhelming need to empathize/help the struggling parent (Lombardo & Motta, 2008). Children may demonstrate symptoms of rumination, intrusive thoughts, physiological arousal, emotional arousal, and impulsive behaviors (Langrock, Compas, Keller, Merchant, & Copeland, 2002; Lombardo & Motta, 2008; Jaser et al. 2005). Increased ratings of anxiety, depression and aggression have also been reported (Jaser et al., 2005; Meadows et al., 2017). Children with parents diagnosed with mental illness (with and without comorbid PTSD) demonstrate significant symptoms of depression and anxiety at rates of approximately 78% for depression and 30% for anxiety as compared to children with non-ill parents (Devlin & O'Brien, 1999; Lombardo & Motta, 2008; Mowbray et al., 2002; Oyserman et al., 2000). PTSD symptoms of intrusion and avoidance are also found in children with mentally-ill parents (Jaser et al. 2005; Langrock et al., 2002; Lombardo & Motta, 2008; White et al., 2011).

While a significant amount of research has focused on parental psychopathology and child emotional problems in civilian families, research in military families is comparatively limited, particularly with respect to parental PTSD symptoms among GWOT veterans and their children. Research among civilian samples has demonstrated parental emotional distress constituting a high risk for poor adjustment in children, which can lead to pediatric mental health concerns and negative outcomes (Beardslee, 1984; Beardslee & Wheelock, 1994; Coyne & Downey, 1991; Rutter, 1996). However, most research examining the effects

of military parent PTSD on children was conducted among Vietnam War veterans. In one survey study, children of male veterans with PTSD had a higher likelihood of behavioral problems (Jordan et al., 1992), scoring in the clinical range on the Child Behavioral Check List (CBCL; Achenbach, 1991). Other studies have found parental PTSD symptomatology among Vietnam veterans to be related to somatic complaints, depression, and withdrawal in female children, and somatic complaints, hyperactivity, and anxiety in male children (Caselli & Motta, 1995; Parsons, Kehle, & Owen, 1990). Recently, more studies have begun emerging looking at deployment's effect on military families. In one rare exploratory study conducted during the 2006 and 2007 military troop surge of OIF/OEF, children of National Guard service members who had high levels of PTSD symptoms reported high levels of emotional problems including depression, anxiety, and somatic complaints (Herzog, 2008). Meadows and colleagues (2017) collected longitudinal data from 2,700 military families from 2009 – 2012 and found significant changes in three child outcomes during a deployment cycle: greater emotional problems (specifically depression scores), increased drug use during a deployment cycle, and a degradation of the quality of relationship with the deployed parent over the deployment cycle (Meadows et al., 2017).

Parental sleep disturbances, as specific symptoms of PTSD, might also significantly impact parenting. When comparing fatigued mothers with non-fatigued mothers, fatigued mothers tend to view their child as having a more difficult temperament, are less sensitive to a child's needs, are more prone to conflict, have more intense negative emotions, demonstrate less warmth, and show more parenting hostility towards their children (Bell & Belsky, 2008; Giallo et al., 2011; Sadeh, et al., 1994). This parental negativity and lack of warmth with their children have been implicated in the development of childhood anxiety

and depression (McLeod, Weisz, & Wood, 2007; McLeod, Wood, & Weisz, 2007; Parker, 1983). It has been suggested that parental negativity may lead a child to believe that their environment is fundamentally hostile, threatening, and may lead to a sense of low self-worth and competence leading to a higher baseline of childhood anxiety (Bogels & Tarrier, 2006; Parker, 1983). Parental hostility, defined as averseness towards children, was most strongly related to child depression (McLeod, Weisz, & Wood, 2007). These relationships have not been examined however in military parents and in relation to PTSD symptomatology.

Use of Corporal Punishment and Child Mental Health

The American Academy of Pediatrics (AAP) defines corporal punishment as “the application of some form of physical pain in response to undesirable behavior” (Wolraich, Aceves, & Feldman, 1998). However, the term corporal punishment is used with considerable variation, both in terms of frequency and severity. For example, simply slapping a child’s hand once a year might be considered corporal punishment, as might severe beatings that occur on a weekly basis. Corporal punishment also typically includes two categories: instrumental corporal punishment and impulsive corporal punishment. Instrumental corporal punishment tends to be planned, controlled, and is likely a regular part of disciplinary procedures within the family (Gershoff, 2002). Impulsive corporal punishment is defined as a spur-of-the-moment action accompanied by intense emotion such as anger, frustrations, aggravation, and usually used as a last resort (Gershoff, 2002). In either case, the line between corporal punishment and maltreatment can be fine, as most incidents of child maltreatment in the United States are the result of overly severe disciplinary practices (Gershoff, 2008; Gill, 1971; Margolin, 1990).

When a parent's emotions are in a high state, they tend to make negative attributions about their child's behavior (or misbehavior), in turn increasing the likelihood of using more forceful disciplinary methods such as corporal punishment (Gershoff, 2002). Numerous studies have linked the parental use of corporal punishment to the development of mental health disorders in children (see Gershoff, 2002; Straus & Stewart, 1999; Bordin et al., 2006; Turner & Finkelhor, 1996). In one of the largest cross-sectional studies to date examining parental use of corporal punishment (N= 4,957), duRivage and colleagues (2015) reported significantly higher rates of externalizing and internalizing behavioral problems in children whose parents reported frequent use of corporal punishment compared to parents that did not (duRivage et al., 2015). A significant association was also found between the use of corporal punishment and rates of child anxiety and depression (duRivage et al., 2015).

Child Maltreatment in Military Families

According to the DoD, child maltreatment is defined as “physical or sexual abuse, emotional maltreatment, or neglect of a child by a parent, guardian, foster parent, or by a caregiver” (DoD, 2011). An alarming number of studies conducted during the recent conflicts have found higher rates of substantiated child maltreatment among military families, and specifically in relation to the deployment cycle. McCarroll and colleagues (2008) compared data examining the trend of child maltreatment in the U.S. Army from 1990-2004, a time frame encompassing two periods of large scale combat deployments (1990-1991 & 2002-2004). Compared to a child maltreatment rate of 6.92 per 1000 children in 1990, rates decreased over the subsequent decade, hitting a low of 4.65 per 1000 children in 2000. However, a 17% increase was observed between 2000 and 2004 (McCarroll, Fan, Newby, & Ursano, 2008), coinciding with the start of the GWOT and increased number and

duration of service member deployments (Rentz et al., 2007). Multiple studies have also shown that an increase of parental combat experience (deployments) is considered a risk factor for increased child maltreatment (McCarroll, Fan, Newby, & Ursano, 2008; Rentz et al., 2006; Sheppard, Malatras, & Israel, 2010).

As the rate of deployments increased during GWOT, rates of reported child maltreatment also increased (McCarroll et al., 2008; Rentz et al., 2007). In one study, risk of child maltreatment within enlisted military families was 42% greater when a parent was deployed (Gibbs, Martin, Kupper & Johnson, 2007). However, when Gibbs and colleagues (2007) analyzed all reported cases of maltreatment ($n = 3334$), 72% of maltreatment incidents occurred while the service member parent was not deployed (Gibbs et al., 2007). Other studies have suggested that periods of pre-deployment and reintegration may pose the greatest risk for maltreatment (Rentz et al., 2007), with rates of moderate to severe abuse being highest during reintegration and after deployment (Strane et al., 2017; Thomsen et al., 2014). In another study, rates of moderate to severe child maltreatment involving injury to a child were nearly twice as high during the reintegration time frame compared to pre-deployment (Rabenhorst et al., 2015) and supported by Taylor and colleagues (2016) study finding the highest maltreatment rate occurred during reintegration from a 2nd deployment (Taylor et al., 2016). Irrespective of the number of deployments, rates of maltreatment have been found to be higher in deploying fathers than deploying mothers; an opposite pattern compared to civilian families where mothers tend to be the primary perpetrators (Rabenhorst et al., 2015).

Current Study

Extensive research documents the strain of military deployment on the family unit, including substantial negative effects on individual family members including children. A number of studies have shown service member PTSD symptoms following deployment to increase risk of poor adjustment and behavioral problems in children, though many studies were not conducted during the GWOT and specific mechanisms have rarely been examined. Understanding these relationships within families during recent conflicts, which have included more frequent and lengthy deployments than ever before, is unfortunately lacking. Moreover, the role of specific types of parental PTSD symptoms associated with child maladjustment requires greater understanding. Lastly, whether relationships between service member PTSD symptomatology and child mental health might be partially explained by the use of corporal punishment is unknown.

The current study utilized data collected as part of a larger study at the Sleep and Anxiety Center of Houston (SACH) to address two primary Aims.

Aim 1. To examine relationships between overall PTSD symptomatology and symptom clusters in service members deployed during the GWOT and anxiety/depressive symptoms in dependent children.

Based on available research it was hypothesized that, after controlling for the total number of parental deployments, greater overall PTSD symptoms among previously-deployed service members will significantly predict higher levels of self-reported anxiety and depressive symptoms in children (Hypothesis 1a). Additionally, previous research has shown symptoms of hypervigilance, emotional reactivity, and emotional numbing to be strongly associated with parent-child relationship problems. Thus, we also hypothesized individual

PTSD symptom clusters of hyperarousal and emotional numbing will significantly predict higher levels of self-reported anxiety and depressive symptoms in children (Hypothesis 1b).

Aim 2. To examine putative mediators of relationships between PTSD symptomatology among service members and anxiety/depressive symptoms in children, including sleep disturbance and use of corporal punishment.

Based on available evidence it was hypothesized that greater levels of sleep disturbance among service members will partially mediate (i.e., explain) the relationship between overall PTSD symptoms (excluding sleep problems) and child anxiety/depression (Hypothesis 2a). Additionally, we hypothesized sleep disturbances to partially mediate the relationship between each individual PTSD symptom cluster and child anxiety/depression (Hypothesis 2b). In this model, we used the Pittsburg Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) to assess service member's overall sleep quality.

We also examined service members' use of corporal punishment as a potential mediator, hypothesizing increased use of corporal punishment will partially mediate the relationship between overall PTSD symptoms (including sleep problems) in service members and child anxiety/depression symptoms (Hypothesis 3a). Additionally, we also hypothesized the increased use of corporal punishment will partially mediate the relationship between each individual PTSD symptom cluster and child anxiety/depression (Hypothesis 3b).

Methods

Participants

Screeners were completed and study materials were sent to 282 military and veteran families. Complete data from 48 military families (48 veteran/service members; 78 children) were returned and used in the current study (i.e., 17% response rate among all eligible

families who expressed interest in participating). Families were recruited for a larger study (i.e., Risk and Resilience Study) on the effects of deployment and separation on military families through online social media postings and post card mailings to schools, military bases, and local veteran organizations. U.S. military and veteran families of all races/ethnicities/gender and sexual identities with cohabitating spouses/parents and a child between the ages of 7 and 17 years of age were eligible for participation. At least one parent was required to be a member or veteran of the U.S. Armed Forces (any branch) who previously deployed in support of the GWOT (the term service member used from this point on represent both active member and veteran participants). The average age of participating service member parents at the time of the study was 39.13 (SD = 6.28). The majority of service member participants were active duty (n = 36; 75%), enlisted (n = 33; 68.8%), and completed an average of 2.42 (SD = 1.05) deployments in support of GWOT. The average age of children participating was 11.74 (SD = 3.21) with a slight majority of females (n = 41; 52.6%). See Table 1 for descriptive statistics.

Service Member Measures

Military Personnel Questionnaire

The Military Personnel Questionnaire (MPQ) is a self-report questionnaire developed for the larger Risk and Resilience Study. The MPQ inquires about military service (e.g., branch, rank), deployment history, previous psychiatric and medical diagnoses, and current medications.

Post-Traumatic Stress Disorder Checklist – Military Version

The PTSD Checklist – Military (PCL– M; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item self-report measure asking respondents to rate the degree to which they

have been bothered by the 17 DSM-IV symptoms (American Psychiatric Association, 1994) within the last month on a 5 point scale with 1 being *not at all* to 5 being *extremely*. The PCL-M has demonstrated good psychometric properties to be used as a screening tool for PTSD in a combat veteran population with excellent test-retest reliability ($r = .96$) and excellent full scale internal consistency ($\alpha = 0.96$) (Forbes, Creamer, & Biddle, 2001; Weathers et al., 1993). The PCL-M also had excellent internal consistency for re-experiencing symptoms cluster ($\alpha = 0.94$), avoidance symptoms cluster ($\alpha = 0.91$), numbing symptoms cluster ($\alpha = 0.89$) and hyperarousal symptoms cluster ($\alpha = 0.92$) (King et al., 1998; Weathers et al., 1993). For the current sample, the PCL-M demonstrated excellent full scale internal consistency ($\alpha = .90$), excellent consistency for re-experiencing symptoms cluster ($\alpha = 0.92$), avoidance symptoms cluster ($\alpha = 0.95$), and good internal consistency for numbing symptoms cluster ($\alpha = 0.88$) and hyperarousal symptoms cluster ($\alpha = 0.87$). The PCL-M correlates strongly with total PTSD symptom severity on the Clinician Administered PTSD scale (CAPS; Blake et al., 1995) ($r = 0.79, p < 0.001$) (Keen, Kutter, Niles, & Krinsley, 2008) and demonstrates moderate convergent validity with the PTSD section of the Structured Clinical Interview for DSM Disorders (SCID; Spitzer, Williams, Gibbon, & First, 1992) ($k = .64$) (Weathers et al., 1993).

Pittsburgh Sleep Quality Index

The Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) is a self-rated measure of quality of sleep over the past month assessing sleep quality and disturbances. Nineteen individual items generate seven component scores of subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, the use of sleep medication, and daytime dysfunction (Buysse et al., 1989). The

PSQI seven component scores demonstrated a high degree of internal consistency ($\alpha = 0.83$) and demonstrated good test-retest reliability ($r = 0.85$) (Buysse et al., 1989). Convergent validity of the PSQI was examined and found to acceptable (Buysse et al., 1989). For the current sample, the PSQI seven component score demonstrated acceptable internal consistency ($\alpha = 0.72$).

Child Measures

Revised Children's Anxiety and Depression Scale

The Revised Children's Anxiety and Depression Scale (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000) is a 47-item child self-report questionnaire developed to correspond with DSM-IV anxiety disorders and major depression, including total anxiety/depression symptoms scores and subscales of separation anxiety disorder (SAD), social phobia (SP), generalized anxiety disorder (GAD), panic disorder (PD), obsessive compulsive disorder (OCD), and major depressive disorder (MDD). Good internal consistency has been found, with alpha coefficients for SAD, $\alpha = 0.78$; SP, $\alpha = 0.87$; GAD, $\alpha = 0.84$; PD, $\alpha = 0.88$; OCD, $\alpha = 0.82$; and MDD, $\alpha = 0.87$ (Chorpita, Moffitt, & Gray, 2005). The current sample had good internal consistency, with alpha coefficients for SAD, $\alpha = 0.76$; SP, $\alpha = 0.87$; GAD, $\alpha = 0.89$; PD, $\alpha = 0.85$; OCD, $\alpha = 0.77$; and MDD, $\alpha = 0.83$. Convergent validity was evaluated in relation to the Child Depression Inventory (CDI; Kovacs, 1980) and the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978). The CDI and RCADS scales correlated positively and significantly for MDD, $r = .70$; SAD, $r = .60$; SP, $r = .72$; GAD, $r = .65$; PD, $r = .64$; and OCD, $r = .59$ (Chorpita, Moffitt, & Gray, 2005).

Alabama Parenting Questionnaire – Child Form

The Alabama Parenting Questionnaire – Child Form (APQ-CF; Frick, 1991) is the parallel form of the APQ. The APQ-CF is a 42-item measure assesses the child's perception of parenting practices across five domains: Positive Parenting, Poor Monitoring, Inconsistent Discipline, Involvement, and Corporal Punishment. Items are scored from 1 (never) to 5 (always). Good internal consistency demonstrated with alpha coefficients for Positive Parenting, $\alpha=.90$; Poor Monitoring, $\alpha=.93$; Inconsistent Discipline, $\alpha=.90$; Involvement, $\alpha=.88$; and Corporal Punishment, $\alpha=.81$ (Shelton, Frick, & Wootton, 1996). The current sample demonstrated acceptable internal consistency for corporal punishment, $\alpha=.79$. Convergent validity of the APQ-CF was examined using correlations between subscale scores and observational data of parent-child interaction. Positive Parenting correlated positively with the parents' use of praise ($r=.48$), Involvement correlated positively with the parents' involvement in a play setting with their children ($r=.45$), Inconsistent Discipline correlated negatively with observations of praise in a play setting ($r= -.41$), and Corporal Punishment correlated positively with observations of aversive parenting behavior during play observation ($r=.29$) (Hawes & Dadds, 2006).

Procedure

All study procedures were approved by the University of Houston Institutional Review Board. Families expressing interest in participating were screened by telephone to determine basic eligibility. Eligible families were provided with the option to complete consent and questionnaire documents via a secure online Qualtrics survey link or paper and pencil forms sent via the U.S. postal system. All consent and questionnaire documents were delivered pre-sorted to correspond to participating family members (i.e., service member

parent, non-service member parent, and child). Instructions were included in each packet instructing families to complete their questionnaires independently, read all directions for each questionnaire, and for family members not to review each other's answers. Families were contacted the day after the Qualtrics survey link was sent through email or one week after paper and pencil forms were mailed to confirm the family received their materials. During this time, study instructions were reviewed and questions were answered. Each participating family member was compensated with a \$15 gift card to Target, Walmart, Starbucks, or Barnes & Nobles for their time.

Analysis

Preliminary analyses were conducted using SPSS 22.0 statistical software. Intra-class correlation coefficient (ICC), hierarchical linear modeling (HLM), and multivariate regression analyses were conducted using M-Plus 6.1 statistical software (Muthén & Muthén, 2011). Survey data were collected from 48 service members and 78 dependent children. The data was first visually examined for outliers via scatterplots and boxplots. Scatterplots indicated that linearity was acceptable for all variables and heteroscedasticity of the data was not violated. Missing data was assessed and no missing data were found. Power analysis for post-hoc multiple linear regressions was conducted using G*Power 3.1.9.2 (Faul et al., 2007). With a total sample size of 78, using an alpha of 0.05 with five predictors, the study achieved a power of 0.98, a sufficient sample size to detect a large effect ($f^2 = .33$).

Approximately 67% of children ($n=53$) participating in the study were from families with another sibling participating. Analyses were conducted to examine within-family versus between-family variance in the sample. Clustering at the family level for children within the same family accounted for a significant amount of variance in child anxiety ($ICC = .29$, $p <$

.05) and depression ($ICC = .39, p < .01$). To account for this non-independence, similar to prior research (Oosterhoff, Babskie, & Metzger, 2015), HLM and multivariate regression analysis were conducted to account for nesting within the dataset. All tests for statistical significance of direct and indirect effects were conducted using M-Plus 6.1.

To address aim 1, two primary HLM models were used to assess the relationship between: (1) parental PTSD total symptoms and child anxiety (RCADS anxiety total scores) and (2) parental PTSD total symptoms and child depression (RCADS depression total scores). Follow-up HLM models were used to assess whether specific PTSD symptom clusters predicted child anxiety and depression. Based on previous research (Asmundson et al., 2002; King et al., 1998; Taylor et al., 2001), the PCL-M was divided into four separate symptom clusters of PTSD re-experiencing symptoms, PTSD avoidance symptoms, PTSD numbing symptoms, and PTSD hyperarousal symptoms.

To address aim 2, multivariate regression analysis was used to determine direct and indirect effects of PTSD total symptoms and the four symptoms clusters on child anxiety and depression through sleep disturbances (PSQI) and the use of corporal punishment (APQ). Sleep disturbances items on the PCL-M were removed from analyses when appropriate. In line with previous research (i.e., Kenny, Kashy, & Bolger, 1998; Kenny, 2016; Preacher & Hayes, 2008), sleep disturbances and corporal punishment are conceptually distinct variables, allowing simultaneously testing of both mediators. An advantage of testing conceptually distinct mediators simultaneously allows us to learn if the mediation is independent of the effect of the other mediators (Kenny, 2016). Thus, multiple mediator models were used to determine the specific and unique indirect effects of sleep disturbances and the use of corporal punishments on the relationship between PTSD (total symptoms from PCL-M and

four symptom clusters; re-experiencing, avoidance, numbing, and hyperarousal) and child anxiety and depressive symptoms. Five mediational models were computed for child anxiety and for child depression (a total of 10 models).

Results

Bivariate Correlations

Pearson's bivariate correlations are presented in *Table 2*. Children with higher reports of anxiety symptoms had parents with greater PTSD total symptoms, PTSD re-experiencing symptoms, PTSD hyperarousal symptoms, PSQI sleep disturbances, and marginally greater PTSD numbing symptoms. Reports of higher child depressive symptoms were correlated with greater parental PTSD total symptoms, PTSD re-experiencing, PTSD numbing, PTSD hyperarousal, and greater use of corporal punishment. Children with higher depressive symptoms also experienced marginally greater parental PTSD avoidance and sleep disturbance.

Aim 1: PTSD and Child Anxiety/Depression

Two primary hierarchical linear models were used to investigate whether there was a direct effect between parental PTSD symptoms and child anxiety and depression. When examining PTSD total symptoms, parental PTSD symptoms were significantly related to child anxiety symptoms ($\beta = .34$, $SE = .16$, 95% confidence interval (CI) = [.01, .648]) and to child depressive symptoms ($\beta = .35$, $SE = .12$, 95% CI = [.12, .579]).

Eight follow-up HLM models were used to investigate whether there were direct relationships between the four PTSD symptom clusters and child anxiety and depression. There was no evidence of significant relationships between child anxiety and PTSD re-experiencing ($\beta = 1.46$, $SE = .75$, 95% CI = [-.015, 2.94]); PTSD avoidance ($\beta = -.85$, $SE =$

.75, 95% CI = [-2.32, .617]); PTSD numbing ($\beta = -.48$, $SE = .96$, 95% CI = [-2.37, 1.42]); or PTSD hyperarousal ($\beta = .57$, $SE = .76$, 95% CI = [-0.92, 2.07]). Similarly, we did not find evidence of significant relationships between child depression and PTSD re-experiencing ($\beta = .90$, $SE = .70$, 95% CI = [-.461, 2.262]); PTSD avoidance ($\beta = -.65$, $SE = .99$, 95% CI = [-2.587, 1.293]); PTSD numbing ($\beta = .49$, $SE = .67$, 95% CI = [-.818, 1.789]); or PTSD hyperarousal ($\beta = .21$, $SE = .43$, 95% CI = [-.636, 1.056]).

Aim 2: Parental Sleep Disturbances and Corporal Punishment/ as Mediators

PTSD Total Scores and Child Anxiety

We examined parental sleep disturbance as a mediator between PTSD total scores and child anxiety. Results indicated total PTSD total scores significantly predicted greater parental sleep disturbances ($\beta = .20$, $SE = .04$, 95% CI = [.125, .283]). However, greater sleep disturbance did not significantly predict child anxiety ($\beta = .18$, $SE = .49$, 95% CI = [-.778, 1.132]), and the indirect effect of PTSD on child anxiety through sleep disturbances was non-significant ($\beta = .036$, $SE = .10$, 95% CI = [-.16, .233]) (Figure 1).

We also examined the use of corporal punishment as a mediator between PTSD total scores and child anxiety. Total PTSD scores did significantly predict greater use of corporal punishment ($b = .10$, $SE = .04$, 95% CI = [.020, .174]) and corporal punishment significantly predicted greater child anxiety ($b = 1.58$, $SE = .48$, 95% CI = [.693, 2.517]). Additionally, the indirect effect of PTSD on anxiety through corporal punishment was significant ($b = .153$, $SE = .09$, 95% CI = [.016, .322]), which suggests the use of corporal punishment partially mediated the effect of PTSD on child anxiety (Figure 1). Approximately 10% of the variance of corporal punishment was accounted for by the predictor ($R^2 = .109$).

PTSD Re-Experiencing and Child Anxiety

We next examined parental sleep disturbance as a mediator between PTSD re-experiencing symptoms and child anxiety. Results indicated re-experiencing symptoms significantly predicted greater parental sleep disturbances ($\beta = .61$, $SE = .14$, 95% CI = [.328, .889]). Sleep disturbances did not significantly predict child anxiety ($\beta = .2$, $SE = .44$, 95% CI = [-.653, 1.053]) and the indirect effect of re-experiencing symptoms on child anxiety through sleep disturbances was not significant ($\beta = .12$, $SE = .27$, 95% CI = [-.653, 1.053]) (Figure 2).

When examining the use of corporal punishment as a mediator between PTSD re-experiencing symptoms and child anxiety, results indicated re-experiencing symptoms did significantly predict greater use of corporal punishment ($\beta = .37$, $SE = .133$, 95% CI = [.105, .627]) and greater use of corporal punishment significantly predicted greater child anxiety ($\beta = 1.55$, $SE = .48$, 95% CI = [.616, 2.478]) (Figure 2). The indirect effect of re-experiencing symptoms on child anxiety through corporal punishment was significant ($\beta = .57$, $SE = .30$, 95% CI = [.616, 2.478]), suggesting the use of corporal punishment partially mediates the effect of PTSD re-experiencing symptoms on child anxiety, with approximately 14% of the variance of corporal punishment accounted for by the predictor ($R^2 = .135$).

PTSD Avoidance and Child Anxiety

The next model examined parental sleep disturbance as a mediator between PTSD avoidance symptoms and child anxiety. Results indicated avoidance symptoms significantly predicted greater parental sleep disturbances ($\beta = .79$, $SE = .24$, 95% CI = [.314, 1.264]), but did not significantly predict child anxiety ($\beta = .41$, $SE = .40$, 95% CI = [-.372, 1.195])

(Figure 3). The indirect effect of avoidance symptoms on child anxiety through sleep disturbances was not significant ($\beta = .33$, $SE = .32$, 95% CI = [-297, .946]).

When examining the use of corporal punishment as a mediator between PTSD avoidance symptoms and child anxiety, results indicated avoidance symptoms did not significantly predict greater use of corporal punishment ($\beta = .41$, $SE = .24$, 95% CI = [-.064, .888]) (Figure 3). However, greater use of corporal punishment still significantly predicted greater child anxiety ($\beta = 1.70$, $SE = .51$, 95% CI = [.698, 2.696]), but the indirect effect of avoidance symptoms on child anxiety through corporal punishment was not significant ($\beta = .70$, $SE = .52$, 95% CI = [-.314, 1.712]) (Figure 3).

PTSD Numbing and Child Anxiety

We next examined parental sleep disturbance as a mediator between PTSD numbing symptoms and child anxiety. Results indicated numbing symptoms significantly predicted greater parental sleep disturbances ($\beta = .72$, $SE = .13$, 95% CI = [.460, .973]), but sleep disturbances did not significantly predict child anxiety ($\beta = .26$, $SE = .46$, 95% CI = [-.653, 1.163]) (Figure 4). The indirect effect of numbing symptoms on child anxiety through sleep disturbances was not significant ($\beta = .18$, $SE = .34$, 95% CI = [-.48, .845]).

When examining the use of corporal punishment as a mediator between PTSD numbing symptoms and child anxiety, results indicated numbing symptoms did marginally predict greater use of corporal punishment ($\beta = .24$, $SE = .12$, 95% CI = [.005, .482]) and greater use of corporal punishment significantly predicted greater child anxiety ($\beta = 1.65$, $SE = .52$, 95% CI = [.641, 2.660]) (Figure 3). The indirect effect of numbing symptoms on child anxiety through corporal punishment was significant ($\beta = .39$, $SE = .26$, 95% CI = [.113, .901]), suggesting corporal punishment partially mediates the effect of PTSD numbing

symptoms on child anxiety. Approximately 5% of the variance of corporal punishment accounted for by the predictor. ($R^2 = .057$).

PTSD Hyperarousal and Child Anxiety

For the 5th model, we examined parental sleep disturbance as a mediator between PTSD hyperarousal symptoms and child anxiety. Results indicated hyperarousal symptoms significantly predicted greater parental sleep disturbances ($\beta = .71$, $SE = .13$, 95% CI = [.221, .705]), but did not significantly predict child anxiety ($\beta = .26$, $SE = .46$, 95% CI = [-.485, .955]) (Figure 5). The indirect effect of PTSD hyperarousal symptoms on child anxiety through sleep disturbances was not significant ($\beta = .11$, $SE = .17$, 95% CI = [-.222, .439]).

When examining the use of corporal punishment as a mediator between PTSD hyperarousal symptoms and child anxiety, results indicated hyperarousal symptoms did not significantly predict greater use of corporal punishment ($\beta = .24$, $SE = .12$, 95% CI = [-.002, .510]), but greater use of corporal punishment did significantly predicted greater child anxiety ($\beta = 1.65$, $SE = .52$, 95% CI = [.693, 2.482]) (Figure 5). The indirect effect of PTSD hyperarousal symptoms on child anxiety through corporal punishment was not significant ($\beta = .4$, $SE = .26$, 95% CI = [-.108, .914]).

PTSD Total and Child Depression

We examined parental sleep disturbance as a mediator between PTSD total scores and child depression. Results indicated PTSD total scores significantly predicted greater parental sleep disturbances ($\beta = .20$, $SE = .04$, 95% CI = [.125, .283]). However, greater sleep disturbance did not significantly predict child depression ($\beta = .18$, $SE = .47$, 95% CI = [-.734, 1.091]), and the indirect effect of PTSD on child depression through sleep disturbances was not significant ($\beta = .036$, $SE = .01$, 95% CI = [-.008, .231]) (Figure 6).

We also examined the use of corporal punishment as a mediator between PTSD total scores and child depression. Total PTSD scores did significantly predict greater use of corporal punishment ($b = .10$, $SE = .04$, 95% CI = [.093, .568]) and corporal punishment significantly predicted greater child depression ($b = 1.15$, $SE = .33$, 95% CI = [.501, 1.796]). However, the indirect effect of PTSD on depression through corporal punishment was not significant ($b = .112$, $SE = .06$, 95% CI = [-.008, .231]), suggesting the use of corporal punishment did not partially mediate the effect of PTSD on child depression (Figure 6).

PTSD Re-experiencing and Child Depression

We examined parental sleep disturbance as a mediator between PTSD re-experiencing symptoms and child depression. Results indicated re-experiencing symptoms significantly predicted greater parental sleep disturbances ($\beta = .61$, $SE = .14$, 95% CI = [.328, .889]) (Figure 7). However, greater sleep disturbance did not significantly predict child depression ($\beta = .26$, $SE = .40$, 95% CI = [-.538, 1.048]), and the indirect effect of re-experiencing symptoms on child depression through sleep disturbances was not significant ($\beta = .16$, $SE = .25$, 95% CI = [-.336, .646]) (Figure 7).

We examined the use of corporal punishment as a mediator between PTSD re-experiencing symptoms and child depression. Re-experiencing symptoms did significantly predict greater use of corporal punishment ($b = .37$, $SE = .13$, 95% CI = [.105, .627]) and corporal punishment significantly predicted greater child depression ($b = 1.14$, $SE = .35$, 95% CI = [.453, 1.818]). However, the indirect effect of re-experiencing symptoms on depression through corporal punishment was not significant ($b = .42$, $SE = .21$, 95% CI = [-.002, .834]), suggesting the use of corporal punishment did not partially mediate the effect of re-experiencing on child depression (Figure 7).

PTSD Avoidance and Child Depression

We examined parental sleep disturbance as a mediator between PTSD avoidance symptoms and child depression. Results indicated avoidance symptoms significantly predicted greater parental sleep disturbances ($\beta = .79$, $SE = .24$, 95% CI = [.314, 1.264]) (Figure 8). However, greater sleep disturbance did not significantly predict child depression ($\beta = .45$, $SE = .39$, 95% CI = [-.308, 1.204]), and the indirect effect of avoidance symptoms on child depression through sleep disturbances was not significant ($\beta = .35$, $SE = .30$, 95% CI = [-.242, .949]) (Figure 8).

We examined the use of corporal punishment as a mediator between PTSD avoidance symptoms and child depression. Avoidance symptoms did not significantly predict greater use of corporal punishment ($b = .41$, $SE = .24$, 95% CI = [-.064, .888]), but corporal punishment did significantly predict greater child depression ($b = 1.28$, $SE = .35$, 95% CI = [.589, 1.973]). The indirect effect of re-experiencing symptoms on anxiety through corporal punishment was not significant ($b = .53$, $SE = .40$, 95% CI = [-.25, 1.305]), suggesting the use of corporal punishment did not partially mediate the effect of re-experiencing on child depression (Figure 8).

PTSD Numbing and Child Depression

We examined parental sleep disturbance as a mediator between PTSD numbing symptoms and child depression. Results indicated numbing symptoms significantly predicted greater parental sleep disturbances ($\beta = .72$, $SE = .13$, 95% CI = [.460, .973]). However, greater sleep disturbance did not significantly predict child depression ($\beta = .12$, $SE = .45$, 95% CI = [-.755, .990]), and the indirect effect of numbing symptoms on child

depression through sleep disturbances was non-significant ($\beta = .08$, $SE = .32$, 95% CI = [- .544, .712]) (Figure 9).

We also examined the use of corporal punishment as a mediator between PTSD numbing symptoms and child depression. Numbing symptoms did not significantly predict greater use of corporal punishment ($b = .24$, $SE = .12$, 95% CI = [-.005, .482]), but corporal punishment significantly predicted greater child depression ($b = 1.20$, $SE = .29$, 95% CI = [.641, 1.767]). The indirect effect of numbing symptoms on child depression through corporal punishment not significant ($b = .287$, $SE = .184$, 95% CI = [-.073, .648]), suggesting the use of corporal punishment did not mediate the effect of PTSD on child depression (Figure 9).

PTSD Hyperarousal and Child Depression

We examined parental sleep disturbance as a mediator between PTSD hyperarousal symptoms and child depression. Results indicated hyperarousal symptoms significantly predicted greater parental sleep disturbances ($\beta = .46$, $SE = .12$, 95% CI = [.221, .705]). However, greater sleep disturbance did not significantly predict child depression ($\beta = .31$, $SE = .36$, 95% CI = [-.396, 1.019]), and the indirect effect of hyperarousal symptoms on child depression through sleep disturbances was non-significant ($\beta = .144$, $SE = .166$, 95% CI = [-.181, .470]) (Figure 10).

We examined the use of corporal punishment as a mediator between PTSD hyperarousal symptoms and child depression. Hyperarousal symptoms did not significantly predict greater use of corporal punishment ($b = .25$, $SE = .13$, 95% CI = [-.002, .510]), but corporal punishment significantly predicted greater child depression ($b = 1.19$, $SE = .31$, 95% CI = [.588, 1.798]). The indirect effect of hyperarousal symptoms on child

depression through corporal punishment was not significant ($b = .303$, $SE = .182$, 95% CI = $[-.055, .661]$), suggesting the use of corporal punishment did not mediate the effect of PTSD on child depression (Figure 10).

Discussion

There is a considerable body of research revealing increased risk of emotional difficulties in children of service members due to military deployments (Cederbaum et al., 2014; Chandra et al., 2010; Gorman et al., 2010; Lester et al., 2010; Flake et al., 2009). Unfortunately, there has been limited research examining the effects of PTSD symptoms on child outcomes, with even fewer studies conducted among GWOT veterans and service members. Additionally, specific mechanisms through which PTSD symptoms in parents negatively impact children have rarely been explored. The primary aim of this study was to examine relationships between service member PTSD symptoms and child internalizing behaviors, specifically anxiety and depressive symptoms. Our study first examined the relationship between overall PTSD symptomatology and child anxiety and depression. As hypothesized, overall PTSD symptoms significantly predicted greater levels of child anxiety and child depression (Hypothesis 1a). However, when examining the individual PTSD symptom clusters of re-experiencing, avoidance, numbing, and hyperarousal, we did not find evidence that any individual symptom cluster significantly impacts increased child anxiety or depression (Hypothesis 1b).

First, consistent with research conducted with Vietnam War era military families and more recently in GWOT families, results underscore the far-reaching consequences of war. Children of service members already face considerable challenges when a parent deploys, but these challenges do not necessarily end when a parent returns home. Similar to our findings,

previous research has found children of GWOT service members with PTSD symptoms are at an increased risk of developing internalizing symptoms including anxiety and depression (Herzog, 2008; Jaser et al., 2005; Langrock et al., 2002; Meadows et al., 2017). In addition to the stress that accompanies prolonged separation from a parent during deployment, a parent who returns with emotional problems places additional stress on children that conceivably manifests in increased symptoms of anxiety and depression. Internalizing problems/disorders also have a well-established genetic basis (Kendler et al., 1995; Kendler et al., 2004; Silberg et al., 1999; Thapar et al., 2007) that elevates risk within affected families. However, many children may also feel a need to try and help their struggling parent (Lombardo & Motta, 2008) contributing further to their own distress. Left untreated, childhood anxiety and depression can become chronic conditions (Kendall et al., 2004; Pine, Cohen, & Gurley, 1998), leading to increased risk of problems in school, impaired social skills, withdrawal, anger/irritability, and substance abuse (Achenbach, 1991; Briggs-Gowan et al., 2001; Compas, Grant, & Ey, 1994; Compas & Hammen, 1994; King, Iacono, & McGue, 2004; Nottelmann & Jensen, 1995).

Since sleep disturbances are a key feature of PTSD and have been shown to impact parenting (APA, 2013; Krakow et al., 2001; Spoormaker & Montgomery, 2008), we also examined whether service member sleep disturbances served as a unique mediator between parent PTSD symptoms and child anxiety and depression. First, as expected, overall PTSD symptoms as well as each PTSD symptom cluster (re-experiencing, avoidance, numbing, and hyperarousal) significantly predicted increased levels of sleep disturbance in service members (Hypothesis 2a). The latter finding (i.e., that each PTSD symptom cluster is associated with sleep disturbance) suggests that there may not be one individual aspect of

PTSD associated with sleep disturbance in service members. For example, hyperarousal symptoms are highly incompatible with sleep and lead to sleep avoidance (Harvey, Jones, & Schmidt, 2003; Mellman, 1997; Ulmer et al., 2011). Re-experiencing symptoms may lead to increase difficulties initiating and maintaining sleep and produce nightmares (Ehlers & Clark, 2000). Avoidance and numbing clusters have received less attention in relation to sleep but researchers postulate the use of avoidance and numbing to manage negative cognitive-affective experiences may lead to greater cognitive and physiological arousal during sleep interfering with sleep onset and maintenance (Harvey, 2002, Harvey & Bryant, 1999; Tull, Jakupcak, Paulson, & Gratz, 2007).

This study did not find evidence that parental sleep disturbance directly impacts child anxiety or depression, nor did we find evidence of partial mediation of PTSD–child anxiety/depression relationships through sleep disturbances (Hypothesis 2b). These findings were unexpected given that sleep disturbances have been shown to negatively impact parenting by reducing overall quality, increasing hostility (Bell & Belsky, 2008; Giallo et al., 2011; Sadeh, et al., 1994) and predict child mental health issues (Bell & Belsky, 2008; Giallo et al., 2011). However, it may be possible the substantial symptom overlap between sleep disturbances and PTSD may actually reduce the significance of sleep disturbances on parenting when PTSD symptoms are present. Severe sleep disturbances occurring independent of mental health disorders increase negative mood, irritability, hostility, and anger, while decreasing positive mood (Altena et al., 2008; Saper, Cano, & Scammell, 2005; Walker, 2008; Walker, 2009; Zohar et al., 2005). The majority of these symptoms due to sleep disturbances are already core features of PTSD, with additional research demonstrating sleep disturbances having a positive association on PTSD symptom severity (Belleville et al.,

2009; Verfaellie et al., 2015). Specifically, sleep disturbances have been shown to maintain and exacerbate PTSD symptoms related to hypervigilance, irritability, and anger (Belleville et al., 2009), specific parental qualities that may lead to child anxiety and depression (Caselli & Motta, 1995; Herzog, 2008). Even though sleep disturbance is considered a core feature of PTSD, it may be possible PTSD sleep disturbances alone have minimal significance on parenting, but rather intensify the PTSD symptomatic response affecting parenting quality. This impact of decreased effectiveness in parenting, regardless of sleep disturbances or PTSD symptomatology, has been shown to increase parenting stress, which in turn increases child internalizing symptoms (Costa, Weems, Pellerin, & Dalton, 2006). Future research should examine the bi-directional effect between PTSD symptoms and sleep disturbances, specifically in regards to mechanisms affecting parental quality.

Research conducted during GWOT also reveals alarmingly elevated rates of child maltreatment in families experiencing deployment. The current study sought to better understand these findings by determining if corporal punishment served as a mediator between service member PTSD and increased child anxiety and depression. Our study did indeed find greater overall PTSD symptoms to predict greater use of corporal punishment when disciplining children, which in turn partially mediated the association with greater anxiety in children (Hypothesis 3a). Further, when we analyzed individual symptom clusters, re-experiencing and numbing symptom clusters specifically predicted greater use of corporal punishment, which again mediated the relationship with child anxiety.

PTSD re-experiencing symptoms are not generally associated with increased aggression or hostility (Holmes, Grey, & Young, 2005; Price et al., 2006), but have not been examined in relation to child disciplinary strategies. While some research in the civilian

population shows PTSD re-experiencing symptoms to be positively associated with physiological reactivity and increased anger (Orth & Wieland, 2006, Taft et al., 2007), these studies are correlational and did not focus on parenting. PTSD re-experiencing symptoms have also been uniquely linked to increased substance use disorders (Bradizza, Stasiewicz, & Pass, 2006; Read, Brown, & Kahler, 2004; Saladin et al., 1995). We did not examine substance use in the current study, but may need to be considered. Rates of substance use disorders in service members with PTSD symptomatology are over 20% (National Center for PTSD, 2015). Parental substance abuse is associated with coercive parenting styles, less parental supervision, and increased rates of punitive forms of discipline (Kandel, 1990; Miller, Smyth, & Mudar, 1999). Additionally, children who grow up with one or more alcoholic parents are twice as likely to experience emotional abuse, physical abuse, sexual abuse, or neglect, than children whose parents are not alcoholics (Dube et al., 2001). Thus, future research should aim to better determine the mechanisms of this relationship.

With regard to emotional numbing symptoms, there has been ample research identifying PTSD emotional numbing symptoms as key factors interfering with the quality of relationship functioning after combat trauma (MacDonald, Chamberlain, Long, & Flett, 1999; Riggs et al., 1998; Wilson & Kurtz, 1997). Emotional numbing can lead service members to disengage from parent-child relationships, experience difficulties displaying warmth and empathy, engage in negative communication patterns, decrease demonstrations of intimacy and closeness, and impair the service member's ability to notice emotional changes in children (Samper et al., 2004; Cohen, Zerach, & Solomon, 2011; Dekel & Monson, 2010; Green & Goldwyn, 2002). Additionally, emotionally-numbed parents demonstrate less sensitivity towards their children's positive behaviors while being more

sensitive towards their negative actions (Palmieri & Berenbaum, 2003). In turn, this may lead to increased behavioral problems in children, creating a detrimental cycle that increases the likelihood of service members using more severe discipline techniques, such as corporal punishment.

While we did find evidence that corporal punishment mediated the relationship between PTSD symptoms and child anxiety, we surprisingly did not find the same results for child depression (Hypothesis 3a & 3b). The study did find overall PTSD symptoms, re-experiencing symptoms, and numbing symptoms predicted greater use of corporal punishment and corporal punishment predicted greater child depression. However, the indirect effects of PTSD total symptoms and all symptom clusters on depression through corporal punishment were not significant. One possible explanation for this lack of evidence may be attributed to the normalization of corporal punishment within military families. With 75% of service members in this study serving on active duty, it is very likely children from these households live in military communities and have peers experiencing similar discipline strategies, leading to shared experiences, shared strategies for coping, and normalization of certain aspects of military life (Easterbrooks, Ginsburg, & Lerner, 2013; Mmari et al., 2010). Another point of contention are children in homes with service members suffering from combat related PTSD are at a higher risk of witnessing intimate partner violence (IPV) (Taft et al., 2011; Trevillion et al., 2015). Trevillion and colleagues (2015) review on IPV among military populations reported the rate of military IPV perpetrated by male veterans with PTSD were approximately 27.5%, significantly higher than the 12.7% IPV prevalence rate found in a nationally representative sample of non-combat related PTSD (Trevillion et al., 2015). However, due to numerous barriers of reporting (e.g. it will ruin our family's military

career), under-reporting of IPV is typically considered the norm rather than the exception by actively serving military families (Sparrow et al., 2017), which may indicate many children from military families witness violence on a regular basis. Research has demonstrated children from communities where corporal punishment and violence are highly prevalent and normalized exhibit a lower adverse response to being physically disciplined (Baumrind, 1997; Deater-Decker & Dodge, 1997; Simons et al., 2002) and may also become desensitized or emotionally numbed to further violence leading to decreased reporting of depressive symptoms (Boxer et al., 2008; Ng-Mak et al., 2004; White & Farrell 2006).

Another possible explanation may be due to the interesting theory that instead of a linear relationship, depressive symptoms share a curvilinear relationship with violence exposure (Flaherty et al., 2006; Gaylord-Harden, Cunningham, & Zelencik, 2011; Mrug, Loosier, & Windle, 2008). This may suggest the use of corporal punishment by service members experiencing PTSD symptoms may differentially impact depression and anxiety symptoms in children; with anxiety symptoms increasing as the use of corporal punishment increases, but depressive symptoms receding as corporal punishment increases. While this theory has been contested (Maikovich et al., 2008, Margolin et al., 2010; McDonald & Richmond, 2008), no study to date has tested this theory within the military community. Longitudinal study designs examining potential curvilinear relationships between the use of corporal punishment in military families and depressive symptoms of children should be considered.

Study Limitations

A primary limiting factor in this research was the response rate. At a 17% response rate, it is not possible to fully generalize findings to the greater population of military

families. Techniques aimed at increasing response rates should be utilized in future research. The difficulties experienced with recruitment also led to a smaller sample size ($n = 78$) than is needed for examining relationships of interest in this study. Indeed, a-priori power analysis using G-Power (Faul et al., 2007) calculated a total sample size of 92 was needed in order to achieve a medium effect size ($f^2 = 0.15$).

Due to this low response rate, nested models were also used, resulting in clustering at the family level. While we did account for non-independence in our statistical models, mutual influence of within-family participants has the potential to lead to various similarities in behaviors, affect, and cognitions (Kenny et al., 2002). Additionally, within-family contextual variables (i.e. rank, # of deployments) may have influenced response tendencies of participating children from the same family. This non-independence may have decreased overall within-group variance.

The use of only self-report measures to assess for symptoms of psychological disorders and to evaluate parenting practices is subject to social desirability bias. Additionally, younger children and service members experiencing PTSD symptoms may lack the emotional insight to respond accurately. To overcome these limitations, standard clinical interview techniques and multi-informant models should be used. Since cross-sectional data were used, it is also possible that child internalizing symptoms predate PTSD symptoms of service members. Similarly, it is possible service member PTSD symptoms may predate their deployments in support of GWOT. Structured/semi-structured interviews are needed to properly assess and diagnose lifetime service-member PTSD, child anxiety/depression, and the potential time-course of these conditions. Additionally, there are likely to be other interactions among variables not examined. For example, child internalizing symptoms may

predict worse PTSD symptoms in service members (and lead to increased use of corporal punishment). In order to adequately test these relationships, parent and children reports needs to be collected before and after trauma occurs.

Summary and Conclusion

This research adds to a growing literature on military deployments and family. Findings are largely consistent with past findings of a relationship between PTSD symptoms in service members and internalizing symptoms in children. This study also suggests the use of corporal punishment as a form of discipline by service members experiencing PTSD symptoms, and specifically re-experiencing and emotional numbing symptom clusters of PTSD, partially accounted for increased child anxiety. However, given the sample size and use of nested models, results should nonetheless be interpreted cautiously. Still, military family access to mental health care during and after deployments continues to be of vital importance. Although military families are often found to be resilient (Lester et al., 2010; MacDermid, Swamper, Schwarz, Nishida & Nyaronga, 2008; The White House, 2011), service member PTSD symptoms poses significant risk to family members including children. Factors that increase risk for the use of corporal punishment, child abuse, and neglect should be a topic of priority.

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Tables and Figures

Table 1: *Participant Demographics*

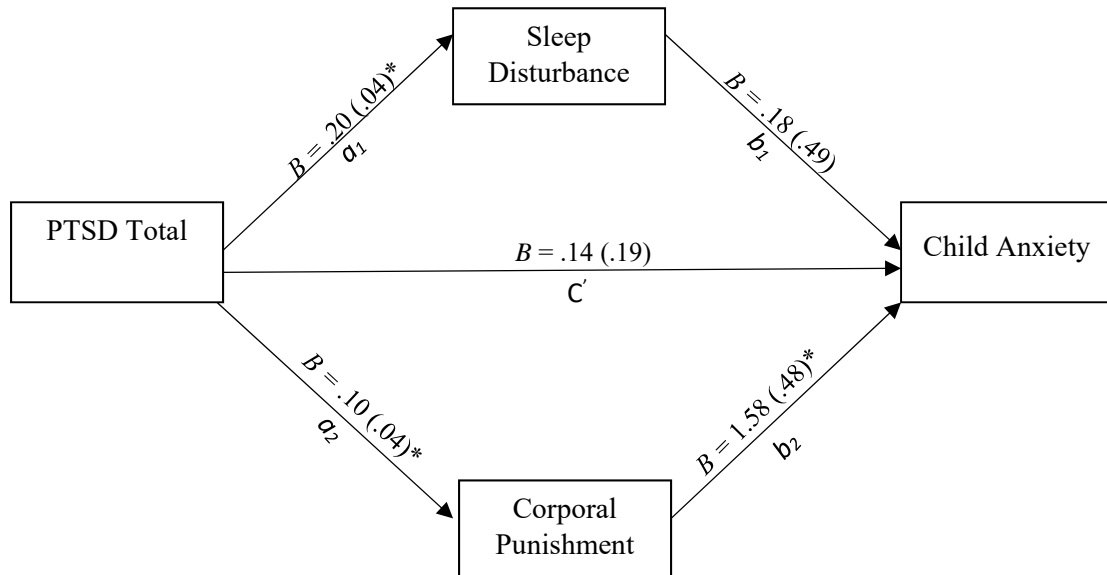
Age	n	%
Service Member Min Age: 25 Service Member Max Age: 52 Mean Age: 39.13 \pm 6.28	48	
Sex		
Male	45	93.8
Female	3	6.3
Child Min Age: 7 Child Max Age: 17 Mean Age: 11.74 \pm 3.21	78	
Sex		
Male	37	47.4
Female	41	52.6
Time In Service Min: 24 months Time In Service Max: 356 months Mean Time In Service: 197.33 \pm 81.04		
Service Branch	n	%
Air Force	4	8.3
Army	37	77.1
Marine Corps	3	6.3
Navy	4	8.3
Total	48	100
Service Component		
Active Duty	36	75
National Guard	3	6.3
Reserves	4	8.3
Retired/Separated	5	10.4
Total	48	100
Military Rank Category		
Enlisted	33	68.8
Commissioned Officer	12	25.0
Warrant Officer	3	6.3
Total	48	100
Total # of Deployments		
1	9	18.8
2	19	39.6
3	13	27.1
4	5	10.4
5	2	4.2
Total	48	100
Mean # of Deployments: 2.42 \pm 1.05		

Table 2: *Bivariate Correlations among Variables of Interest for all Participants*

	1	2	3	4	5	6	7	8	9
1. RCADS MDD	1								
2. RCADS Anxiety	.717**	1							
3. PCL-M	.395**	.316**	1						
4. PCL Re-exp	.394**	.335**	.932**	1					
5. PCL Avoidance	.236*	.168	.815**	.716**	1				
6. PCL Numbing	.378**	.245*	.921**	.805**	.656**	1			
7. PCL Hyperarousal	.351**	.297**	.843**	.738**	.578**	.783**	1		
8. PSQI Sleep Disturbance	.266*	.210	.595**	.524**	.409**	.613**	.442**	1	
9. Corporal Punishment	.357**	.336**	.234*	.247*	-.042	.300**	.184	.357**	1

Notes. RCADS MDD = Major Depressive Disorder Total Score; RCADS Anxiety = Anxiety Disorders Total Scores PCL-M = PTSD Check List – Military Total Scores; PCL Re-exp = PTSD Checklist Military Re-experiencing cluster; PSQI Sleep Disturbance = Pittsburg Sleep Quality Index Sleep Disturbance Total Score.

** $p \leq .01$, * $p < .05$.



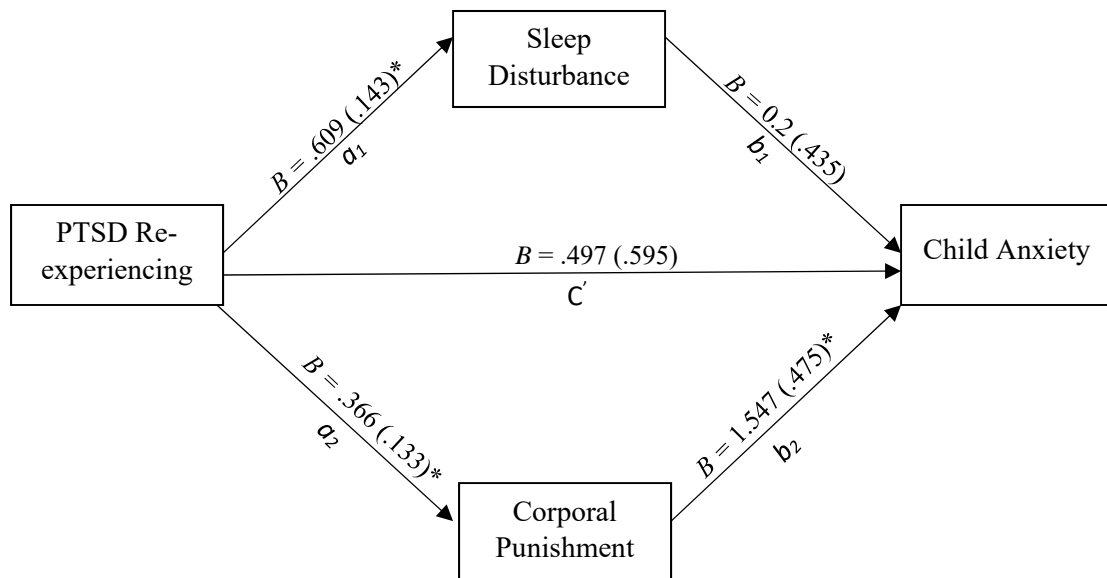
Direct Effect: .14 (.19), $p > .05$, 95% CI [-.223, .503]

Indirect Effect Sleep Disturbance: .036 (.10), 95% CI [-.16, .233]

Indirect Effect Corporal Punishment: .153 (.086), 95% CI [.016, .322]

Figure 1. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD total severity and variability in child-reported anxiety symptoms.

* $p < .05$



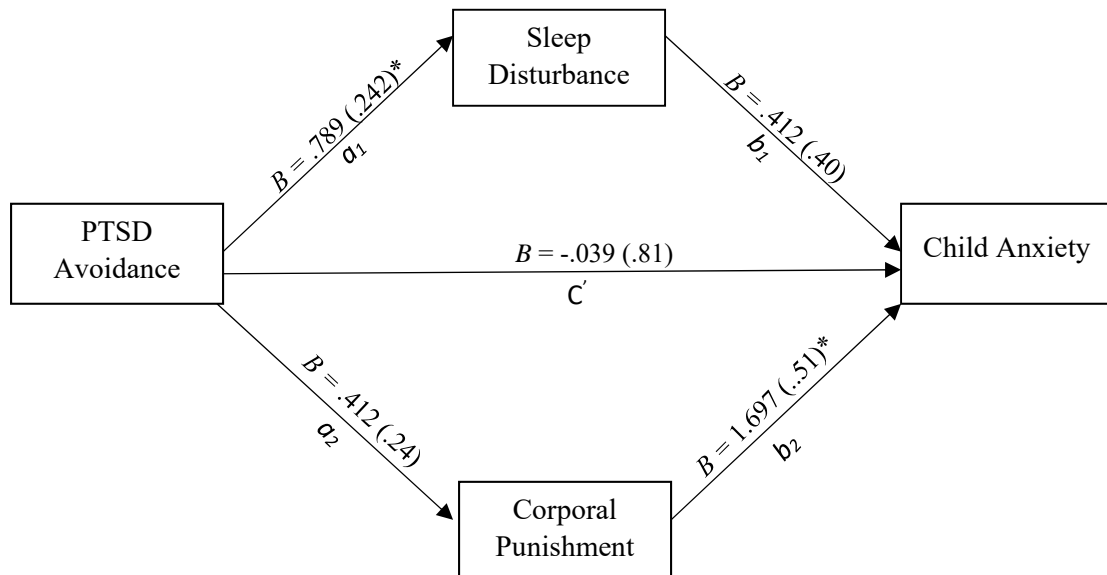
Direct Effect: .497(.595), $p > .05$, 95% CI [-.669, 1.664]

Indirect Effect Sleep Disturbance: .122 (.268), 95% CI [-.653, 1.053]

Indirect Effect Corporal Punishment: .567 (.296), 95% CI [.616, .2478]

Figure 2. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD re-experiencing cluster and variability in child-reported anxiety symptoms.

* $p < .05$



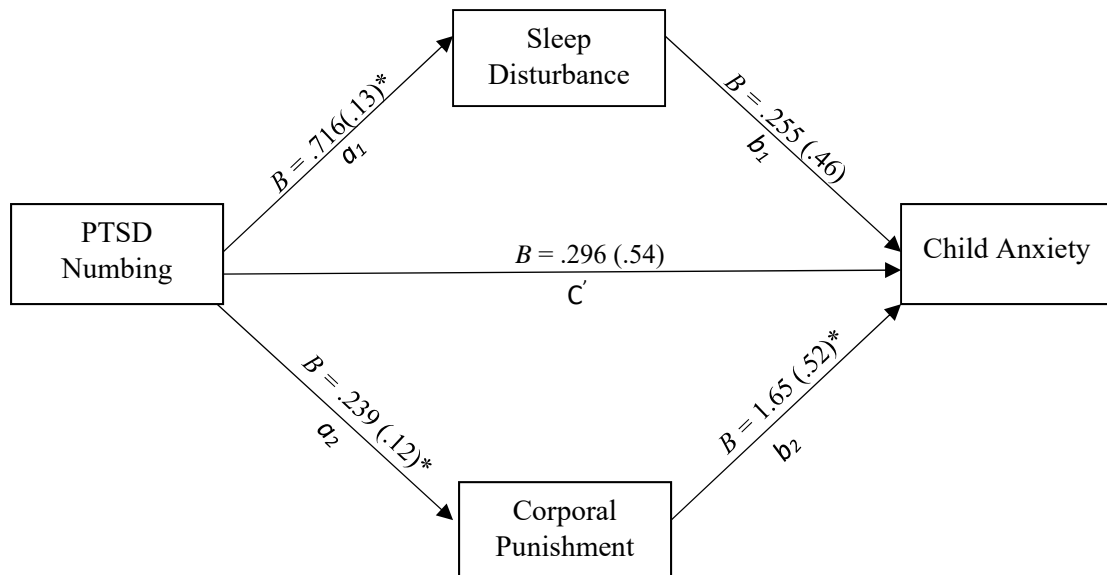
Direct Effect: $-.039 (.81)$, $p > .05$, 95% CI $[-1.619, 1.541]$

Indirect Effect Sleep Disturbance: $.325 (.317)$, 95% CI $[-.297, .946]$

Indirect Effect Corporal Punishment: $.699 (.517)$, 95% CI $[-.314, 1.712]$

Figure 3. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD avoidance cluster and variability in child-reported anxiety symptoms.

* $p < .05$



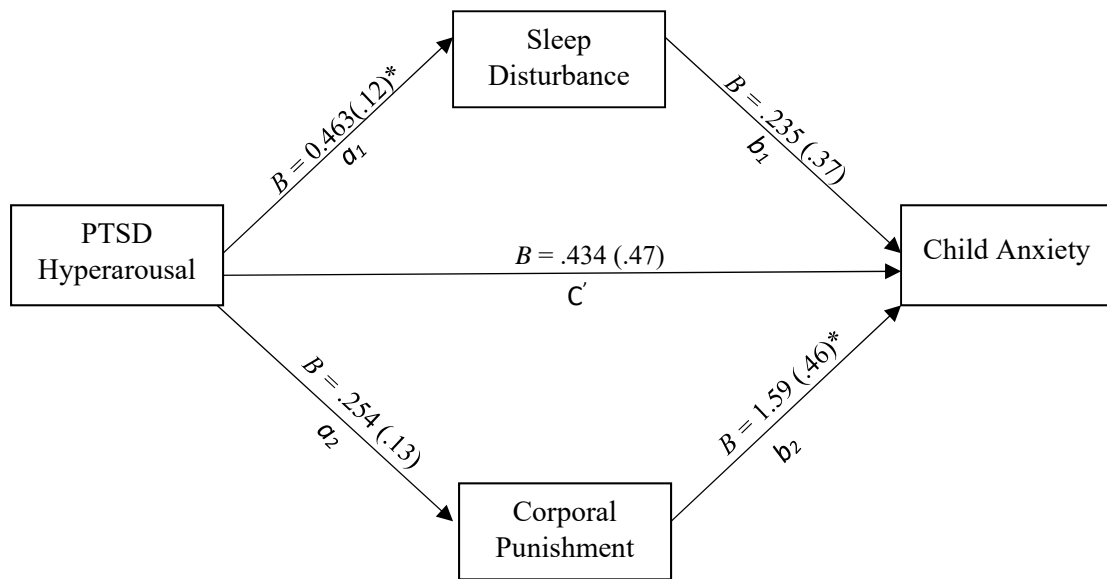
Direct Effect: .296 (.54), $p > .05$, 95% CI [-.767, 1.359]

Indirect Effect Sleep Disturbance: .182 (.338), 95% CI [-.480, .845]

Indirect Effect Corporal Punishment: .394 (.259), 95% CI [.113, .901]

Figure 4. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD numbing cluster and variability in child-reported anxiety symptoms.

* $p < .05$



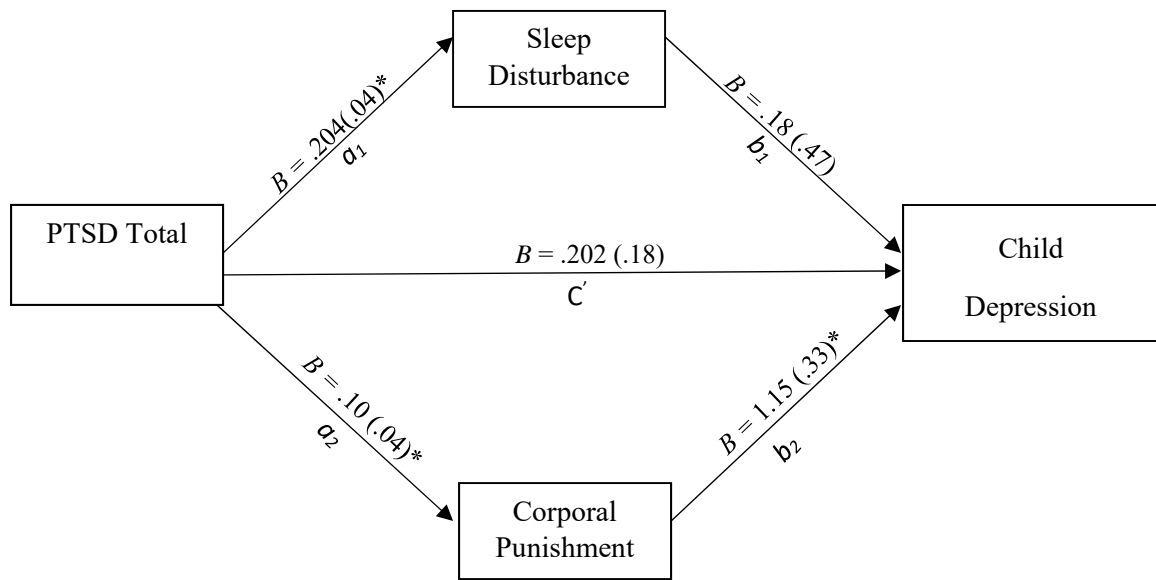
Direct Effect: .434 (.47), $p > .05$, 95% CI [-.490, 1.357]

Indirect Effect Sleep Disturbance: .109 (.169), 95% CI [-.222, .439]

Indirect Effect Corporal Punishment: .403 (.261), 95% CI [-.108, .914]

Figure 5. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD hyperarousal cluster and variability in child-reported anxiety symptoms.

* $p < .05$



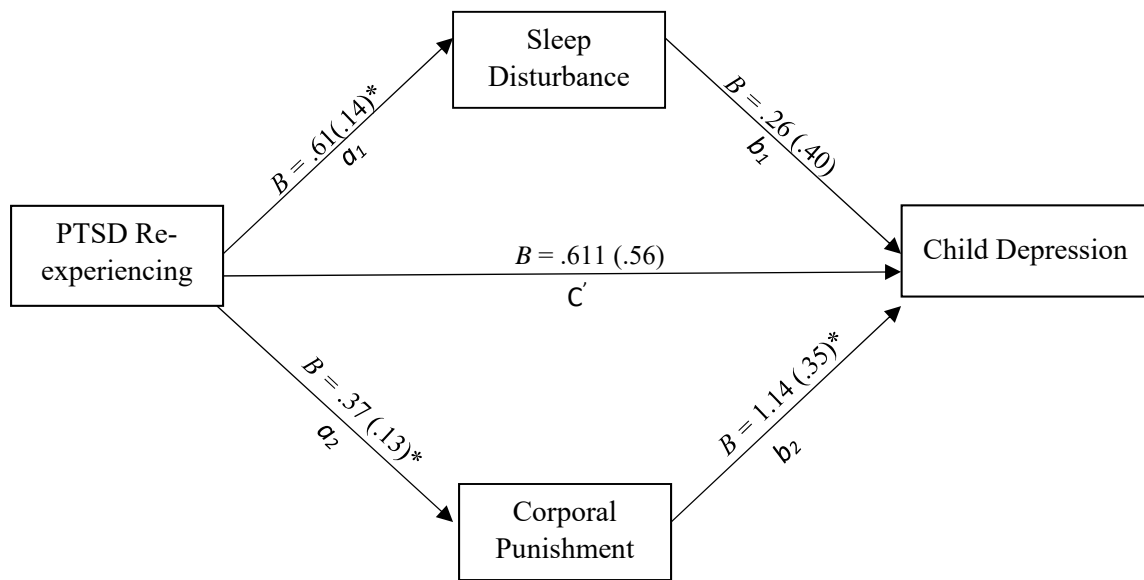
Direct Effect: .202 (.18), $p > .05$, 95% CI [-.141, .544]

Indirect Effect Sleep Disturbance: .036 (.096), 95% CI [-.151, .224]

Indirect Effect Corporal Punishment: .112 (.061), 95% CI [-.008, .231]

Figure 6. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD total symptom cluster and variability in child-reported depression symptoms.

* $p < .05$



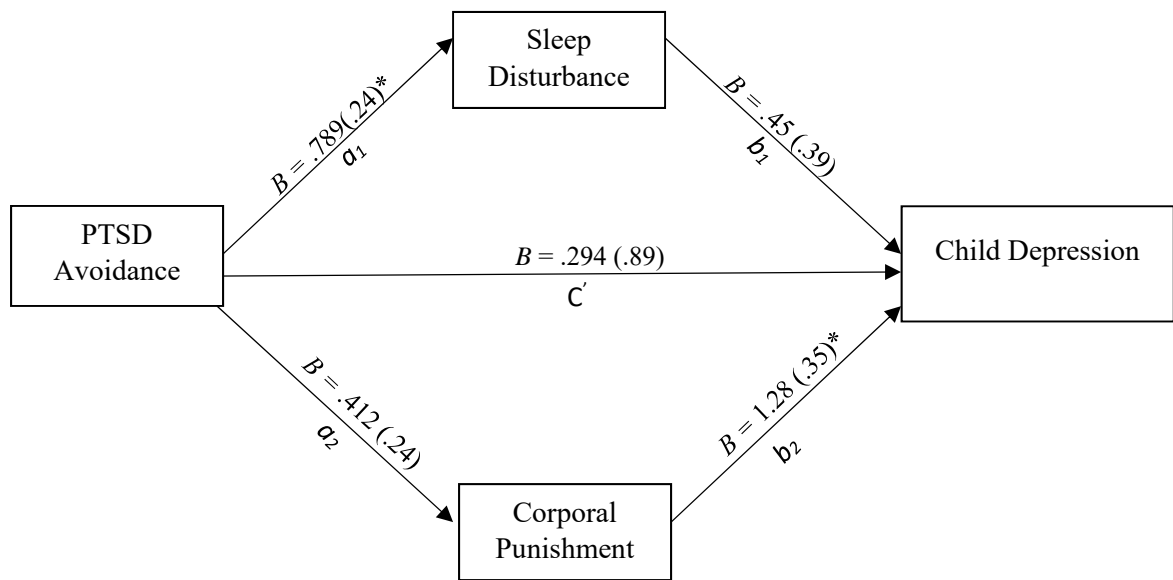
Direct Effect: .611 (.56), $p > .05$, 95% CI [-.490, 1.712]

Indirect Effect Sleep Disturbance: .155 (.25), 95% CI [-.336, .646]

Indirect Effect Corporal Punishment: .416 (.213), 95% CI [-.002, .834]

Figure 7. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD re-experiencing cluster and variability in child-reported depression symptoms.

* $p < .05$



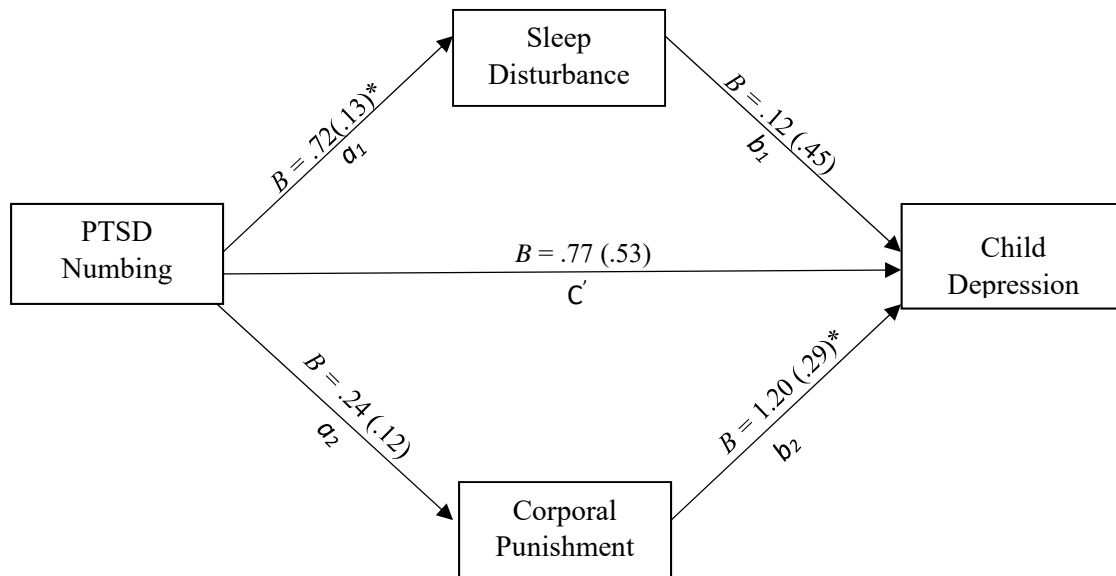
Direct Effect: .294 (.89), $p > .05$, 95% CI [-1.459, 2.047]

Indirect Effect Sleep Disturbance: .354 (.304), 95% CI [-.242, .949]

Indirect Effect Corporal Punishment: .528 (.397), 95% CI [-.25, 1.305]

Figure 8. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD total symptom cluster and variability in child-reported depression symptoms.

* $p < .05$



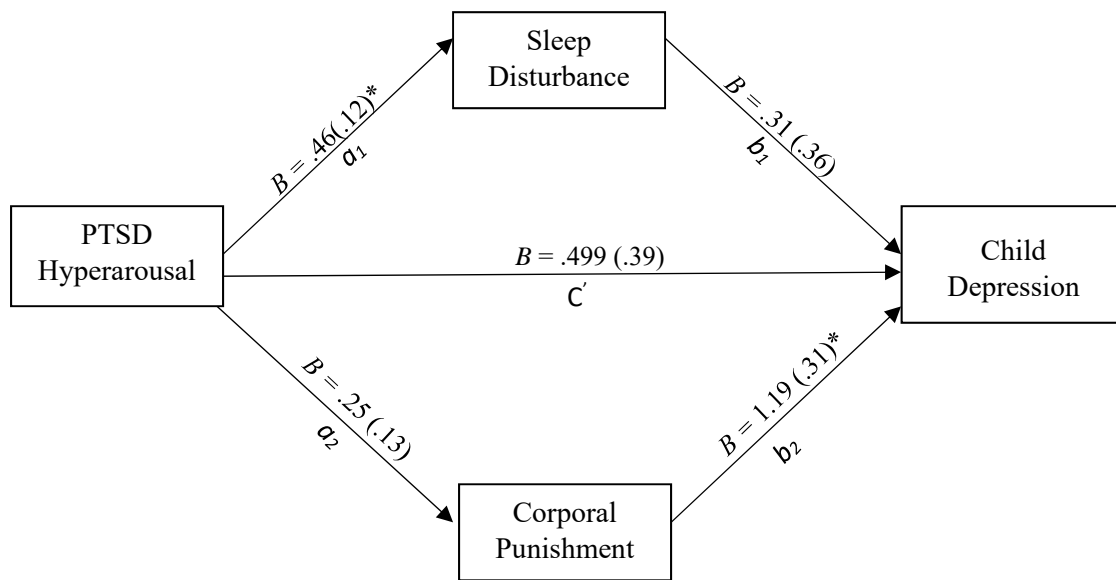
Direct Effect: .77 (.53), $p > .05$, 95% CI [-.267, 1.808]

Indirect Effect Sleep Disturbance: .084 (.321), 95% CI [-.544, .712]

Indirect Effect Corporal Punishment: .287 (.184), 95% CI [-.073, .648]

Figure 9. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD numbing cluster and variability in child-reported depression symptoms.

* $p < .05$



Direct Effect: .499 (.39), $p > .05$, 95% CI [-.271, 1.269]

Indirect Effect Sleep Disturbance: .144 (.166), 95% CI [-.181, .470]

Indirect Effect Corporal Punishment: .303 (.182), 95% CI [-.055, .661]

Figure 10. Parental sleep disturbance and parental corporal punishment as an explanatory mechanism between parent-reported PTSD hyperarousal cluster and variability in child-reported depression symptoms.

* $p < .05$