8-2016

Impact of peer relationship and exposure to violence on Posttraumatic Stress for children at risk for maltreatment

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PURDUE UNIVERSITY
GRADUATE SCHOOL
Thesis/Dissertation Acceptance

This is to certify that the thesis/dissertation prepared

By Aura Ankita Mishra

Entitled

IMPACT OF PEER RELATIONSHIP AND EXPOSURE TO VIOLENCE ON POSTTRAUMATIC STRESS FOR CHILDREN AT RISK FOR MALTREATMENT

For the degree of Master of Science

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IMPACT OF PEER RELATIONSHIP AND EXPOSURE TO VIOLENCE ON POST-TRAUMATIC STRESS FOR CHILDREN AT RISK FOR MALTREATMENT

A Thesis

Submitted to the Faculty

of

Purdue University

by

Aura Ankita Mishra

In Partial Fulfillment of the

Requirements for the Degree

of

Master of Science

August 2016

Purdue University

West Lafayette, Indiana

For my parents and husband, who have always loved and supported me.

ACKNOWLEDGEMENTS

I would like to thank my major advisor Dr. Sharon Christ for believing in me and my abilities in conducting this research. She challenged me constantly throughout this project and has shaped me into a competent researcher. I would also like to thank my committee members Dr. Aryn Dotterer and Dr. Zoe Taylor for their support and feedback on this project.

"This document includes data from the National Survey on Child and Adolescent Well-Being, which was developed under contract with the Administration on Children, Youth, and Families, U.S. Department of Health and Human Services (ACYF/DHE-{S). The data have been provided by the National Data Archive on Child Abuse and Neglect. The information and opinions expressed herein reflect solely the position of the author(s). Nothing herein should be construed to indicate the support or endorsement of its content by ACYF/DHHS."

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ABSTRACT

Mishra, Aura Ankita. M.S., Purdue University, August 2016. Impact of Peer Relationship and Exposure to Violence on Post-Traumatic Stress for Children at Risk for Maltreatment. Major Professor: Sharon Christ.

Post-traumatic Stress (PTS) symptomology includes ruminating thoughts and feelings around trauma, inability to feel and express emotions, and avoidance of things related to the traumatic event (American Psychiatric Association, 2000). Children and youth exposed to child maltreatment (abuse and neglect) are at higher risk of experiencing PTS. Extra-familial support, including peer support can reduce post-traumatic stress among youth (Pina et al., 2008). In the present study, Witnessing, Victimization, and Both Witnessing and Victimization due to Exposure to In-Home Violence and Peer Relationship Quality are evaluated as to their relative impact on PTS for children at risk for child maltreatment. Peer Relationship Quality is also tested as a moderator of the effects of violence exposures on PTS. Data come from the National Survey of Child and Adolescent Well-Being II (NSCAW II). Three waves of assessment were obtained starting in 2008 at 18 month intervals. A subsample of 2,151 children (2,071 children with non-missing values on the predictor, outcome and moderator variables) who were between the ages of 8 and 17 at any of the 3 waves was used.

A three process latent linear growth model was estimated to assess PTS, Peer Relationship Quality and Exposure to In-Home Violence. Each of three Exposure to In-

Home Violence constructs were assessed separately. Findings suggest that the average PTS at baseline was about 9.18 points (on a 32 point scale) and PTS declines by about 0.58 points every year on average. Additionally, baseline Peer Relationship Quality was predictive of baseline PTS with higher scores on Peer Relationship Quality associated with lower PTS at baseline. Moreover higher Peer Relationship Quality over time was associated with declines in PTS over time. The baseline effect of Exposure to In-Home Violence was positively associated with baseline PTS. So more Exposure to In-Home Violence was related to more post-traumatic stress. Change in witnessing violence at home over time and change in both witnessing and victimization over time were strongly positively associated with change in PTS over time. Peer Relationship Quality did not moderate the association between baseline Exposure to In-home Violence and PTS levels at baseline nor between baseline Exposure to In-Home Violence and change in PTS over time.

These findings suggest several possible avenues for intervention for clinicians and help understand the dynamic associations between Exposure to In-Home Violence, Peer Relationship Quality and PTS in the population of children at risk for maltreatment.

CHAPTER 1. INTRODUCTION

Maltreatment of children includes abuse - sexual, physical and psychological, and neglect – physical and psychological. While abuse and neglect each comprise of several domains, neglect overall is seen to be the most common form of child maltreatment (Dubowitz & Bennett, 2007; Jonson-Reid, Drake, & Zhou, 2013). Factors such as Exposure to In-Home Violence, parental mental health problems, low socio-economic status, low social cohesion and bad neighborhoods contribute to higher incidence of maltreatment. However having supportive adults, peers and/or siblings might prevent the incidence of maltreatment and/or mitigate the impact of maltreatment on the victims (Coulton, Crampton, Irwin, Spilsbury, & Korbin, 2007; Criss, Pettit, Bates, Dodge, & Lapp, 2002; Dubowitz & Bennett, 2007; Garbarino, Dubrow, Kostelny, & Pardo, 1992; Hazen, Connelly, Kelleher, Barth, & Landsverk, 2006; Merritt & Snyder, 2015). Through the present study, I evaluated how Exposure to In-Home Violence over time affects post-traumatic stress trajectories and the buffering effect of peer relationship on this association, in a nationally representative sample of children at risk for maltreatment.

Effects of Maltreatment

Maltreatment is associated with poor socio-behavioral outcomes such as depression, anxiety, eating disorders to name a few (Beach et al., 2010; Lansford, et al., 2002; Thornberry, Ireland, & Smith, 2001). Moreover the deleterious effects of

maltreatment are long lasting and have been observed in later life (Ciccheti & Toth, 2005). In addition to exhibiting signs of depression, anxiety and other behavioral and psychiatric conditions, the majority of maltreated children end up with a diagnosis of some psychiatric disorder as young adults (Guendelman, Owens, Galán, Gard, & Hinshaw, 2016; Silverman, Reinherz, & Giaconia, 1996). These later mental health problems are seen to be rooted in the impaired neural activity and the dysfunction in the serotonin, norepinephrine and dopamine systems (Kaufman & Charney, 2001).

Childhood abuse and neglect is associated with low self-compassion in adolescents which in turn results in greater psychological distress, alcohol problems and suicide attempts (Tanaka, Wekerle, Schmuck, & Paglia-Boak, 2011). Sexual abuse in childhood is seen to induce emotional problems in adolescent and prolonged sexual abuse also results in poor cognitive skills, thereby leading to poor coping skills (Bagley & Mallick, 2000; Maikovich-Fong & Jaffee, 2010).

Existing research demonstrates that maltreatment or trauma can often produce cognitive deficits, deregulation of the HPA (hypothalamic–pituitary–adrenal) pathways, increase cortisol production responsible for stress and arousal, and structural and functional changes to the brain. Improper glucocorticoid functioning is another biological anomaly among maltreated children and youth and is believed to be linked to mood disorders (Carpenter et al., 2007; Handwerger, 2009; Heim & Nemeroff, 2009; Margolin & Gordis, 2000; Scarpa, 2004; Watts-English, Fortson, Gibler, Hooper, & De Bellis, 2006). Maltreatment is also associated with PTS. Physical and sexual abuse are studied extensively to understand their role in PTS (Weaver, Griffin, & Mitchell, 2014; Widom,

1999). Moreover sustained effects of maltreatment are observed later in life on PTS and through adulthood (Kearney, Wechsler, Kaur, & Lemos-Miller, 2010; Widom, 1999).

The negative sequela of maltreatment is therefore very significant and it becomes important to understand both the familial and extra-familial factors contributing to its cause and/or reduction of its deleterious impacts. Knowing these risk and resilience factors can guide interventions that promote healthy developmental outcomes. In the present study, Exposure to In-Home Violence and Peer Relationship Quality was evaluated as to their roles in the development and process of PTS for children and youth at-risk for maltreatment.

Post-Traumatic Stress

Post-traumatic stress occurs as a result of a distressing event that is marked by feelings of vulnerability (American Psychiatric Association, 2000; Kearney, et al., 2010). For an individual to develop post-traumatic stress, they needn't experience direct injury themselves. In fact, loss of a close relative or witnessing the victimization of a close relative can also trigger post-traumatic stress (Kearney, et al., 2010; Pina et al., 2008; Saldinger, Cain, & Porterfield, 2003; Thabet & Vostanis, 2000).

PTS is common among victims of maltreatment. Wechsler-Zimring & Kearney (2011) reported that sexual and physical abuse dimensions of maltreatment have greater impact on the symptoms of post-traumatic stress among adolescents compared to neglect. However before understanding the development and role of post-traumatic stress among maltreated adolescents, it is important to understand the etiology and phenomenological dimensions of post-traumatic stress in general and among maltreated individuals in particular.

Symptoms of post-traumatic stress include ruminating thoughts and feelings around the trauma, inability to feel and express emotions, and avoidance of things related to the traumatic event (American Psychiatric Association, 2000; Kearney, et al., 2010). Post-Traumatic stress can also cause changes in biological systems particularly the amygdala and the hippocampus (Kearney, et al., 2010; Rauch et al., 2000; Schuff et al., 2001). These alterations are directly related to PTS symptomology because the amygdala regulates fear responses and the hippocampus dysregulation results in intrusive thoughts and cognitive problems (Kearney, et al., 2010; Vasterling, Brailey, Constans, & Sutker, 1998; Yehuda, 2002). Moreover, PTS can affect family life wherein the individual with PTS can express both anger and withdrawal from other members of the family (Dekel & Monson, 2010; Galovski & Lyons, 2004). Also stress symptoms can often be transmitted among family members. A case in point would be heightened psychopathology symptoms among children and spouses of war veterans of World War II, Korea, Vietman, The Gulf War and holocaust survivors (Blore, Sim, Forbes, Creamer, & Kelsall , 2015; Galovski & Lyons, 2004; Van Ijzendoorn, Bakermans-Kranenburg, & Sagi- Schwartz, 2003; Zerach & Solomon, 2016).

Effects of post-traumatic stress over time reveal somewhat mixed findings, while some groups might indicate declines in traumatic stress over time, others groups indicate no or smaller declines in post-traumatic stress over time. For instance in a study of rape victims, it was observed that PTS symptoms were observed right after trauma but after 4 weeks of assessment only 65% of their sample met the requirement for clinical levels of PTS. While declines were steady in the group that did not meet the clinical level criteria, the declines were slower from week 4 to 12 for all PTS groups and several women still

reported PTS symptoms at the end of week 12 (Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992). Another study assessing factors impacting PTS and depression following a traumatic event also found differences between individuals in PTS trajectories. The study identified education, type of trauma, anger and self-efficacy as important factors leading to 4 different PTS trajectory patterns (deRoon-Cassini, Mancini, Rusch, & Bonanno, 2010). A study by McCrae, (2008) using the first cohort of The National Survey of Child and Adolescent Well-Being (NSCAW) also demonstrated the PTS does decline over-time in children at risk for maltreatment. While these studies evaluate PTS trajectories, the majority of studies evaluating PTS do not take into account ongoing exposure to violence or stressors. Therefore the study presented here adds to existing knowledge by helping us understand how the changes in ongoing Exposure to In-Home Violence impacts changes in PTS.

Maltreatment, Exposure to In-Home Violence and Post-Traumatic Stress

In several studies, researchers try to understand the role of maltreatment on PTS in children and youth. In a nationally representative sample of maltreated children greater post-traumatic stress was reported for younger children, those who had higher incidences of exposure to in-home violence, those with an abuser who was not a relative and those with depression. Moreover out-of-home placement was associated with higher magnitudes of post-traumatic stress symptoms due to the traumatic experience of being separated from loved ones (Kolko et al., 2010). Maltreated girls with post-traumatic stress are more likely to indulge in risky sexual behaviors compared to maltreated boys with similar symptomology (Cavanaugh, 2013). Victims of sexual and physical abuse show more symptoms of post-traumatic stress relative to victims of neglect. This is

understandable given the physically intrusive nature of sexual and physical abuse (Kearney, et al., 2010; Ozer, Best, Lipsey, & Weiss, 2008). In addition, exposure to familial violence is now recognized as a factor affecting post-traumatic stress symptoms among adolescents because severity and intensity of familial violence produce post-traumatic stress symptoms among some adolescents (Margolin & Vickerman, 2011).

While children who are exposed to violence at home do not always develop clinical levels of post-traumatic stress, a large proportion of these children exhibit one or more symptoms associated with post-traumatic stress (Graham-Bermann & Levendosky, 1998; Margolin & Vickerman, 2011). Moreover the lack of awareness of the ongoing violence at home (both victimization of the child as well as witnessing violence at home by the child) by those outside of the household, makes the children extremely vulnerable (Margolin, 1998; Margolin & Vickerman, 2011).

Younger children exhibit different symptoms of post-traumatic stress compared to adolescents in several ways. Younger children have difficulty verbalizing their problems and may indulge in repetitive behavior acting out the traumatic event. Moreover they are likely to have nightmares associated with the trauma and may exhibit affective behaviors following trauma. Adolescents on the other hand display symptoms similar to those exhibited by adults and tend to be more agitated (American Psychiatric Association, 2000; Kearney, et al., 2010). Nevertheless, post-traumatic stress both in youth and children are related to several negative mental health outcomes such as depression, psychosis, attention deficit hyperactivity disorder, suicidal ideation, and mood disorders as well as on other socio-emotional and academic dimensions (Famularo, Fenton, Augustyn, & Zuckerman, 1996; Giaconia et al., 1995; Margolin & Vickerman, 2011).

Exposure to intentional in-home violence (violence targeted at a person) compared to exposure to traumatic events at home that are not intended to harm a person have greater bearing on an individual's mental health "because they shake the foundations of human trust and charity that could cast a long shadow on social adjustment" (pp. 109, McCloskey & Walker, 2000). Children are seen to have greater fear response in the presence of witnessing and experiencing adult Exposure to In-Home Violence (Hennessy, Rabideau, Cicchetti, & Cummings, 1994; Margolin & Vickerman, 2011). Higher proportions of children who reported being victimized by their fathers showed PTS compared to those that saw their father victimizing their mother (McCloskey & Walker, 2000). Therefore there might be difference in PTS in children who are direct victims of aggression at home compared to those that witness aggression at home.

There is mixed evidence on the role of ongoing violence compared to a single traumatic event on PTS. Clinical observation studies show that ongoing violence and single traumatic events can affect children differentially particularly with regards to their PTS symptoms. Children with ongoing violence do not show symptoms typically associated with PTS and instead use maladaptive coping mechanisms (Margolin & Vickerman, 2011; Terr, 1991). However another study suggests no difference in symptoms between on-going and single event trauma (Rossman, Bingham, & Emde, 1997). Other studies suggest that ongoing violence exposure at home is associated with child's PTS symptoms and the association is moderated by child's emotion regulation (Katz & Gurtovenko, 2015; Levendosky, Bogat, & Martinez-Torteya, 2013). However none of these studies include evaluation of changes in exposure to violence over time and how that might affect the trajectory of PTS.

Family violence can also disrupt family life and in some instances occurrences of daily living. Family violence is often comorbid with several types of maltreatment (Margolin & Gordis, 2000). The chronic and prolonging nature of in-home violence make it difficult to tease out one particular traumatic event that acts as a trigger for PTS for children and a child may develop generalized reaction to all stressful life events; even small stressors might trigger the child to exhibit significant traumatic reactions. Moreover in many instances a parent is either a perpetrator towards the child or towards another member of the household. Additionally the victimized parent may be pre-occupied with their own trauma and may therefore become emotionally unavailable to the child. Living in such uncertain circumstances combined with the lack of emotional support at home may make these children extremely vulnerable to developing traumatic stress (Dutton, 2000; Margolin, 1998; Margolin & Vickerman, 2011).

Therefore it is important to understand how both witnessing aggressive behavior and being victims of aggressive behaviors at home over time can impact children's PTS. For the purpose of this study, witnessing Exposure to In-Home Violence consists of the child or youth seeing any acts of aggression towards another person in the house that they live in and victimization due to Exposure to In-Home Violence comprises of aggression directed towards the child herself.

Risk and Resilience and the Impact of Peer Relations

Risk factors both for the occurrence of maltreatment as well as poor well-being outcomes resulting from child maltreatment are well documented in the literature (Brown, Cohen, Johnson, & Smailes, 1998; Haskett, Nears, Sabourin Ward, & McPherson, 2006; Thornberry et al., 2014). However, less is known about resilience

factors, factors that mitigate the influence of maltreatment and other violence exposures on mental health outcomes.

Resilience has been defined as the ability of an individual to adapt given adverse situations or have positive outcomes despite exposure to adverse situations (Luthar, 2006; Masten, 2001; Masten 2011). Such positive outcomes could be the ability to return to baseline behavioral, emotional and social responses in the presence of stressors (Neuman & Fawcett, 2002).

Most studies of environmental factors and maltreatment have a focus on how the environment impacts the incidence of maltreatment. Most studies on resilience among maltreated adolescents focus on family and individual factors, such as child intelligence level and parents anti-social behavior (Cicchetti, 2013; Jaffee et al., 2007), while failing to acknowledge other influences on resilience in maltreated children (Haskett, et al., 2006).

Not all individuals who experience trauma exhibit prolonged signs of traumatic stress and some of them bounce back more quickly. Studies with Cambodian adolescents exposed to war trauma show that though these adolescents show symptoms of PTS, several of these adolescents also show resilience over time by carrying on daily activities of living and demonstrating appropriate development over time (Hubbard et al., 1995; Masten, 2001; Masten, 2011). Therefore, while trauma induces traumatic stress, there are biological and environmental mechanisms of resilience that may lower traumatic stress over time.

Researchers have focused on internal resilience factors such as self-esteem and problem solving strategies for both maltreated and non-maltreated adolescents (Cicchetti,

2013; Dumont & Provost, 1999, Valentine & Feinauer, 1993). Self-esteem is seen to be positively influenced by participation in school activities among victims of abuse (Cicchetti, 2013; Valentine & Feinauer, 1993). Research indicates that internal locus of control and self-esteem are protective factors against symptoms of depression in maltreated adolescents (Moran & Eckenrode, 1992) but the protective influence of ecological systems in which the adolescent operates, is not well accounted for in research on PTS.

One potential ecological factor is peer relationships outside of the family. The transition from late childhood into early adolescent is marked by the increased influence of peers. As children develop so do the complexity and intensity of their friendships and they seek less support from their parents (Ammaniti, van Ijzendoorn, Speranza, & Tambelli, 2000; Arnett, 1999; Nickerson & Nagle, 2005; Paikoff & Brooks-Gunn, 1991). Peer relationships during this time are based on loyalty and faithfulness (Berndt & Perry, 1990; Damon, 1983). Supportive and better quality of peer relationship is associated with several positive outcomes such as better school performance and better psycho-social adjustment, and lower levels of negative outcomes such as school problems and depression (Bukowski, Hoza, & Boivin, 1993; Nickerson & Nagle, 2005; Reis & Shaver, 1988).

Maltreated children have difficulties forming friendships due to increased withdrawal behaviors and aggression and have lower intimacy with friends during adolescence (Flynn, Cicchetti, & Rogosch, 2014; Parker & Herrera 1996; Rogosch & Cicchetti 1994; Salzinger, Feldman, Hammer, & Rosaria, 1993). Also maltreated children show lower pro-social behaviors and view friendships in more negative terms than

positive (Salzinger et al., 1993). In addition to the social debility, maltreated children also have increasing unpopularity ratings by peers over time (Dodge, Pettit, & Bates, 1994; Teisl, Rogosch, Oshri, & Cicchetti, 2012). Severity of maltreatment in terms of time, and type of maltreatment was found to be directly related to greater problems in peer relationship, however low self-esteem did not influence this relationship (Bolger, Patterson, & Kupersmidt, 1998).

Extra – familial support is seen to reduce post-traumatic stress among youth (Pina et al., 2008). The impacts of peer relationships can be seen on a risk-resilience continuum. While peer isolation or poor peer relationships could negatively impact maltreated children and adolescents, positive peer relationships can be a buffering factor for maltreated children and adolescent. Lower externalizing behaviors are noticed among maltreated children with higher quality of peer relationships even in the face of severe violence at home and punitive discipline (Criss et al., 2002). Moreover supportive peer-relationships are seen to act as buffers benefiting the social and emotional development of maltreated adolescents (Cicchetti, Toth, & Maughan, 2000). Therefore, evaluating quality of peer relationship is one ecological factor that needs closer examination.

CHAPTER 2. PRESENT STUDY

This study is an evaluation of the dynamic relationship between Exposure to In-Home Violence (witnessing and victimization), Peer Relationship Quality and PTS, including the moderating effect of Peer Relationship Quality on the association between Exposure to In-Home Violence and post-traumatic stress in children age 8 to 17 involved with Child Protective Services (CPS) in the U.S. In the present study I anticipate that witnessing violence at home such as the victimization of another member of the household – a parent, sibling, grandparent et. cetra,- is enough to trigger PTS symptoms among this sample of at-risk children and youth. The National Survey of Adolescent and Child Well-Being (NSCAW) data include assessment of Peer Relationship Quality as well as Exposure to In-Home Violence and Post-Traumatic Stress. Latent parallel growth/trajectory models for Post-Traumatic Stress, Peer Relationship Quality and Exposure to In-Home Violence over time was performed. Child reported items were used for all three measures.

Research indicates that there is significant disparity between parent reports and adolescent self-reports of adolescent internalizing problems. In a study by Sourander, Helstelä & Helenius (1999), it was observed that adolescents often report more emotional and behavioral problems than their parents' report of their child's symptomology (Sourander, Helstelä, & Helenius, 1999). Moreover, parents of maltreated adolescents are

often impervious to their child's peer networks (Salzinger et al., 1993). It therefore becomes important to look at child reports to evaluate Peer Relationship Quality, Exposure to In-Home Violence and PTS symptoms.

Theoretical Perspective

The present study is based upon two theoretical perspectives – the Bioecological framework (Bronfenbrenner & Morris, 2006) and the developmental psychopathology model (Cicchetti, 1993; Rutter & Sroufe, 2000). The study is guided by the Bioecological framework primarily in the following ways (Bronfenbrenner & Morris, 2006). First, it includes evaluation of the role of proximal process – the role of violence exposure at home (on-going interaction with family members – parents, siblings and other members of the household). Ongoing Exposure to In-Home Violence over time is expected to have a positive effect on the post-traumatic stress trajectory over time. Second, the study also uses micro-system contextual factor in that it evaluates peer relationships (measured by relationship quality with peers) and its buffering role on the association between exposure to violence and post-traumatic stress. Third, from the Bioecological perspective, the effect of time or chronosystems is evaluated in the present study. Since the study includes the role of exposure to violence and peer relationship over time on the post-traumatic stress trajectory, the study thus includes the on-going nature of the proximal process and contextual factor (Bronfenbrenner & Morris, 2006).

The second theoretical model used in this study is the developmental psychopathology model which takes into account both proximal and distal factors to understand typical and atypical development while also taking into account the stage of development of the child. This study focuses on late childhood, early adolescence, and

adolescence and controls for the age of the child. Moreover this study's focus is child maltreatment which is associated with atypical development such as the development of PTS. Also, proximal processes within the family and with friends are used to understand this atypical development. From this perspective, the ongoing stressors as well as ongoing adaptation resulting from risk and protective factors, can be understood within the context of developmentally appropriate changes. In the present study, while chronic Exposure to In-Home Violence can have a pile up effect, Peer Relationship Quality as a contextual factor can affect adaptation to adversity (Belsky, 1993; Cicchetti, 1993; Cicchetti & Lynch, 1993; Rutter & Sroufe, 2000).

Specific Objectives

The first major objective of this study was to assess the effect of: 1) Exposure to In-Home Violence Witnessing and Peer Relationship Quality trajectories on PTS trajectories, 2) Exposure to In-Home Violence Victimization and Peer Relationship Quality trajectories on PTS trajectories, and 3) Exposure to In-Home Violence Witnessing and Victimization at home in combination and Peer Relationship Quality trajectories on PTS trajectories, for children age 8 to 17 involved with CPS in the U.S. The second major objective was to test the moderation effect of Peer Relationship Quality at baseline on the association between 1) baseline Exposure to In-Home Violence Witnessing, Victimization and Both violence Witnessing and Victimization, and baseline PTS, and 2) baseline Exposure to In-Home Violence Witnessing, Victimization and both violence Witnessing and Victimization, and PTS trajectories.

Specific Description and Hypotheses

In this project, the following was undertaken: 1) a description of how PTS and Exposure to In-Home Violence changes over time, 2) estimation of the association between levels and change over time in Exposure to In-Home Violence (Witnessing and Victimization and both combined) and levels and change over time in post-traumatic symptoms, and 3) testing of whether changes in Peer Relationship Quality over time had a main effect on the PTS trajectory and/or a buffering effect on the association between Exposure to In-Home Violence and post-traumatic stress.

1. It was hypothesized that due to biological and social resilience factors not evaluated in this study and due to contact with CPS and the associated interventions, post-traumatic stress for maltreated youth will reduce over time.
2. Moreover there will be a positive relationship between Exposure to In-Home Violence (Witnessing, Victimization and the combination of the two) and post-traumatic stress at baseline and over time.

2.1 Experiencing both forms of violence at home will have the strongest association with post-traumatic stress (baseline and over time), followed by Victimization due to Exposure to In-Home Violence which will have a stronger association with post-traumatic stress (baseline and over time) compared to Witnessing Exposure to In-Home Violence .

3. Peer Relationship Quality at school will have a negative effect on PTS both at baseline and over time. In other words higher scores on Peer Relationship Quality at baseline will predict lower PTS at baseline and more decline in

PTS over time. Moreover improving Peer Relationship Quality over time will predict greater decreases in PTS scores over time.

4. It is further hypothesized that positive Peer Relationship Quality at baseline will act as a buffer by dampening the effect of Exposure to In-Home Violence at baseline on post-traumatic stress at baseline and over time.

Plan of Research

Conceptual Framework. Figure 1 shows the conceptual Model that was used to test hypotheses in this study for each of the three types of Exposure to In-Home Violence.

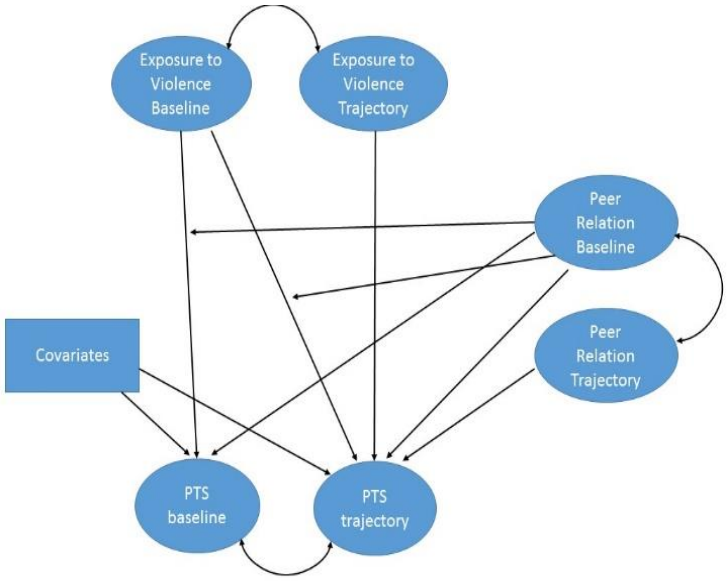

Figure 1. Conceptual model for testing associations between Exposure to In-Home Violence and post-traumatic stress and the buffering role of peer relationship at baseline.

CHAPTER 3. METHODS

Data

The data for the study come from the National Survey of Adolescent and Child Well-Being II (NSCAW II). NSCAW was the first nationally representative sample of children involved with the Child Protective Services (CPS) in the United States. NSCAW II is the second cohort of the NSCAW study. NSCAW II is a longitudinal study of a cohort of 5,873 children between the ages of birth and 17.5, who had contact with the child welfare system (substantiated and unsubstantiated cases) within a 15 month period beginning February, 2008. The primary purpose of the study is to understand well-being outcomes among children at risk for maltreatment.

Data was collected from children, caregivers, teachers, and caseworkers with face-to-face and Computer Assisted Personal Interviews. The NSCAW II sampling design is a two-stage, stratified, clustered design with unequal selection probabilities of observations. Eighty-one Primary Sampling Units (PSU), CPS agencies, were included in NSCAW II from 83 counties that agreed to participate in the study. Children were selected from these 81 agencies. Three waves of assessment were obtained at 18 month intervals. A subsample of 2,151 children (2,071 children with non-missing values on the predictor, outcome and moderator variables) who were between the ages of 8 and 17 at any of the 3 waves was used in this research.

Measures

Outcome – Post-traumatic Stress. The raw total item score for all 8 items (scores ranging from 1-32) at each time point for an adapted version (only the PTS module) of The Trauma Symptom Checklist for Children (Briere, 1996) was used to assess Post-Traumatic Stress. The Trauma Symptom Checklist for Children (Briere, 1996) is a valid and reliable measure of Post-Traumatic Stress in children (Briere, 1989; Briere, 1996; Lanktree & Briere, 1991).

The PTS items were scored on a scale of 1-4 with 1 being "never" and 4 being "almost all the time". The wording preceding these items was: "Now I am going to ask you how often different things happen to you. Pick your answer from this card. Tell me whether these things happen never, sometimes, lots of times, or almost all of the time." Example items include "bad dreams or nightmares" and "remembering scary things." See Appendix C for a full listing of the items from the checklist used in this research. Since the measure for PTS used in this study assesses symptoms associated with PTS, it is therefore capturing the phenomenological dimensions of PTS, not other forms of stress.

Predictor - Exposure to In-Home Violence. Exposure to In-Home Violence was measured three ways at each time point. Average score for all item (scores ranging from 1-4) for Witnessing violence at home (10 item average), violence Victimization at home (7 item average) and both forms of violence combined (17 item average) was measured at each time point using items from the VEX-R scale (Violence Exposure Scale for Children; Fox & Levitt, 1995). All items for this scale were asked of the children age 8 to 17.

The items that were included for the three types of violence at home in this study assess the intensity of exposure and are measured by the number of times a child witnessed or experienced a potentially violent act in the home. All items begin with "How many times have you seen… in a home you've lived in?" for witnessing and "How many times has an adult… you in a home you've lived in?" for victimization. Item responses included "never" (coded 1), "one time" (coded 2), "A few times" (coded 3) and "Lots of time" (coded 4). (VEX-R; Fox & Leavitt, 1995).

Items for violence witnessing at home included, seeing another person subjected to mild forms of violence such as slapping or shouting by another person in the household or seeing a person being subjected to severe forms of violence such as stabbing or shooting by others in the home. The victim domain consisted of children's personal experiences with similar mild and severe forms of violence at home. Appendix A includes all of the items that were used to create average scores for Exposure to In-Home Violence witnessing at home and Exposure to In-Home Violence victimization at home. The measure for both witnessing and victimization together at home was created by taking the average of the items from both subscales.

Moderator – Peer Relationship Quality. Peer Relationship Quality is a measure of the quality of friendships at school using average item scores for all ten items combined (range: 1-5) at each time point from the Loneliness and Social Dissatisfaction Questionnaire for Young Children (Asher & Wheeler, 1985). The responses to these items are coded on a 1-5 scale, with "never" being coded as 1, "hardly ever" coded as 2, "sometimes" coded 3, "most of the time" coded 4 and "always" coded as 5. All the items used to create the average score are included in Appendix B. Since items 4 to 10

(Appendix B), assess peer rejection and isolation, these items were reverse coded so higher scores are indicative of better quality of peer relationship.

Control variables. Several demographic variables were used as controls and include child's age at baseline, gender, and race. The most severe type of maltreatment exposure (physical abuse, neglect, sexual abuse and others type of maltreatment) at baseline was also controlled for in the study.

Models and Analysis

A three-process linear latent growth model was fit to the data where PTS, violence exposure type and Peer Relationship Quality trajectories were estimated simultaneously (Model 1). Model 1 did not include any directional estimates, in other words, in this model the slopes and intercepts of the three parallel processes were allowed to correlate with each other. This Model was used to assess mean levels at baseline and average change as well as degree of inter-individual difference in levels and change using latent growth variables. In the next model (Model 2 – see Figure 1) for each type of Exposure to In-Home Violence, directional associations were tested where baseline Exposure to In-home Violence and baseline Peer Relationship Quality predicted PTS at baseline and PTS change over time (slope), and the Exposure to In-home Violence slope and Peer Relationship Quality slope predicted the PTS slope. Finally covariates (Model 3) were added to Model 2. In Model 4, an interaction between the latent intercept for Peer Relationship Quality and the latent intercept for violence exposure was created and tested on the PTS intercept and on the PTS slope. The Model fit assessment indices for Models 1, 2 and 3 include the chi-square test, RMSEA, and the TLI and CFI fit indices.

Model 1 was used to evaluate hypothesis 1. Model 3 for each type of Exposure to In-Home Violence was used to answer hypotheses 2 through 3, respectively. Hypothesis 4 was tested using an interaction between the latent intercept for Peer Relationship Quality and the Exposure to In-Home Violence latent intercept. Maximum Likelihood (ML) estimation procedures suggested by Klein & Moosbrugger (2000) & Muthén (2012) were used to test the interaction between latent variables. The moderator variables were added to Model 3 for each type of Exposure to In-Home Violence separately (Model 4). The effect of baseline Peer Relationship Quality on the association between baseline Exposure to In-home Violence and baseline PTS was tested (Model 4). Next I tested the effect of baseline Peer Relationship Quality on the association between baseline Exposure to In-home Violence and the PTS slope (Model 4). Additionally, since the analysis was conducted over a large age range, the sample was then divided in three age groups based on baseline ages: pre-adolescents (8-9 years old), early adolescents (10-13 years old) and adolescents (14-17 year olds) to map on to three developmental stages. The final models were tested by age groups to see if there were differences in these models by child's baseline age. No differences were found in associations. Therefore for all three age-groups, baseline PTS scores and change in PTS scores over time were the same. Additionally, the association between Exposure to In-Home Violence and PTS, and association between Peer Relationship Quality and PTS both at baseline and over time were the same for all three age groups. Appendix E summarizes the result of these post-hoc tests.

Since the NSCAW II uses a complex sampling design, appropriate sampling weights were applied to correct for unequal selection bias for all analyses. Standard error

estimates were corrected for the nesting of children within agency. FIML was used to retain observation with missing values where a missing at random assumption was applied (Rubin, 1987). SAS version 9.3 was used for data management, and MPLUS 14 (Muthén & Muthén, 2015) was used for all the modeling and analysis.

CHAPTER 4. RESULTS

Table 1 summarizes the descriptive statistics for the sample of children pooling across the three time points. The *Mean* values for the categorical variables – race, type of maltreatment and gender denote the proportion of individuals of the total (*n*) in those categories. For instance for: Type of Maltreatment: Physical Abuse, indicates that the total no. of children who have non-missing values for the variable Type of Maltreatment is 1495 and the *Mean* = 0.30 indicates the 30% of the 1495 children with non-missing values for the Type of Maltreatment variable, had physical abuse (substantiated or unsubstantiated) reported as their most severe type of maltreatment. Similarly, 12% had sexual abuse (substantiated or unsubstantiated) reported as their most severe type of maltreatment, 37% had neglect (substantiated or unsubstantiated) reported as their most severe type of maltreatment and the remaining kids had other types of maltreatment reported as their most severe type of maltreatment. 49% of children in the sample were females and the 51% were males. Additionally, 30% were African American, 61% were Caucasian and 15% were of other race. The average age for the sample was 12. Measurement of time was in one-year units where baseline = 0, wave 1 = 1.5, and wave 3 = 3.

Model fit statistics for Models 1, 2, and 3 for all three types of Exposure to In-home Violence are summarized in Table 2. The Model fit for all the Models is great

according to most fit criteria; however, the $\chi 2$ value is significant for all Models with the exception of witnessing violence at home Models 1 and 2. The significant $\chi 2$ is likely due to the large sample size giving statistical power to detect small differences between the model implied and observed data covariance. Moreover the Model fit does not change dramatically for the Model without covariates (Model 2) and the Model with covariates (Model 3) for all three types of Exposure to In-home Violence. Model 1 for each type of Exposure to In-home Violence was used to test hypothesis 1 and the final Model (Model 3) tested hypothesis 2 and 3 for each of the three types of violence exposure at home.

Hypothesis 1: It was hypothesized that due to biological and social resilience factors not evaluated in this study and due to contact with CPS and the associated interventions, post-traumatic stress for maltreated youth will reduce over time.

In Model 1, average PTS at baseline was approximately 9.18 points (on a 32 point scale) and PTS decreased 0.58 points per year on average (See Table 3 and Figure 2). The estimates and their standard errors for PTS level at baseline and PTS slopes were comparable across Model 1 for the three types of Exposure to In-Home Violence . Therefore the first hypothesis that, PTS symptoms decreased on average in this population of children at risk for maltreatment is supported. The standardized effect for the PTS intercept ranges from $\beta_{intercept}$ = 1.87 to 1.88 and the standardized effect for the PTS slopes ranges from β_{slope} = -.41 to -.42 (See Table 3).

Moreover there was significant variance between children both for baseline PTS (witnessing Model 1: $\sigma^2_{intercept}$ = 23.84, *SE* (σ^2_i) = 3.07, $p < .001$; victimization Model 1: $\sigma^2_{intercept}$ = 23.92, *SE* (σ^2_i) = 2.93, $p < .001$; both forms Model 1: $\sigma^2_{intercept}$ = 24.01, *SE* (σ^2_i) = 2.97, $p < .001$) and over time (witnessing Model 1: σ^2_{slope} = 1.91, *SE* (σ^2_s) = 0.74, $p <$

0.05; victimization Model 1: σ^2_{slope} = 1.92, *SE* (σ^2_s) = 0.76, $p < 0.05$; both forms Model 1: σ^2_{slope} = 1.93, *SE* (σ^2_s) = 0.77, $p < 0.05$).

Average baseline Exposure to In-Home Violence Witnessing at home was 1.54 on a 4 point scale (*SE* ($b_{intercept}$) = 0.02, $\beta_{intercept}$ = 3.63, $p < .001$), average baseline Exposure to In-Home Violence Victimization at home was 1.59 points on a 4 point scale (*SE* ($b_{intercept}$) = 0.02, $\beta_{intercept}$ = 3.72, $p < .001$), and average baseline Exposure to In-Home Violence due to both (Victimization and Witnessing) was 1.56 points on a 4 point scale (*SE* ($b_{intercept}$) = 0.02, $\beta_{intercept}$ = 3.76, $p < .001$). There was significant variance between kids in average baseline Exposure to In-Home Violence Witnessing at home ($\sigma^2_{intercept}$ = 0.18, *SE* (σ^2_i) = 0.03, $p < .001$), average baseline Exposure to In-Home Violence Victimization ($\sigma^2_{intercept}$ = 0.18, *SE* (σ^2_i) = 0.04, $p < .001$), and average baseline Exposure to In-Home Violence due to both (Victimization and Witnessing) types ($\sigma^2_{intercept}$ = 0.17, *SE* (σ^2_i) = 0.03, $p < .001$).

On average, Exposure to In-Home Violence Witnessing at home decreased by 0.05 points over time (*SE* (b_{slope}) = 0.01, β_{slope} = -0.38, $p < .001$) and there were significant variance between kids (σ^2_{slope} = 0.02, *SE* (σ^2_s) = 0.01, $p < .01$) in change over time. Similarly, on average Exposure to In-Home Violence Victimization at home decreased by 0.06 points over time (*SE* (b_{slope}) = 0.01, β_{slope} = -0.62, $p < .001$). However there was no significant between kid variance in this average decrease over time (σ^2_{slope} = 0.01, *SE* (σ^2_s) = 0.01, $p > .05$). Also average Exposure to In-Home Violence due to both (Victimization and Witnessing) types decreased by 0.05 points over time (*SE* (b_{slope}) = 0.01, β_{slope} = -0.45, $p < .001$) and the variance between kids was statistically significant

(σ^2_{slope} = 0.01, *SE* (σ^2_s) = 0.01, p = .05) (See Figure 2 for average trajectories for each Exposure to In-Home Violence construct).

The average Peer Relationship Quality at baseline was 3.88 points on a 5 point scale and on average it increased by .05 points each year. Once again these findings for Peer Relationship Quality were comparable across Model 1 for the three forms of violence. Average Peer Relationship Quality at baseline and over time also varied between kids in the sample (See Table 3 and Figure 2 for the average peer relationship trajectory). Appendix D include the covariance matrices for Model 1 across the three types of Exposure to In-home Violence.

The parameter estimates for Model 3 for all three types of Exposure to In-Home Violence are summarized in Table 4 and Figures 3, 4 and 5. Hypothesis 2 and 3 are partially supported for each type of Exposure to In-home Violence controlling for child gender, baseline age, child's race and the most severe type of maltreatment the child was exposed to (substantiated or unsubstantiated) at baseline.

Hypothesis 2: Moreover there will be a positive relationship between Exposure to In-Home Violence (witnessing, victimization and the combination of the two) and post-traumatic stress at baseline and over time.

Hypothesis 3: Peer Relationship Quality at school will have a negative effect on PTS both at baseline and over time. In other words higher scores on Peer Relationship Quality at baseline will predict lower PTS at baseline and more decline in PTS over time. Moreover improving Peer Relationship Quality over time will predict greater decreases in PTS scores over time.

For all three types of Exposure to In-home Violence, baseline Exposure to In-Home Violence was associated with baseline PTS in the direction hypothesized net of everything else in the Model. Peer Relationship Quality at baseline was also associated with baseline PTS in the direction hypothesized net of everything else in the Model (See Table 4). Higher levels of baseline Exposure to In-Home Violence, was associated with higher levels of baseline PTS and better Peer Relationship Quality at baseline was associated with lower levels of baseline PTS.

In the Exposure to In-Home Violence Witnessing and for both Exposure to In-Home Violence (Witnessing and Victimization) types, the change over time in Exposure to In-Home Violence was associated with change in PTS over time. Therefore, as Exposure to In-Home Violence increased over time, PTS over time also increased. However these effects were not observed for the model with Exposure to In-Home Violence Victimization.

Change in Peer Relationship Quality over time was also associated with change in PTS over time (for models with witnessing violence and for both forms of violence Model 3, controlling for all other effects). Therefore as Peer Relationship Quality increased over time, PTS decreased even more (See Table 4). Level of Exposure to In-Home Violence at baseline did not predict change in PTS over time for any of the three types of Exposure to In-Home Violence (See Table 4). This indicates that there are within time associations between PTS and Exposure to In-Home Violence, and between PTS and Peer Relationship Quality and there are associations in changes over time. However the degree of exposure at baseline does not relate to subsequent change over time in PTS.

The model accounted for 53.6% of the variance in the PTS intercept and 91.6% of the variance in the PTS slope for the Exposure to In-Home Violence both types (Model 3). Additionally, the model accounted for 53.4% of the variance in the PTS intercept and 95% of the variance in the PTS slope for the Exposure to In-Home Violence Witnessing (Model 3), and the model accounted for 51.5% of the variance in PTS intercept and 82.8% of the variance in PTS slope for the Exposure to In-Home Violence Victimization (Model 3).

Hypothesis 2.1: Experiencing both forms of violence at home will have the strongest association with post-traumatic stress (baseline and over time), followed by victimization due to Exposure to In-Home Violence which will have a stronger association with post-traumatic stress (baseline and over time) compared to witnessing inter-personal violence.

Hypothesis 2.1 was only partially supported. While both forms of Exposure to In-Home Violence had the strongest standardized effect ($\beta = 0.46$) for baseline Exposure to In-Home Violence predicting baseline PTS compared to Witnessing violence and Victimization due to violence, and a larger positive effect size for Exposure to In-Home Violence over time predicting change in PTS ($\beta = 0.82$) compared to Witnessing violence at home ($\beta = 0.80$). However, Exposure to In-Home Violence Victimization ($\beta = 0.43$) does not have a larger effect size compared to Exposure to In-Home Violence Witnessing ($\beta = 0.45$) for baseline violence exposure predicting baseline PTS. Moreover while Victimization over time does not predict change in PTS over time likely due to no statistically significant variance across kids in the slope of Victimization, Exposure to In-Home Violence Witnessing over time does predict change in PTS over time ($\beta = 0.80$).

All effect sizes for Exposure to In-Home Violence predicting baseline PTS and PTS over time are medium to large. Baseline Peer Relationship Quality predicting baseline PTS (witnessing: β= -0.44; victimization: β= -0.44; both forms of violence: β = -0.43) and peer relationship slope predicting PTS change over time (witnessing: β= -0.69; both forms of violence: β = -0.64) have moderate effect size.

Hypothesis 4: It is further hypothesized that positive Peer Relationship Quality at baseline will act as a buffer by dampening the effect of Exposure to In-Home Violence at baseline on post-traumatic stress at baseline and over time.

To test hypothesis 4, the interaction between baseline Peer Relationship Quality and baseline Exposure to In-Home Violence predicting the PTS intercept (witnessing Model 4: b = -0.040, SE (b) = 1.46, p > .05; victimization Model 4: b = -0.41, SE (b) = 1.85, p > .05; both forms Model 4: b = -0.30, SE (b) = 1.70, p > .05) was added to Model 3. This interaction effect was not significant across all three Models. The interaction effect was then tested as a predictor of the PTS slope (witnessing Model 4: b = 0.031, SE (b) = 0.155, p > .05; victimization Model 4: b = -0.335, SE (b) = 1.083, p > .05; both forms Model 4: b = -0.193, SE (b) = 1.149, p > .05). This interaction effect was also not significant across Models. Therefore, hypothesis 4 is not supported. Though Peer Relationship Quality has a main effect on PTS both at baseline and over time, baseline Peer Relationship Quality does not moderate the main effect of Exposure to In-Home Violence at baseline on PTS at baseline or over time.

CHAPTER 5. DISCUSSION

The aim of this study was to understand the dynamic association between Exposure to In-Home Violence and PTS, and the dynamic association between Peer Relationship Quality and PTS. PTS is common among victims of maltreatment, particularly those children subjected to physical or sexual abuse (Wechsler-Zimring & Kearney, 2011). While maltreated children tend to have difficulties forming friendships, higher quality of peer relationships among maltreated children is associated with lower externalizing behaviors even where there is increased Exposure to In-Home Violence and punitive discipline practiced by parents (Criss et al., 2002; Flynn, Cicchetti, & Rogosch, 2014). Although the effect of Exposure to In-home Violence on PTS has been examined previously among maltreated children (McCloskey & Walker, 2000; Margolin & Vickerman, 201) the processes of change in both these constructs over time and how changes in Exposure to In-Home Violence relates to changes in PTS has not been established. Similarly, Peer Relationship Quality and contextual factors are seldom examined as protective factors for maltreated children (Haskett, et al., 2006), and to my knowledge, the effect of Peer Relationship Quality on PTS in maltreated children has not been examined by any previous research. Therefore there is still inadequate understanding of how the contextual factor of peer relationship impacts PTS symptoms in the presence of Exposure to In-Home Violence. In this paper I not only look at the

association between Peer Relationship Quality and PTS, I also show the process by which change in Peer Relationship Quality, predicts levels of PTS and change in PTS.

Overall the results in this paper supported the hypotheses made. Consistent with extant research, baseline Exposure to In-Home Violence was predictive of baseline PTS and baseline peer relationship was predictive of baseline PTS in for three measures of violence exposure. The effect sizes for baseline Exposure to In-Home Violence witnessing ($\beta = 0.45$), baseline in-home victimization ($\beta = 0.43$), and baseline in-home witnessing and victimization together ($\beta = 0.46$), predicting baseline PTS are moderate to high. Research suggests that violence exposure at home for maltreated children is often co-morbid with forms of child maltreatment. A case in point would be that maternal domestic violence and child physical abuse often co-occur (Margolin & Gordis, 2000). In this study by controlling for the most severe form of maltreatment reported for the child, we are trying to examine the effects of violence exposure at home above and beyond the most severe type of maltreatment experienced by the child, and net of their Peer Relationship Quality level. The statistically significant and high standardized effects show the strong impact of Exposure to In-Home Violence exposure on levels of PTS at any given time point.

Further I found links between change in Exposure to In-Home Violence and change in PTS. The effect sizes for these changes for two types of Exposure to In-Home Violence are very high (Witnessing: $\beta = 0.80$, both forms: $\beta = 0.82$) and are capturing developmental processes rather than short-lived effects. These effects point at the importance of understanding chronic stressors at home in development of PTS in maltreated children. As Margolin & Gordis (2000) point out chronic stressors result in

dysregulation of the HPA (hypothalamic–pituitary–adrenal) pathways which is important for regulation of stress and arousal. Therefore we can conclude that it is not just within time associations that are important to understand but it is equally important to understand how change in chronic stressors account for pathology of PTS over time. These effects are also important because they control for all unobserved child and environmental characteristics that are static during the period of observation, providing stronger support for a fundamental relationship between the two.

Baseline effects of Peer Relationship Quality on baseline PTS is also moderately strong in all three Exposure to In-Home Violence models (witnessing: β = -0.45; victimization: β = -0.44; both forms: β = -0.43). We therefore have strong evidence for effects of Peer Relationship Quality on levels of PTS at a given time point. The effect size for the change in Peer Relationship Quality over time predicting the trajectory for PTS (witnessing: β= -0.69; both forms of violence: β = -0.64) predicting the trajectory for PTS is moderate to large. These large effect sizes for the Peer Relationship Quality slope predicting PTS slope once again point at developmental processes that are occurring over time. Therefore peer relationships are not just important at a given time point in reducing the negative effect of Exposure to In-Home Violence on PTS, but a more positive Peer Relationship Quality trajectory are important mechanisms essential for declines in PTS over time in presence of ongoing chronic Exposure to In-Home Violence.

Better Peer Relationship Quality is associated with better outcomes, peer isolation or rejection can lead to a wide variety of problems (Bolger, Patterson, & Kupersmidt, 1997; Cicchetti, Toth, & Maughan, 2000; Criss, Pettit, Bates, Dodge, & Lapp, 2002; Parker, & Herrera 1996; Rogosch & Cicchetti 1994; Salzinger et al. 1993). The present

study therefore contributes to these studies by corroborating that positive Peer Relationship Quality does reduce post-traumatic stress in the population of maltreated children who are exposed to Exposure to In-Home Violence. Margolin & Vickerman (2011) point out that very little is known about the factors that reduce post-traumatic stress and the lack of traumatic stress symptoms in some maltreated children. This research therefore helps further add to the gap in the literature by looking at peer relationship as a protective factor in the presence of Exposure to In-Home Violence in this population.

While the moderating effect of Peer Relationship Quality on the association between inter-personal Exposure to In-Home Violence and PTS was not statistically significant in the present study, Peer Relationship Quality still had significant main effects and therefore is a factor promoting lower levels of PTS in children experiencing maltreatment. Results from this study contribute to our understanding of the importance of peer relationship as a resilience factor and a mechanism that has direct effects on the level and change of post-traumatic stress in maltreated adolescents in the presence of Exposure to In-home Violence. As far as our knowledge goes, this is one the few studies to demonstrate the positive effect of Peer Relationship Quality in reducing levels of PTS at baseline (β: -.43 to -.45) and the positive effect of increases over-time in Peer Relationship Quality on PTS over-time (β: -.55 to -.69) and the large effect sizes show the importance of understanding the role of peer relationship quality on PTS.

This study adds to the body of research on traumatic experiences and PTS by evaluating dynamic associations, i.e., the relationship between changes in Exposure to In-Home Violence and changes in PTS over time and between changes in Peer Relationship

Quality and PTS over time. This suggests that these processes are intertwined and perhaps cannot be decoupled. Therefore the study captures the dynamic nature of these three processes simultaneously.

The practical impact of this study is that it helps policy makers, clinicians, child services workers and child protective services better understand the importance and interplay of inter-personal peer relationships and their impact on the mental health outcomes of maltreated youth. For example, clinicians could implement intervention programs aimed at improving peer relationships, including the social skills needed for such relationships in youth and children at risk for maltreatment. Additionally, the strong effects of Exposure to In-Home Violence on PTS above and beyond the most severe form of maltreatment reported, opens up other possible avenues for interventions and policy implementation. For example, improving parenting practices and family interventions focusing on violence reduction might prove helpful given these findings. Current research demonstrates the effectiveness of Triple P Parenting intervention and Incredible Years intervention in reduction of child maltreatment substantiation, injuries associated with child maltreatment, greater incidence of positive parenting and fewer externalizing behavior in maltreated children (Linares, Montalto, Li, & Oza, 2006; Prinz, Sanders, Shapiro, Whitaker, & Lutzker, 2009). It is likely that parenting intervention can have direct effects on PTS and reduce exposure to In-Home Violence in maltreated children. Additionally since where children start out on their Peer Relationship Quality and exposure to inter-personal violence do not relate to increases in PTS over time, effective interventions that reduce chronicity and escalation of Exposure to In-Home Violence and improve Peer Relationship Quality over time would likely help improve long-term mental

health outcomes for children at risk for maltreatment. Some interventions such as the Child and Family Traumatic Stress Intervention, which is a child-caregiver based intervention is aimed directly at reducing post-traumatic stress in children immediately following a traumatic event, has shown positive results in reducing PTS. An intervention like that can also prove useful in reducing PTS in at-risk children following trauma.

Limitations. The project utilizes youth reports to assess post-traumatic stress, Exposure to In-Home Violence, and Peer Relationship Quality. Youth reports are used in the current study because most maltreated adolescents will seek help for mental health problems only if advised to do so by a caregiver and as pointed out previously, parents often under report their children's emotional problems (Sourander, Helstelä, & Helenius, 1999). Moreover parents of maltreated children are often unaware of the child's friend circle (Salzinger et al. 1993). The project therefore used only youth self-reports because it is believed that this would help both researchers and practitioners understand the need to include youth self-report in assessing emotional problems particularly post-traumatic stress in adolescents since adolescents are more likely to report their own emotional problems as compared to their parents. While it is believed a single reporter can produced biased estimates and there might in fact be single reporter bias for baseline association estimates, the association estimated for changes over time in this study are free of reporter bias.

Another limitation of this study is that the hypothesized association between the victimization due to violence exposure at home slope and PTS slope is not significant in the study. Moreover the association between the Peer Relationship Quality slope and PTS slope is also not significant in the victimization due to violence exposure at home model.

This could be due to high correlation between the Peer Relationship Quality and victimization due to Exposure to In-Home Violence exposure at home -0.40. Even though the correlation is not statistically significant, the statistical significance is trending ($p = .08$). Moreover this correlation between the Peer Relationship Quality and victimization due to Exposure to In-Home Violence is higher than the correlation between the Peer Relationship Quality slope and the other two forms of violence victimization (witnessing: -0.17; both forms: -.24). So even though the association between the two slopes might not be statistically significant at $\alpha = .05$, it is possible that the shared variance between these two constructs might be contributing to the null findings. Moreover as noted previously, children who are maltreated tend to have difficulties forming friendships (Wechsler-Zimring & Kearney, 2011). So though not tested directly in this study, it is possible that physical forms of violence are related to poorer Peer Relationship Quality in maltreated children because such physical forms of Exposure to In-Home Violence are pathways explaining the association between maltreatment and difficulties in forming peer relationships. Another possibility for the lack of findings for the victimization domain could be that this construct was measured using fewer items compared to Exposure to In-Home Violence witnessing. It would then be likely that the effects of both forms of violence on PTS in this study could be driven by the witnessing violence domain. However the fewer items for victimization might result in non-significant findings for the association between victimization due to Exposure to In-Home Violence and PTS, it still would not explain the effects of peer relationship on PTS disappearing in the victimization model. Therefore, the first reasoning provided seems more plausible. Additionally, for the strong peer effects observed previously, since the direction of effects

is not known for certain, it is likely that children who are getting better on PTS at any given time point and over time might be forming better peer relationship.

A last limitation of this study is that sum scores for PTS, and average scores for Peer Relationship Quality, and Exposure to In-home Violence were used in this study. Since the age range used in this study is fairly large. It is likely that children in different developmental stages might have different items that account for these constructs and therefore the measure itself might be variant between the age groups. Creating sum scores and averages prevents us from exploring such measurement variance. Therefore since PTS symptomology might differ by different developmental stages, as would Peer Relationship Quality and experiences with ongoing Exposure to In-Home Violence, it might be important to look at measurement invariance between different age groups of children.

Future Directions. Peer Relationship Quality in this study was assessed as a contextual factor by testing its role as a moderator on the association between Exposure to In-Home Violence and PTS. However quality of any relationship is based on long enduring interactions and it might be important to look at peer relationship as a proximal process as suggested in the bioecological theory and test it as a mediating mechanism between Exposure to In-Home Violence and PTS and see if it explains the association between Exposure to In-Home Violence and PTS (Bronfenbrenner & Morris, 2006). This would help hone in on the exact mechanism by which Exposure to In-home Violence affects PTS in maltreated children. It is also likely that having PTS probably results in a lower ability to develop good quality friendship and looking at Peer Relationship Quality as a mediator might help establish this link.

Even though extant research points towards differences in PTS symptoms by age, and the dramatic shift in the importance of peer relationships from late childhood to early adolescence (Nickerson & Nagle, 2005), results of this study do not suggest age specific differences. Nevertheless, future research should also investigate the age specific differences over time in post-traumatic stress symptoms, peer relationship qualities and experiences with Exposure to In-home Violence.

Another possible avenue for future research to consider is to look at community violence and peer violence in addition to Exposure to In-Home Violence to understand the role of cumulative violence exposure on post-traumatic stress-symptomology for children at risk for child maltreatment.

Conclusion. This study is one of the first studies to understand the dynamic associations between Peer Relationship Quality and PTS, and between exposures to Exposure to In-home Violence and PTS. The results suggest that all forms of Exposure to In-Home Violence exposure is important in understanding levels of PTS. Moreover there are increased PTS symptoms with increased violence witnessing and both forms of violence exposure at home. However despite these negative effects of Exposure to In-home Violence, Peer Relationship Quality can still be protective factor for maltreated children particularly for their level of stress symptoms in the presence of any kind of in-home Exposure to In-Home Violence. Even though there are increases in PTS symptoms when some forms of Exposure to In-Home Violence increase, however when Peer Relationship Quality increases over time PTS symptoms are decreasing.

Table 1

Descriptive Statistics

Variable	n	Mean	s.e.
PTS_Total_Time1	1453	8.95	0.28
PTS_Total_Time2	1361	7.92	0.26
PTS_Total_Time3	1340	7.85	0.25
Exposure to In-Home Violence_Victimization_Time1	1429	1.57	0.02
Exposure to In-Home Violence_Victimization_Time2	1350	1.49	0.02
Exposure to In-Home Violence_Victimization_Time3	1309	1.42	0.02
Exposure to In-Home Violence_Witnessing_Time1	1432	1.52	0.02
Exposure to In-Home Violence_Witnessing_Time2	1351	1.45	0.02
Exposure to In-Home Violence_Witnessing_Time3	1314	1.39	0.02
Exposure to In-Home Violence_Both_Time1	1432	1.54	0.02
Exposure to In-Home Violence_Both_Time2	1351	1.47	0.02
Exposure to In-Home Violence_Both_Time3	1314	1.40	0.02
Peer Relationship Quality_Time1	1427	3.90	0.03
Peer Relationship Quality_Time2	1335	3.98	0.03
Peer Relationship Quality_Time3	1325	4.01	0.03
Age	1561	12.00	0.12
Race (African American)	2096	0.24	0.01
Race(Caucasian)	2096	0.61	0.02
Type of Maltreatment: Physical Abuse	1495	0.30	0.02
Type of Maltreatment: Sexual Abuse	1495	0.12	0.01
Type of Maltreatment: Neglect	1495	0.37	0.02
Gender	2151	0.49	0.02

Table 2

Model Fit

Witnessing Violence at Home	*CFI*	*TLI*	*χ2*		*df*	*RMSEA*	*90% CI RMSEA [LL, UL]*
Model 1	0.99	0.97	28.44		18	0.02	[0.00, 0.03]
Model 2	0.99	0.98	28.34		20	0.01	[0.00, 0.03]
Model 3	0.98	0.95	61.52	*	41	0.02	[0.01 ,0.02]
Victimization due to Violence at Home	*CFI*	*TLI*	*χ2*		*df*	*RMSEA*	*90% CI RMSEA [LL, UL]*
Model 1	0.98	0.96	33.36	*	18	0.02	[0.01, 0.03]
Model 2	0.98	0.97	32.77	**	20	0.02	[0.01,0.03]
Model 3	0.98	0.95	62.66	**	41	0.02	[0.01,0.02]
Violence at Home both Witnessing Violence and Victimization	*CFI*	*TLI*	*χ2*		*df*	*RMSEA*	*90% CI RMSEA [LL, UL]*
Model 1	0.98	0.96	31.703	*	18	0.02	[0.01, 0.03]
Model 2	0.98	0.97	31.53	*	20	0.02	[0.00, 0.03]
Model 3	0.98	0.95	63.71	***	41	0.02	[0.01, 0.02]

*p = .05,**p < .05, ***p< .01,
****p<.001

Table 3

Model 1 parameter estimates for PTS and Peer Relationship Quality

	Exposure to Violence Witnessing					Exposure to Violence Victimization					Exposure to Violence Both				
	b	*s.e.(b)*	*β*	δ^2	*s.e.*(δ^2)	*b*	*s.e.(b)*	*β*	δ^2	*s.e.*(δ^2)	*b*	*s.e.(b)*	*β*	δ^2	*s.e.*(δ^2)
PTS intercept	9.19***	0.3	1.87	23.84***	3.07	9.17***	0.3	1.88	23.92***	2.93	9.18***	0.3	1.87	24.01***	2.97
PTS slope	-0.59***	0.1	-0.42	1.91*	0.74	-0.57***	0.1	-0.4	1.92*	0.76	-0.58***	0.1	-0.4	1.93*	0.77
Peer Relationship Quality Intercept	3.88***	0.3	7.7	0.25***	0.04	3.88***	0.3	7.7	0.25***	0.04	0.317***	0.3	7.71	0.25***	0.04
Peer Relationship Quality Slope	0.05***	0.3	0.32	0.03**	0.01	0.05***	0.1	0.32	0.05**	0.01	0.05***	0.1	0.32	0.03**	0.01

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

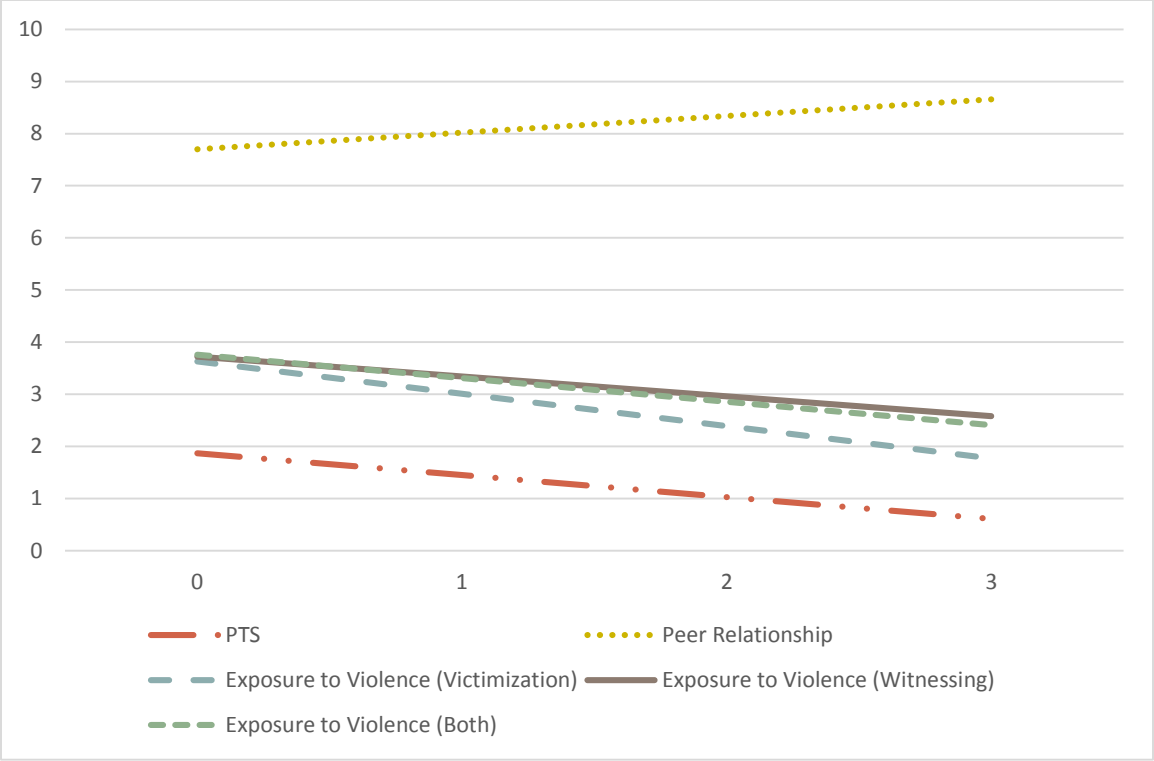

Figure 2. Exposure to In-Home Violence, Peer Relationship Quality and PTS trajectories over the three time points standardized scores. *(Note: The three Exposure to In-Home Violence have similar levels of decline over time).*

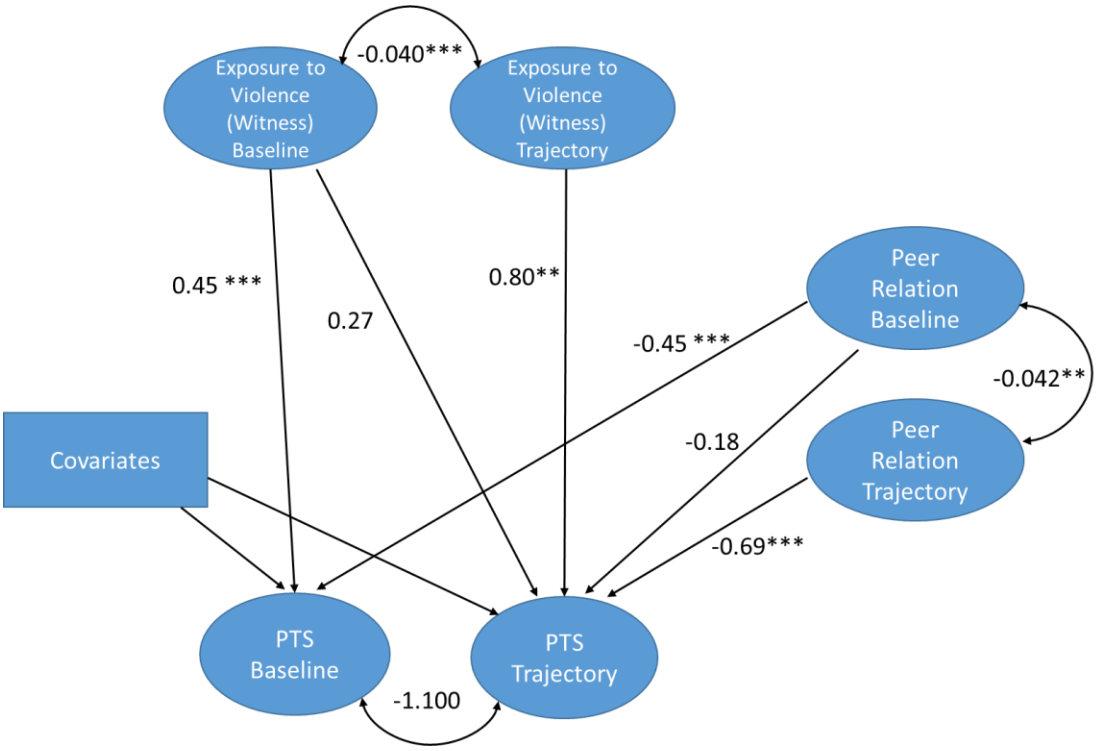

Figure 3. Exposure to In-Home Violence: Witnessing and Peer Relationship predicting PTS standardized effects (Model 3)

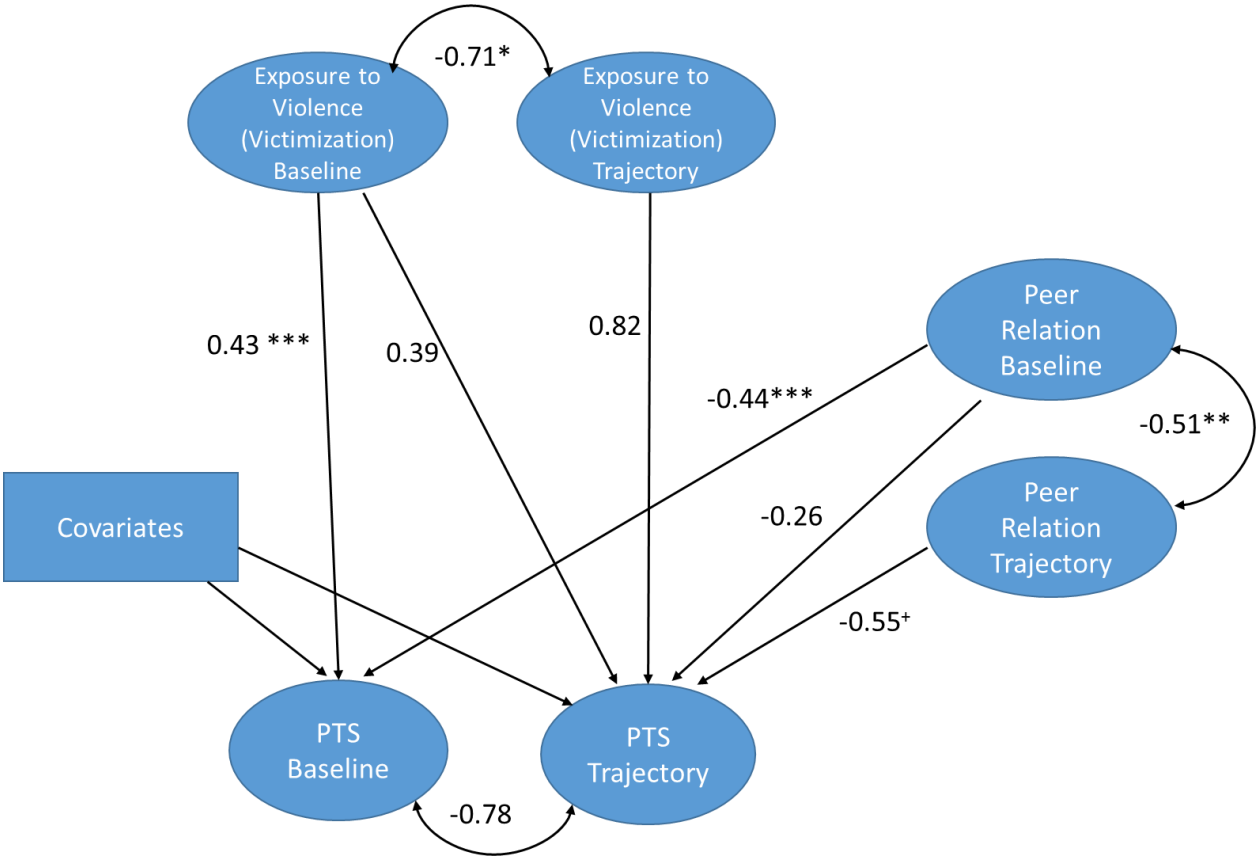

Figure 4. Exposure to In-Home Violence: Victimization and Peer Relationship predicting PTS standardized effects (Model 3)

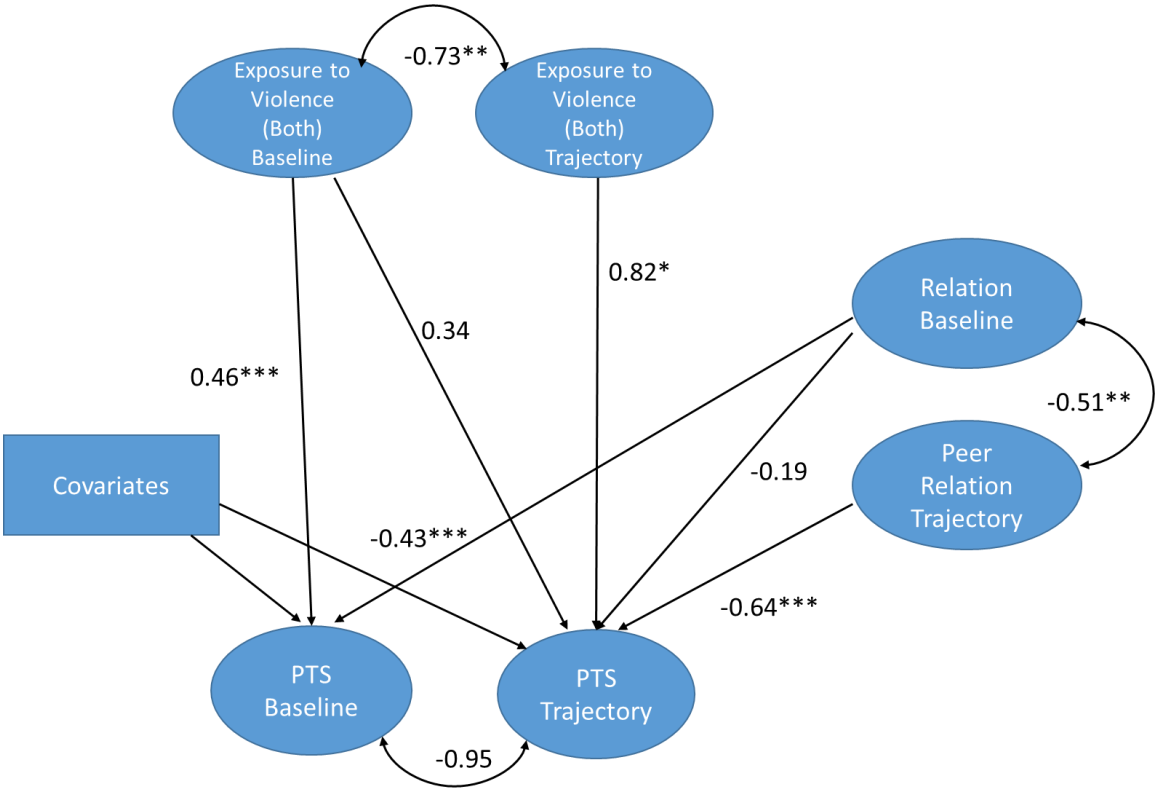

Figure 5. Exposure to In-Home Violence: Both and Peer Relationship predicting PTS standardized effects (Model 3)

Table 4

Regression Parameter Estimates

Predictors	Exposure to Violence Witnessing			Exposure to Violence Victimization			Exposure to Violence Both		
	b	*s.e (b)*	*β*	*b*	*s.e (b)*	*β*	*b*	*s.e (b)*	*β*
Exposure to In-Home Violence intercept---> PTS intercept	5.08***	0.94	0.45	4.88***	0.9	0.43	5.35***	0.97	0.46
Exposure to In-Home Violence intercept---> PTS slope	0.89	0.73	0.27	1.294	1.76	0.39	1.16	0.87	0.34
Exposure to In-Home Violence slope---> PTS slope	8.66**	3.17	0.80	12.902	14.37	0.82	10.24*	4.55	0.82
peer relationship quality intercept---> PTS intercept	-4.31***	0.75	-0.45	-4.20***	0.78	-0.44	-4.19***	0.77	-0.43
peer relationship quality intercept---> PTS slope	-0.50	0.4	-0.18	-0.731	0.69	-0.26	-0.54	0.42	-0.19
peer relationship quality slope--> PTS slope	-5.91***	1.53	-0.69	-4.759+	2.67	-0.55	-5.54***	1.49	-0.64
Covariates	Exposure to Violence Witnessing			Exposure to Violence Victimization			Exposure to Violence Both		
	b	*s.e (b)*	*β*	*b*	*s.e (b)*	*β*	*b*	*s.e (b)*	*β*
Age --> PTS intercept	-0.17	0.11	-0.1	-0.18	0.1	-0.1	-0.18	0.1	-0.1
Race (Caucasian) --> PTS intercept	-0.02	0.67	0	0.29	0.63	0.03	0.07	0.65	0.01
Race (African American) --> PTS intercept	0.1	0.57	0.01	0.17	0.51	0.02	0.12	0.54	0.01
Type of Maltreatment: Physical Abuse--> PTS intercept	1.11	0.69	0.11	1.13	0.79	0.11	1.1	0.72	0.1
Type of Maltreatment: Sexual Abuse--> PTS intercept	0.01	1.01	0	0.32	1.02	0.02	0.16	1.01	0.01
Type of Maltreatment: Neglect --> PTS intercept	0.72	0.61	0.07	1.02	0.68	0.1	0.85	0.62	0.09
Gender --> PTS intercept	-0.63	0.51	-0.07	-0.58	0.53	-0.06	-0.59	0.51	-0.06
Age --> PTS slope	0.03	0.06	0.05	0.06	0.07	0.11	0.04	0.06	0.07
Race (Caucasian) --> PTS slope	0.09	0.35	0.03	0.02	0.37	0.01	0.06	0.35	0.02
Race (African American) --> PTS slope	0.14	0.26	0.05	0.1	0.3	0.03	0.13	0.26	0.05
Type of Maltreatment: Physical Abuse --> PTS slope	-0.94	0.34	-0.31	-0.99	0.53	-0.32	-0.96**	0.34	-0.31
Type of Maltreatment: Sexual Abuse --> PTS slope	0.17	0.48	0.04	0.22	0.71	0.05	0.19	0.51	0.04
Type of Maltreatment: Neglect --> PTS slope	-0.7	0.31	-0.24	-0.43	0.33	-0.15	-0.62*	0.31	-0.21
Gender --> PTS slope	0.37	0.23	0.13	0.05	0.41	0.018	0.29	0.23	0.1

+ $p = .08$, *$p < .05$, **$p < .01$, ***$p < .001$

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APPENDICES

Appendix A Survey 1

Exposure to In-Home Violence Items (Violence Exposure Scale for Children; Fox and Levitt 1995)

Witnessing:

1. How many times have you seen an adult yell at another person in a home you've lived in?
2. How many times have you seen an adult throw something at another person in a home you've lived in?
3. How many times have you seen an adult push or shove another person really hard in a home you've lived in?
4. How many times have you seen an adult slap another person really hard in a home you've lived in?
5. How many times have you seen an adult beat-up another person in a home you've lived in?
6. How many times have you seen a person point a knife or a real gun at another person in a home you've lived in?
7. How many times have you seen a person stab another person with a knife in a home you've lived in?
8. How many times have you seen a person shoot another person with a real gun in a home you've lived in?
9. How many times have you seen a person being arrested in a home you've lived in?

10. How many times have you seen a kid getting spanked?

Victimization:

1. How many times has an adult yelled at you in a home you've lived in?
2. How many times has an adult thrown something at you in a home you've lived in?
3. How many times has an adult pushed or shoved you really hard in a home you've lived in?
4. How many times has an adult slapped you really hard in a home you've lived in?
5. How many times has an adult beaten you up in a home you've lived in?
6. How many times has an adult pointed a knife or a real gun at you in a home you've lived in?
7. How many times has a person spanked you?

Appendix B Survey 2

Items for Peer Relationship (Loneliness and Social Dissatisfaction Questionnaire for Young Children; Asher & Wheeler, 1985)

1. I have lots of friends at school. How often is this true about you?
2. I can find a friend when I need one. How often is this true about you?
3. I am well liked by the kids at school. How often is this true about you?
4. I have nobody to talk to at school. How often is this true about you?
5. I feel alone at school. How often is this true about you?
6. It's hard to get kids in school to like me. How often is this true about you?
7. There are no kids at school that I can go to when I need help. How often is this true about you?
8. I don't get along with other kids at school. How often is this true about you?
9. I'm lonely at school. How often is this true about you?
10. I don't have any friends at school. How often is this true about you?

Appendix C Survey 3

Post-Traumatic Stress Items (The Trauma Symptom Checklist for Children, Briere, 1996)

1. Bad dreams or nightmares
2. Remembering things that happened that I didn't like
3. Remembering scary things
4. Feeling scared of men
5. Feeling scared of women
6. Can't stop thinking about something bad that happened to me
7. Remembering things I don't want to remember
8. Wishing bad things had never happened

Appendix D Additional Tables

Table 5

Covariance for Model 1 (Witnessing Violence, n = 2071)

	PTS Slope	PTS intercept	Exposure to In-Home Violence Witnessing intercept	Exposure to In-Home Violence Witnessing Slope	Peer Relationship Intercept	Peer Relationship Slope
PTS Slope	-					
PTS intercept	-3.15*** (-0.47)	-				
Exposure to In-Home Violence Witnessing intercept	-0.17* (-0.30)	1.17*** (0.57)	-			
Exposure to In-Home Violence Witnessing Slope	0.13*** (0.72)	-0.29*** (-0.46)	-0.04** (-0.72)	-		
Peer Relationship Intercept	0.19** (0.28)	-1.41*** (-0.57)	-0.06*** (-0.26)	0.02* (0.23)	-	
Peer Relationship Slope	-0.16*** (-0.70)	0.20* (0.25)	0.00 (0.01)	0.00 (-0.17)	-0.04* (-0.51)	-

Note: Standardized Estimates (Correlations) included in parenthesis

*p < .05, **p < .01, ***p <.001

Table 6

Covariance for Model 1 (Violence Victimization, n = 2071)

	PTS Slope	PTS intercept	Exposure to In-Home Violence Victimization intercept	Exposure to In-Home Violence Victimization Slope	Peer Relationship Intercept	Peer Relationship Slope
PTS Slope	-					
PTS intercept	-3.14* (-0.46)	-				
Exposure to In-Home Violence Victimization intercept	-0.09 (-0.16)	1.16*** (0.56)	-			
Exposure to In-Home Violence Victimization Slope	0.08** (0.65)	-0.23*** (-0.53)	-0.02 (-0.73)	-		
Peer Relationship Intercept	0.20** (0.29)	-1.43*** (-0.58)	-0.07*** (-0.31)	0.02*** (0.47)	-	
Peer Relationship Slope	-0.17*** (-0.73)	0.21* (0.27)	0.00 (0.05)	-0.01† (-0.40)	-0.04* (-0.51)	-

Note: Standardized Estimates (Correlations) included in parenthesis

† $p = .08$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7

Covariance for Model 1 (Both forms of violence , n = 2071)

	PTS Slope	PTS intercept	Exposure to In-Home Violence Both intercept	Exposure to In-Home Violence Both Slope	Peer Relationship Intercept	Peer Relationship Slope
PTS Slope	-					
PTS intercept	-3.18* (-0.47)	-				
Exposure to In-Home Violence Both intercept	-0.15* (-0.25)	1.17*** (0.57)	-			
Exposure to In-Home Violence Both Slope	0.11*** (0.69)	-0.27*** (-0.48)	-0.04* (-0.73)	-		
Peer Relationship Intercept	0.20** (0.28)	-1.42*** (-0.58)	-0.06*** (-0.28)	0.02** (0.30)	-	
Peer Relationship Slope	- 0.16*** (-0.71)	0.20* (0.25)	0.00 (0.03)	-0.01 (-0.24)	-0.04* (-0.50)	-

Note: Standardized Estimates (Correlations) included in parenthesis

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

Appendix E Post-Hoc Analysis

Since the analysis was conducted over a wide age range, the sample was divided into three age groups: young (ages 8-9, n = 956), middle (ages 10-13, n = 651) and old (ages 14-17, n = 544) to map on to three developmental stages namely: late childhood, early adolescence and adolescence. I then conducted invariance tests for Model 1 and Model 3 for each kind of Exposure to In-home Violence to see if the final models for this paper were different across the three age groups.

Age Groups 1 and 2 (Young and Middle). Group 1 and 2 did not differ on the average PTS intercept or slope for Model 1 3 (Witnessing Model 1: *Wald's Test* (2) = 2.78, $p > .05$; Victimization Model 1: *Wald's Test* (2) = 1.62, $p > .05$; both forms Model 1: *Wald's Test* (2) = 2.15, $p > .05$). Nor did they differ on average peer relationship quality intercept or slope for Model 1 (Witnessing Model 1: *Wald's Test* (2) = 5.12, $p > .05$; Victimization Model 1: *Wald's Test* (2) = 4.74, $p > .05$; both forms Model 1: *Wald's Test* (2) = 5.09, $p > .05$). Lastly there were no differences between these two groups in average witnessing Exposure to In-Home Violence intercept or slope (*Wald's Test* (2) = 0.68, $p > .05$), average victimization due to Exposure to In-Home Violence intercept or slope (*Wald's Test* (2) = 1.06, $p > .05$) and average both forms of inter-personal violence exposure intercept or slope (*Wald's Test* (2) = 1.68, $p > .05$).

The Wald's test statistic was computed between group young and middle, for the Exposure to In-Home Violence Witnessing Model 3 (*Wald's Test* (6) = 2.37, $p > .05$), for Victimization due to Exposure to In-home Violence Model 3 (*Wald's Test* (6) = 5.90, $p > .05$) and both (Witnessing and Victimization) forms of Exposure to In-Home

Violence Model 3 (*Wald's Test* (6) = 3.36, $p > .05$) and no significant difference were found for Model 3 across the three types of maltreatment.

Age Groups 2 and 3 (Middle and Old). Group 2 and 3 also did not differ on the average PTS intercept or slope for Model 1 3 (Witnessing Model 1: *Wald's Test* (2) = 3.69, $p > .05$; Victimization Model 1: *Wald's Test* (2) = 3.48, $p > .05$; both forms Model 1: *Wald's Test* (2) = 3.73, $p > .05$). Nor were they different on average peer relationship quality intercept or slope for Model 1 (Witnessing Model 1: *Wald's Test* (2) = 5.53, $p > .05$; Victimization Model 1: *Wald's Test* (2) = 4.68, $p > .05$; both forms Model 1: *Wald's Test* (2) = 5.07, $p > .05$). There were no differences between these two groups in average witnessing Exposure to In-Home Violence intercept or slope (*Wald's Test* (2) = 0.76, $p > .05$), average Victimization due to Exposure to In-Home Violence intercept or slope (*Wald's Test* (2) = 4.28, $p > .05$) and average both forms of Exposure to In-Home Violence exposure intercept or slope (*Wald's Test* (2) = 2.07, $p > .05$).

Model 3 was tested for differences between the middle and old age groups. The Exposure to In-Home Violence Witnessing Model 3 (*Wald's Test* (6) = 9.92, $p > .05$), Victimization due to Exposure to In-home Violence Model 3 (*Wald's Test* (6) = 7.17, $p > .05$) and both (witnessing and victimization) forms of Exposure to In-Home Violence Model 3 (*Wald's Test* (6) = 8.44, $p > .05$) were not different between these two groups either.

Age Groups 1 and 3 (Young and Old). The same test for Model 3 was conducted to determine if the group young and old were different on Model 2, and the groups once again did not differ from each other: Exposure to In-Home Violence Witnessing Model 3 (*Wald's Test* (6) = 9.09, $p > .05$), Victimization due to Exposure to In-home Violence

Model 3 (*Wald's Test* (6) = 9.98, $p > .05$) and both (Witnessing and Victimization) forms of Exposure to In-Home Violence Model 3 (*Wald's Test* (6) = 10.06, $p > .05$). Therefore Model 3 with all age groups together for the three different types of Exposure to In-Home Violence is the best Model.

Moreover Group 1 and 3 also did not differ on the average PTS intercept or slope for Model 1 (Witnessing Model 1: *Wald's Test* (2) = 4.22, $p > .05$; Victimization Model 1: *Wald's Test* (2) = 4.25, $p > .05$; both forms Model 1: *Wald's Test* (2) = 4.29, $p > .05$). Nor were they different on average peer relationship quality intercept or slope for Model 1 (Witnessing Model 1: *Wald's Test* (2) = 5.62, $p > .05$; Victimization Model 1: *Wald's Test* (2) = 4.99, $p > .05$; both forms Model 1: *Wald's Test* (2) = 5.29, $p > .05$). There were no differences between these two groups in average Witnessing Exposure to In-Home Violence intercept or slope (*Wald's Test* (2) = 0.91, $p > .05$), average Victimization due to Exposure to In-Home Violence intercept or slope (*Wald's Test* (2) = 4.69, $p > .05$) and average both forms of Exposure to In-Home Violence exposure intercept or slope (*Wald's Test* (2) = 2.07, $p > .05$).

Given these results, the best solution is therefore to run Model 1 and Model 3 with the entire sample.