

Developmental Pathways from Childhood Maltreatment to Adolescent Psychopathology,  
Substance Use, and Revictimization

A Dissertation

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## Abstract

Decades of research have demonstrated the detrimental influence that childhood maltreatment has on various aspects of child development and it is important to gain a more complete understanding of the developmental pathways that confer risk for or protection from adverse outcomes. To examine this, the aim of the first study is to determine whether adolescent revictimization mediates the relationship between maltreatment and adolescent psychopathology and substance use. The second study examines whether the quality of relationships with close friends mediates the relationship between child maltreatment and adolescent revictimization, psychopathology, and substance use. Participants were 545 (295 maltreated, 250 non-maltreated) racially diverse (52.8% Black, 27.5% White, 12.8% Bi-racial) children and their families who participated in a weeklong summer camp in middle childhood ( $M_{age} = 7.6$  years). They were followed up twice in early-mid adolescence ( $M_{age} = 13.8$  years) and mid-late adolescence ( $M_{age} = 16.2$  years). Maltreatment was coded using Department of Human Services records. Psychopathology, substance use, revictimization, and friendship quality were assessed using adolescent self-report questionnaires. Structural equation modeling was used to analyze cross-lagged panel mediation models that allowed for examination of main effects, cross-lagged effects, and mediation simultaneously. Results of Study 1 revealed that revictimization occurring between early-mid and mid-late adolescence did not mediate the relationship between maltreatment and mid-late adolescent psychopathology or substance use. However, revictimization strongly and significantly predicted these outcomes whereas maltreatment was weakly related to psychopathology and unrelated to substance use. Results highlight the importance of further examining the

mechanisms by which revictimization increases risk for psychopathology and substance use and whether the relationship between maltreatment and adverse outcomes is attenuated when later victimization is accounted for. Results for Study 2 demonstrated that relationship quality with close friends in early-mid adolescence did not mediate the relationship between maltreatment and later adolescent revictimization, psychopathology, or substance use. Furthermore, friendship quality was actually unrelated to maltreatment and each of the outcomes examined. Results suggest the critical need for future research to seek greater understanding of the unique nature of maltreated children's friendships and the specific ways they may protect from, or even increase risk for, negative outcomes.



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## **1. Introduction**

Child maltreatment, most often defined as encompassing sexual abuse, physical abuse, neglect, and emotional maltreatment, has been described as one of the biggest threats to normative child development and adaptation (Cicchetti, 2013). When reviewing the decades of research studies detailing its impact, it is no wonder why. Child maltreatment has been demonstrated to have a far-reaching negative influence on various areas of children's lives from biological systems within the child to systems operating outside the child, e.g., interpersonal relationships (Cicchetti & Toth, 2016; Cicchetti & Valentino, 2006), and one of the most widely established impacts of child maltreatment is its influence on psychopathology.

### **1.1 Maltreatment and Psychopathology in School-aged Children**

A review of several studies of the influence of child maltreatment reported on the consistent links between maltreatment and aggressive/violent behavior, as well as higher prevalence of clinical-level psychiatric symptomatology and diagnoses such as anxiety, depression, Posttraumatic Stress Disorder (PTSD), Attention-Deficit/Hyperactivity Disorder (ADHD), and Oppositional Defiant Disorder (ODD; Cicchetti & Valentino, 2006). Many empirical studies have demonstrated the link between child maltreatment and psychopathology in school-aged children. Cross-sectional designs comparing maltreated school-aged children with demographically similar comparison samples have shown maltreated children to manifest significantly higher levels of depressive and anxiety symptomatology, as well as aggressive behavior, than their non-maltreated counterparts (Cicchetti, Rogosch, Gunnar, & Toth, 2010; Finzi et al., 2001; Trickett, Noll, Susman, Shenk, & Putnam, 2010). Longitudinal study designs comparing low-

income maltreated and non-maltreated school-aged children, who participated in a week-long summer day camp, have found similar links with maltreatment being associated with increased rates of internalizing and externalizing symptomatology in general (Cicchetti & Rogosch, 1997; Kim & Cicchetti, 2004; Manly, Kim, Rogosch, & Cicchetti, 2001; Vachon, Krueger, Rogosch, & Cicchetti, 2015). However, it is important to understand whether such associations extend into adolescence.

### **1.2 Maltreatment, Psychopathology, and Substance Use in Adolescence**

Adolescence is a period of vulnerability *and* opportunity. While it is characterized by the emergence of many mental disorders, it is also a period of plasticity in which maladaptation can be targeted for intervention. Studies have demonstrated strong links between history of maltreatment and mental health symptomatology in adolescence. A history of maltreatment was associated with ADHD and ODD in a wide age range (6-to-17-years-old) of children (Ford et al., 2000) and with PTSD in runaway and homeless adolescents, even after controlling for more proximal victimization (Whitbeck, Hoyt, Johnson, & Chen, 2007). Although, both study designs relied on data from a single time point and assessment of maltreatment was retrospective in nature. In data drawn from a follow-up of an epidemiological sample first assessed at the age of 9-10 years old and followed up in adolescence with 571 study members and their parents when participants were 14-15 years old, researchers found that the 10% of individuals in the sample who reported repeated or severe physical or sexual abuse in childhood had increased rates of adolescent psychiatric disorders and high rates of adult psychopathology (Collishaw et al., 2007). Specifically, abused individuals were considerably more likely to have suffered from adolescent minor depression or anxiety disorder than non-abused study

members. Other longitudinal studies demonstrating the impact of maltreatment on psychopathology in adolescence have demonstrated relations to adolescent aggression and violent behavior, depression, anxiety, dissociation, and PTSD (Hussey, Chang, & Kotch, 2006; Lansford et al., 2002).

Aside from the relationship between history of maltreatment and psychopathology in school-aged children and adolescents, there are a number of studies that have demonstrated the impact of maltreatment on substance use behavior as well. Multiple empirical studies have shown maltreatment to be associated with adolescent use of marijuana, tobacco, heroin, psychoactive substances, cocaine, and barbiturates, as well as history of ever using alcohol, preteen alcohol use, regular alcohol use, and binge drinking (Dubowitz et al., 2016; Hamburger, Leeb, & Swahn, 2008; Hussey et al., 2006; Lau et al., 2005; Moran, Vuchinich, & Hall, 2004). Furthermore, experiencing multiple subtypes of maltreatment further increases risk for substance use (Hamburger et al., 2008; Moran et al., 2004; Tonmyr, Thornton, Draca, & Wekerle, 2010) and a review of 31 studies measuring the link between maltreatment and use/abuse of substances determined the relation between maltreatment and alcohol use to be the most consistent finding out of the substances (Tonmyr et al., 2010).

### **1.3 Overview of the Current Studies**

Although childhood maltreatment has strong links to later psychopathology and substance use, not all maltreated children go on to develop negative outcomes and some may actually fare off quite well. Therefore, it is critical for us to gain a more complete understanding of the developmental pathways that place some maltreated children at a more heightened risk than others, whereas others appear to be doing relatively well in the



context of adversity. To address this, Study 1 focuses on risk by examining whether adolescent revictimization mediates the relationship between childhood maltreatment and psychopathology and substance use later in adolescence. Study 2 shifts the focus to resilience or protective factors by investigating whether the quality of relationships with close friends in adolescence mediates the relationship between childhood maltreatment and psychopathology, substance use, and revictimization in later adolescence. Additional background and predictions for Study 2 will be discussed in greater detail following a full discussion of Study 1.

## **2. Study 1 Additional Background and Literature Review**

### **2.1 Maltreatment and Increased Risk of Revictimization**

It is clear from the literature that there is strong evidence for the relation between maltreatment and psychopathology as well as substance use. Aside from these risks, an unfortunate reality for many maltreated children is that they will be victimized yet again later in life. This may occur in the form of additional maltreatment as demonstrated by a systematic review of cohort studies investigating factors associated with substantiated maltreatment recurrence. This review found that children who were maltreated previously were approximately six times more likely to experience recurrent maltreatment than children not previously maltreated, with a higher number of previous episodes increasing risk (Hindley, Ramchandani, & Jones, 2006). Beyond increased risk for experiencing maltreatment again, maltreated children are also more likely to be revictimized in other ways by people outside of their family. A review of about 90 empirical studies on revictimization in general showed two of three individuals who are sexually victimized will be revictimized, and a history of child sexual abuse (CSA) and its severity are the

best documented and researched predictors of sexual revictimization. In fact, another review of the literature on the link between CSA and sexual revictimization identified that approximately one of three CSA victims report experiencing repeated victimization and have a two to three times greater risk of adult revictimization than women without a history of CSA (Arata, 2002). Furthermore, experiencing multiple traumas, e.g., physical and sexual abuse, as opposed to CSA or physical abuse alone, was also associated with higher risk of revictimization (Arata, 2002; Classen, Paresh, & Aggarwal, 2005).

However, there are several limitations to the revictimization literature. Much of this literature tends to focus on sexual revictimization and CSA only despite evidence that child abuse of any type may be associated with increased risk for revictimization. Also, much of the revictimization literature focuses on undergraduate samples, making generalization difficult and potentially excluding those at greatest risk who do not have such educational opportunities (Arata, 2002). Furthermore, beyond focusing on undergraduate samples, the majority of studies examining this phenomenon focus on increased risk of revictimization in adulthood, especially in romantic relationships, as opposed to increased risk in adolescence, and many also rely on retrospective reports of child maltreatment (Arata, 2002; Benedini, Fagan, & Gibson, 2016). However, it is important to understand adolescent revictimization for a number of reasons. Arata (2002) notes in her review that adolescent revictimization may be an important mediating variable between child and adult sexual victimization and that the effects of CSA on risk for revictimization may actually be time-limited, with reduced risk the more time that passes without revictimization. Specifically, there are studies that have shown CSA actually does not predict adult sexual victimization if adolescent victimization is

considered. However, many studies do not distinguish between adolescent and adult revictimization or focus on all types of multiple or prior victimization experiences, as opposed to specifying what experiences occurred in childhood versus adolescence and/or adulthood.

Another important limitation of the revictimization literature is that there are very few prospective longitudinal studies in this area that are available to help ensure temporal ordering between maltreatment and subsequent victimization in adolescence or adulthood (Arata, 2002). One such study conducted by Benedini and colleagues (2016) found that children physically abused prior to age 12 had a greater risk of experiencing more intimidation and physical assault by peers at age 16. Also noteworthy was that a history of sexual abuse predicted physical assault as well, which demonstrates the importance of examining how maltreatment of any type may increase risk of different forms of victimization. Further evidence of this comes from a longitudinal study conducted on a national sample of 1,467 children aged 2-17 years old that asked about a range of victimization experiences including child maltreatment, conventional crime, property crime, physical assault, peer/sibling victimization, sexual victimization, and witnessing/indirect victimization (Finkelhor, Ormrod, & Turner, 2007). The sample was reassessed one year later, and the researchers found that revictimization risk for children victimized at baseline was high, with risk ratios ranging from 2.2 for physical assault to 6.9 for sexual victimization. Furthermore, victimization of any one type led to substantial vulnerability, even for different types of subsequent revictimization, with polyvictimized children (those experiencing four or more subtypes of victimization at baseline) at particularly high risk for continuing to be polyvictimized.

## **2.2 Revictimization as a Pathway from Child Maltreatment to Psychopathology/ Substance Use**

In addition to maltreated children being at increased risk for experiencing later victimization, according to Arata's (2002) review of the revictimization literature, repeat victims (those who have been sexually abused in childhood and sexually revictimized in adolescence/ adulthood) have more symptoms of PTSD and dissociation than women with a history of CSA alone. However, they note that findings tend to be inconsistent when considering the effects of revictimization on other measures of physical and emotional well-being/psychopathology aside from PTSD. In Classen and colleagues' (2005) review on sexual revictimization, they determined that when individuals who have been victimized in general – including in childhood, adolescence, or adulthood – are revictimized sexually, they are at greater risk of developing psychopathology, engaging in substance use, and overall maladjustment.

Several empirical studies with a range of populations examining the impact of multiple subtypes of childhood and adulthood victimization on various forms of psychopathology provide further insight. One such study that examined a sample of 2,000 Latina women demonstrated that experiencing multiple forms of victimization (i.e., physical assault, sexual assault, stalking, threats, and witnessed violence) in childhood and/or adulthood significantly predicted clinical levels of psychological distress (i.e., depression, anxiety, anger, and dissociation) over any specific form or single incident of victimization (Cuevas, Sabina, & Picard, 2010). In fact, stalking was the only type of single victimization to significantly predict clinical levels of one form of distress (dissociation) when multiple victimizations were factored into the researchers' statistical

model. Another study, focused on examining revictimization in 342 gay, lesbian, and bisexual men and women, found that sexually revictimized individuals reported the highest levels of psychopathology symptomatology (i.e., depression, PTSD and general psychological distress) when compared to individuals who experienced CSA only, adult sexual assault only, and nonvictims (Heidt, Marx, & Gold, 2005). A similar study, which also considered individuals who had experienced CSA only, adulthood rape only, both CSA and adulthood rape, or no sexual trauma in 97 women, found that being sexually victimized in childhood and raped in adulthood was associated with greater risk of experiencing psychopathology. Differences between revictimized and singly victimized individuals were most pronounced for Major Depressive Disorder, Bipolar Disorder, panic, Social Phobia, and Obsessive-Compulsive Disorder; however, multiply victimized individuals did not differ from singly victimized women in rates of PTSD (Thompson et al., 2005). Furthermore, Lang, Stein, Kennedy, and Foy (2004) found a positive relationship between number of types of childhood traumatization experienced and psychopathology in a sample of 42 female victims of intimate partner violence (IPV).

Although these studies do provide useful information about the impact of being multiply victimized on psychopathology, similar limitations of the literature that examine the occurrence of revictimization remain. Most notably, each of these studies were cross-sectional and thus, retrospective in nature, as they inquired adult participants about previous victimization experiences. Additionally, most of these studies examine the impact of revictimization in women only and even in Heidt and colleagues' (2005) study with gay, lesbian, and bisexual men *and* women, there was a sole focus on sexual victimization. Furthermore, by their design, these studies provide evidence for the

cumulative impact of being multiply victimized by demonstrating that revictimized individuals tend to experience greater rates/severity of psychopathology than singly victimized individuals or non-victims. However, they do not necessarily provide evidence for revictimization as a pathway to psychopathology.

Interestingly, one study using structural equation modeling (SEM) to examine the effects of childhood maltreatment on posttraumatic stress symptoms in an ethnically diverse, high-risk community sample of 99 female survivors of childhood abuse and adulthood IPV determined that there were no significant direct effects of child abuse on posttraumatic stress symptoms (PTSS) in adulthood. However, childhood maltreatment did indirectly affect PTSS in adulthood through IPV victimization in adulthood, suggesting that greater exposure to IPV in adulthood may mediate the effect of childhood maltreatment on PTSS (Lilly, London, & Bridgett, 2014). Though this study was cross-sectional and only examined women that had both experienced childhood maltreatment and recent IPV, the use of SEM helps to provide some indication of how revictimization may actually function as a mediator between maltreatment and psychopathology. One of the few prospective studies in this area examined the impact of revictimization in a sample of 70 abused children from the initial reporting of their CSA through adolescence and into early adulthood. They were then compared to women who had not experienced childhood abuse. In addition to the women with a history of CSA reporting twice as many subsequent rapes or sexual assaults and 1.6 times as many physical affronts, sexual revictimization was positively correlated with PTSD symptoms and peritraumatic dissociation. Physical revictimization was positively correlated with PTSD symptoms and pathological dissociation (Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003). This

prospective study with four time points provides a much stronger argument for the influence of revictimization on psychopathology. However, revictimization was measured only in the final time point and thus does not necessarily demonstrate a pathway from revictimization to PTSD and dissociative symptoms. Additionally, this focused on women with a confirmed history of CSA only that specifically involved genital contact and/or perpetration by a family member, thus limiting the generalizability.

Beyond heightened risk of psychopathology, studies have also noted how revictimization also increases risk for substance abuse/dependence. In Thompson and colleagues' (2005) study described earlier that compared 97 women with either a history of CSA only, adulthood rape only, both CSA and adulthood rape, or no sexual trauma, experiencing sexual revictimization was also associated with a particular risk for substance dependence, especially for alcohol, cocaine, and stimulants, compared to women who experienced a singular trauma. Another study found that in 34,643 adults aged 20 years and older, the odds of substance use disorders (SUDs) were generally higher among both female and male respondents who reported two or more victimization experiences than among those who reported no lifetime victimization, providing further evidence of a cumulative effect of victimization experiences on SUDS (Hughes, McCabe, Wilsnack, West, & Boyd, 2010). However, both of these studies are cross-sectional and since they examine history of victimization in adult participants only, also rely on retrospective reports.

A few papers from a group of researchers at Medical University of South Carolina examining the impact of victimization in national probability samples of women involved in the National Women's Study (NWS; Resnick, Kilpatrick, Dansky, Saunders, & Best,

1993) help to address some of the limitations of this literature. One paper, which describes a structured telephone interview of 4,008 women (ages 18-89 years) who were recontacted for 1- and 2-year follow-up interviews examined mental health status as a function of different types and combinations of exposure to interpersonal violence (i.e., sexual assault, physical assault, and witnessed violence). Researchers determined that the odds of substance use problems, as well as PTSD and depression, increased incrementally with number of different types of violence experienced. Furthermore, occurrence of new violence between baseline and the 2-year follow-up was a significant risk factor for past-year substance use problems and PTSD, but not depression, beyond that predicted by lifetime violence (Hedtke et al., 2008). An earlier paper on this same 3-wave longitudinal study using a sample of 3,006 of these women demonstrated that a new assault between baseline and 2-year follow-up increased risk of alcohol abuse and drug use at 2-year follow-up beyond risk accounted for by demographic variables, assault history, and even baseline alcohol/drug use/abuse. Furthermore, among women who were already engaging in substance use at baseline, who also were significantly more likely to report a history of assault, a new assault was associated with even further increased risk of continued substance use at 2-year follow-up (Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997).

These longitudinal studies' designs provide strong evidence of increased risk of substance use/abuse as a result of revictimization. However, the authors began assessments in adulthood, thus requiring long-term retrospective recall of childhood victimization and reporting of revictimization specific to adulthood. Kilpatrick and colleagues (1997) actually note that other papers using this sample indicate that first



substance use and victimization for these women tend to occur before the age of 18, which highlights the importance of conducting longitudinal research with younger age cohorts, e.g., adolescent and preadolescent groups. If not, then conclusions about the temporal sequence of victimization and alcohol and drug use are based solely on long-term retrospective report. Partly addressing this gap is a study examining associations between sexual revictimization, PTSD, and past-year substance use (i.e., marijuana, alcohol, illicit drugs, and non-medical use of prescription drugs) in three national female samples, which included 1,763 adolescent girls, as well as 2,000 college women, and 3,001 household-residing women. This study found that adolescent re-victims had greater odds of marijuana use, other illicit drug use, and non-medical use of drugs relative to single victims. Additionally, in the college women sample, revictimization was associated with at least twice the odds of all forms of substance use relative to no victimization and revictimized household-residing women also had increased odds of all forms of substance use (Walsh et al., 2014). This helps to confirm the profound impact of adolescent revictimization; however, this study was cross-sectional and each of the studies described by these researchers examining the influence of revictimization on risk for substance abuse/dependence were conducted with adolescent girls and/or women only.

### **3. Study 1 Aims and Predictions**

In order to address the limitations of the literature, the current study utilizes a longitudinal design to follow-up a sample of ethnically diverse maltreated and demographically similar non-maltreated boys and girls from when they were school-aged (ages 6-9 years) into early-mid adolescence (ages 13-15 years) and mid-late adolescence

(ages 15-18 years). The aim of the Study 1 is to examine whether adolescent revictimization provides a developmental pathway from early child maltreatment to adolescent psychopathology/substance use. Child maltreatment is assessed using Child Protective Service (CPS) records rather than retrospective self-report questionnaires and all four primary subtypes of maltreatment (i.e., physical abuse, sexual abuse, emotional maltreatment, and neglect) are included as opposed to focusing on CSA only. Information is also provided on the number of subtypes of maltreatment experienced. Revictimization is measured using adolescent self-report of history of physical and sexual assault and threats and thus, provides a broader view of revictimization experiences beyond the typical focus on sexual revictimization.

### **3.1 Previously Conducted Studies with the Current Sample**

The current study utilizes secondary data from a larger research project that aimed to follow-up children who had participated in a week-long summer camp when they were approximately 6-9 years of age. Children were followed up twice during adolescence (13-15 years and 15-18 years) in a laboratory setting. Child participants and their parents were administered several measures over multiple visits at both follow-up time points. There are a number of manuscripts that have already been published using these data, including some that examined the variables of interest in the current study. Specifically, results from these studies have found that child maltreatment occurring by ages 6-9 years predicted internalizing symptoms, externalizing symptoms, and substance use in early-mid (13-15 years) and/or mid-late (15-18 years) adolescence (Flynn, Cicchetti, & Rogosch, 2014; Handley, Rogosch, & Cicchetti, 2015; Oshri, Rogosch, Burnette, & Cicchetti, 2011; Rogosch, Oshri, & Cicchetti, 2010).

### 3.2 Predictions

The predictions for the current study are based on the literature review and findings from previous studies conducted with this dataset. These predictions are as follows:

- (1) Child maltreatment occurring prior to Wave 1 (childhood; ages 6-9 years) will predict significantly higher levels of psychopathology, substance use, and revictimization at Wave 2 (early-mid adolescence; ages 13-15 years).
- (2) Revictimization, psychopathology, and substance use will display stability and elicit cross-lagged effects from Wave 2 (early-mid adolescence) to Wave 3 (mid-late adolescence).
- (3) New revictimization experiences reported between Wave 2 (early-mid adolescence) and Wave 3 (mid-late adolescence) will partially mediate the effect of child maltreatment on psychopathology and substance use in Wave 3 (mid-late adolescence).

## 4. Study 1 Method

### 4.1 Participants

Participants were 545 children (295 maltreated, 250 non-maltreated) who took part in a multi-wave investigation. Youth were assessed at three time points during childhood (Wave 1;  $M_{age} = 7.6$  years,  $SD = 1.5$  years, Range = 5.1 to 12.5 years, 85.1% between ages 6 to 9 years), early-mid adolescence (Wave 2;  $M_{age} = 13.8$  years,  $SD = 1.1$  years, Range = 12 to 18 years, 90.3% were between ages 13 to 15 years), and mid-late adolescence (Wave 3;  $M_{age} = 16.2$  years,  $SD = 1.3$  years, Range = 15 to 21 years, 92.7%

were between ages 15 to 18 years)<sup>1</sup>. At Wave 1, maltreated children were identified by a county DHS liaison based on the presence of documented records of child maltreatment reports. Of those who met criteria for substantiated maltreatment, families were randomly contacted by the DHS liaison who explained the study. Interested participants signed consent forms to release their contact information to research staff, who subsequently recruited families for participation. Mothers of youth identified as maltreated completed the Maternal Maltreatment Classification Interview (Cicchetti, Toth, & Manly, 2003) to assess any maltreatment that may not have been included in DHS records. Furthermore, all maltreatment information was coded utilizing operational criteria from the Maltreatment Classification System (MCS; Barnett, Manly, & Cicchetti, 1993) to make independent determinations of maltreatment experiences including subtypes of maltreatment (i.e., sexual abuse, physical abuse, emotional maltreatment, and neglect), severity of maltreatment for respective subtypes measured on a 5-point scale (1 = *Minor*, 2 = *Moderate*, 3 = *Serious*, 4 = *Severe*, 5 = *Extremely Severe*), and other characteristics of maltreatment. Coding of records was conducted by trained research assistants, doctoral students, and clinical psychologists and the reliability of the MCS has been established in previous research (Bolger & Patterson, 2003; Manly et al., 2001).

Due to the maltreated sample being primarily from low-income backgrounds, demographically comparable families without a history of maltreatment were recruited through the Aid to Families with Dependent Children program. Eligible families were also randomly contacted by a DHS liaison and recruited in the same manner. Parental

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<sup>1</sup> Wave 3 age characteristics are based on 385 participants of the original sample who completed a demographic form.

consent was provided to review DHS records and the absence of maltreatment experiences was verified through DHS records and completion of the MMCI (Cicchetti et al., 2003).

The complete sample of 545 maltreated and non-maltreated children consisted of 328 boys (60.2%) and 217 girls (39.8%) who were diverse in race (52.8% Black, 27.5% White, 12.8% Bi-racial, 6.4% Other) and ethnicity (13.4% Latino). Maltreated and non-maltreated youth did not differ in terms of sex,  $\chi^2(1) = .27, ns$ ; ethnicity,  $\chi^2(1) = .54, ns$ ; family marital status,  $\chi^2(2) = 4.60, ns$  (28.8% never married, 35.5% married or living with a partner, 35.8% no longer married (i.e., divorced, separated, widowed)), family's history of receipt of public assistance,  $\chi^2(1) = .03, ns$  (92.7% history of ever receiving public assistance), or family annual household income,  $t(342) = 1.46, p = 0.14$  ( $M = \$22,844, SD = \$15,108$ ). However, child's race did differ across groups,  $\chi^2(3) = 16.40, p < .001$ , in that White children were significantly more likely to belong to the maltreated group and Black children were significantly more likely to belong to the non-maltreated group than expected by chance.

## 4.2 Procedure

During Wave 1 of the study, children attended a week-long summer day camp program and participated in various research assessments (see (Cicchetti & Manly, 1990) for detailed descriptions of camp procedures). Youth were subsequently recruited to participate at two waves during early-mid and mid-late adolescence (Wave 2 and Wave 3) spaced approximately two years apart and assessments were conducted in a laboratory setting. Adolescents and parents were administered a comprehensive battery of

assessments, which included measures of demographic characteristics, psychopathology, substance use, and victimization as assessed by community violence.

### **4.3 Measures**

**4.3.1 Psychopathology.** The Youth Self-Report (YSR; Achenbach, 1991) is a self-report measure that was administered to youth at Waves 2 and 3. The YSR measures a comprehensive set of behavioral disturbances and yields two broadband continuous dimensions of internalizing (i.e., anxious, depressed, withdrawn, somatic complaints) and externalizing (i.e., aggressive and rule-breaking behavior) symptoms. Youth are asked to respond to items ( $n=188$ ) based on how the item describes them now or within the past six months using a 3-point scale (0 = Not True, 1= Somewhat or Sometimes True, 2 = Very True or Often True). Raw scores are summed for internalizing and externalizing symptoms and transformed into T-scores based on normative data with higher scores reflecting greater symptoms. The YSR is a widely used and well-validated and reliable measure for 11- to 18-year-olds (Achenbach, 1991; Achenbach & Rescorla, 2001).

The Checklist of Child Distress Symptoms (CCDS; Richters & Martinez, 1993) was originally developed to assess distress in youth related to community violence exposure. This self-report measure was administered to adolescent participants at Waves 2 and 3. This checklist is used to assess post-traumatic stress disorder (PTSD) symptoms and includes 28 items with symptom descriptions. Responses are based on a 5-point Likert scale ranging from 0 (never) to 4 (most of the time) and participants are asked to answer based on their feelings and behaviors during the past six months. An overall total CCDS score is computed with higher scores corresponding to more adverse psychological symptoms.

**4.3.2 Substance use.** The Diagnostic Interview Schedule for Children (DISC; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) is a semi-structured psychiatric interview for children and adolescents designed for use by lay interviewers in epidemiological studies. Questions are organized around diagnostic categories in the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the measures provide diagnostic scoring for both the DSM diagnoses and symptom scales. The psychometric properties of the DISC have been extensively evaluated demonstrating its interrater reliability, test-retest reliability, criterion validity, and sensitivity (Fisher et al., 1993; Shaffer et al., 2000). The substance use module of the DISC was administered at Waves 2 and 3 and total counts of alcohol and cannabis abuse and dependence symptoms for the past year are summed.

**4.3.3 Revictimization.** The Community Violence Survey (Richters & Martinez, 1993) was administered at Waves 2 and 3 and asks children to rate the frequency with which they have experienced, witnessed, or heard about various acts of violence in their community. Responses can range from never to daily. This measure has good test-retest reliability. To measure revictimization that occurs outside of the family, responses to six questions will be considered. These questions ask about how many times the participant has been (1) threatened with serious physical harm by someone; (2) slapped, punched, or hit by someone; (3) beaten up or mugged; (4) sexually assaulted molested, or raped; (5) attacked or stabbed with a knife; or (6) shot with a gun. Responses range from “never” to “5 or 6 times” for questions about being attacked or stabbed with a knife or shot with a gun. Responses for the remaining four questions range from “never” to “almost every day.” For each question, participants are asked to indicate who the perpetrator was of the

incident and were permitted to circle one or more options. Options included a stranger, someone you know, a friend, someone in your family, and don't know. In order to reduce the likelihood of confounding reporting of these incidents with experiences of child maltreatment, responses were counted for participants indicating that the perpetrator was a stranger, someone you know, or a friend. For Wave 2 revictimization, a sum of the total types of revictimization experiences reported was computed. To assess for revictimization experiences occurring between Waves 2 and 3, a total of the types of revictimization experiences reported at Wave 3 that were not reported at Wave 2 was computed.

**4.3.4 Life Events Checklist.** The Life Events Checklist (LEC), administered at Wave 2, is a 46-item measure that assesses for major life events frequently experienced by older children and adolescents, including events the child or adolescent is likely to have little or no control over (e.g., “death of a family member”) and situations that are potentially under their control such as “being suspended from school” (Johnson & McCutcheon, 1980). Respondents are asked to indicate whether the event has occurred in the previous year and to appraise the event as good or bad. The total number of events appraised as “bad” will be used as a covariate for the Community Violence Survey measure at Wave 2, as the experience of such adversities has been found to influence risk for revictimization (Finkelhor et al., 2007).

## **5. Study 1 Data Analysis Plan**

All analyses were conducted in R version 3.4.1 (R Core Team, 2017). Pearson correlation analyses were run to determine associations between variables of interest. In order to examine study predictions over time, a path analysis within a structural equation



modeling (SEM) framework was conducted using the lavaan package in R, which was developed for latent variable modeling (Rosseel, 2012). Specifically, a cross-lagged panel mediation model was used, which allows for examination of cross-lagged and mediation effects simultaneously (Cole & Maxwell, 2003). A similar path analytic model was used to examine pathways from child maltreatment to relevant outcomes in a previous study published on this data (Flynn et al., 2014). Figure 1 displays the proposed statistical model for the relations between the primary variables of interest. Due to observed group differences in race across maltreated and non-maltreated youth in the sample, maltreatment was regressed on race, which was transformed into a dummy variable with “Black” race as the reference group. To account for the potential influence of child sex, this was used as a categorical control across all of the examined endogenous variables by regressing each of these variables on child sex.

In the proposed model, psychopathology is treated as a latent variable at both time points, which consists of YSR internalizing T-score, YSR externalizing T-score, and CCDS PTSD symptoms score at their respective time points. Prior to running analyses for the full proposed model, a confirmatory factor analysis (CFA) was conducted for the psychopathology measurement model using the lavaan package in R to determine if this provided a good fit to the data (see Figure 2). Model fit for the CFA and the full SEM model was evaluated using the comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). CFI and TLI values greater than or equal to .95, RMSEA and SRMR values less than .06, and a non-significant  $\chi^2$  statistic are considered evidence of good model fit (Bentler & Bonett, 1980; Brown, 2014; Hu & Bentler, 1999; Kline, 2010; Yu &

Muthen, 2002). However, CFI and TLI values above .90 and SRMR values less than or equal to .08 are considered acceptable. Additionally, several researchers have noted the limitations of the  $\chi^2$  statistic, partly due to its sensitivity to sample size, with larger samples being more likely to have a significant  $\chi^2$  despite providing an adequate to good fit to the data based on other fit indices. Nevertheless, based on these guidelines, examination of the fit indices revealed that this model provided a strong fit to the data by all values,  $\chi^2(5) = 8.93, p = .11, CFI = 1.0, TLI = .99, RMSEA = .04, SRMR = .02$ .

### **5.1 Missing Data**

For the present study, information on maltreatment status and child sex was provided for all participants. Child race was not reported for two participants (0.4%). Regarding variables examined at Wave 2, the percentages of missing data on each measure for the entire sample were as follows: YSR internalizing score – 1.5%, YSR externalizing score – 1.5%, CCDS PTSD score – 0.9%, DISC alcohol and cannabis abuse and dependence symptoms – 10.5%, Community Violence Survey number of revictimization experiences – 1.8%, LEC number of bad life events – 0.7%. Of note, adolescents completed a total of five visits over both adolescent waves. The YSR, CCDS, and LEC were all administered at Visit 1. The Community Violence Survey was administered at Visit 2 and the DISC was administered at Visit 3. Of the 385 participants who had follow up data for Wave 3, percentages of missing data on each measure for these participants were as follows: YSR internalizing score – 0.5%, YSR externalizing score – 0.5%, CCDS PTSD score – 0.3%, Community Violence Survey new revictimization occurring between Wave 2 and 3 – 4.7%, and DISC alcohol and cannabis abuse and dependence symptoms – 8.1%. Again, the YSR and CCDS were completed at

Visit 1 of this wave, the Community Violence Survey was administered during Visit 2, and the DISC was administered at Visit 3.

Participants followed up at Wave 3 did not differ from participants who completed Wave 2 only on any of the following child demographic characteristics: sex,  $\chi^2(1) = .65$ , ns; race,  $\chi^2(3) = .97$ , ns; ethnicity,  $\chi^2(1) < .001$ , ns. Furthermore, participants followed up at Wave 3 vs. those who completed Wave 2 did not differ on any of the Wave 2 variables: internalizing psychopathology,  $t(283.08) = .22$ ,  $p = 0.82$ ; externalizing psychopathology,  $t(309.48) = 1.51$ ,  $p = 0.13$ ; PTSD symptom score,  $t(287.86) = 1.36$ ,  $p = 0.17$ ; alcohol and cannabis abuse and dependence symptoms,  $t(302.54) = -.86$ ,  $p = 0.39$ ; number of revictimization experiences,  $t(272.75) = 0.07$ ,  $p = 0.94$ ; or number of life events,  $t(306.47) = .91$ ,  $p = 0.36$ . Due to lack of differences between participants followed up vs. those who completed Wave 2 only, path analyses proceeded as planned.

For path analyses, missing data were addressed using full information maximum likelihood (FIML), a method that maximizes the likelihood of the model with the observed data (Arbuckle, 1996). This method is currently the most common approach at present for handling missing data in SEM (Graham & Coffman, 2012) and is considered to be superior to ad hoc techniques (i.e., listwise deletion, pairwise deletion, and mean imputation) across missing data patterns (Enders, 2001). This method was utilized in previous studies using this data as well. The use of this cross-lagged path analytic model and FIML will help to ensure continuity and facilitate comparison with previous findings.

## **5.2 Power Analysis**

There is no universally agreed upon way to determine the minimum required sample size for path models in SEM and guidelines, as well as calculators for the appropriate sample size, vary widely. However, a few basic guidelines include that the sample size should be at least 200 or that an ideal ratio for sample size to number of parameters is 20:1. However, ratios of 10:1 or 5:1 are considered acceptable (Kline, 2005). The number of parameters in the model is 25, thus requiring a sample size range of 125 to 500 to be considered acceptable to ideal. Another guideline is that the sample size should be at least 50 more than eight times the number of variables in the model. Since there are ten variables in the model, based on this guideline, the required minimum sample size is 130. Based on these guidelines, there is adequate power to detect effects in this sample.

## **6. Study 1 Results**

### **6.1 Descriptive Statistics**

Within the sample of maltreated youth, 43% had experienced physical abuse, 15% experienced sexual abuse, 61% experienced emotional maltreatment, and 82% had experienced neglect. The majority of the maltreated sample (62%) had been exposed to more than one subtype of maltreatment ( $M = 2.0$ ,  $SD = .96$ ). Severity scores were calculated for each specific subtype of maltreatment that had been experienced. The average severity score for the maltreated sample (determined by summing all subtype severity scores and dividing this value by number of subtypes) was 3.10 ( $SD = .89$ ), which indicates that overall, the maltreated sample had experienced serious maltreatment (MCS; Barnett et al., 1993).

### **6.2 Correlations between Endogenous Study Variables**

Table 1 displays descriptive information and correlations among measures administered at Wave 2 and Wave 3. Notably, Wave 2 number of revictimization experiences, Wave 2 number of bad life events, Wave 2 and 3 internalizing, externalizing, and PTSD symptoms, and Wave 3 alcohol and cannabis abuse and dependence symptoms were all significantly and positively correlated with each other. However, Wave 2 alcohol and cannabis abuse and dependence symptoms were not correlated with Wave 2 number of bad life events or internalizing and PTSD symptoms at Wave 2 or 3. Though, they were significantly and positively correlated with externalizing symptoms at Wave 2 and 3, Wave 3 alcohol and cannabis abuse and dependence symptoms, and Wave 2 number of revictimization experiences. Additionally, number of new revictimization experiences from Wave 2 to Wave 3 were associated with all variables at Wave 3 (i.e., internalizing symptoms, externalizing symptoms, PTSD symptoms, and alcohol and cannabis abuse and dependence symptoms) but were not associated with either of these variables at Wave 2 or with Wave 2 bad life events. Surprisingly, these new revictimization experiences between Wave 2 and 3 were significantly and negatively correlated with revictimization experiences reported at Wave 2. Based on significant correlations among nearly all endogenous variables, all variables were included in the longitudinal path analysis.

### **6.3 Path Analysis**

A path analysis was conducted using the lavaan package in R version 3.4.1 (R Core Team, 2017) of the proposed model displayed in Figure 1. However, examination of fit indices for the overall model indicated that this model did not provide an adequate fit to the data,  $\chi^2(55) = 323.99$ ,  $p < .01$ , CFI = .84, TLI = .73, RMSEA = .10, SRMR = .10.

Due to this, relationships between variables could not be interpreted and the previous literature was reexamined to inform model respecification.

## **6.4 Model Respecification**

**6.4.1 Maltreatment.** To inform model respecification, literature was first reexamined regarding the exogenous variable, child maltreatment, and the ways in which it is measured in previous studies examining relationships between maltreatment and the variables of interest. Reviews of the revictimization literature have found that experiencing multiple traumas, e.g., physical and sexual abuse, as opposed to CSA or physical abuse alone, is associated with higher risk of revictimization (Arata, 2002; Classen et al., 2005) and that experiencing multiple incidents of victimization in general significantly predicts clinical levels of psychological distress (Cuevas et al., 2010) and higher odds of substance use disorders (Hughes et al., 2010). Furthermore, the experience of multiple subtypes of childhood abuse, childhood traumas, or adverse childhood experiences (ACEs) exhibits a dose-response relationship, in that risk for negative outcomes increases with higher numbers of subtypes, traumas, or ACEs (Chapman et al., 2004; Felitti et al., 1998). Aside from number of subtypes, severity of CSA is considered to be one of the best documented predictors of sexual revictimization risk (Arata, 2002) and previous publications using the current data set have found number of subtypes (Flynn et al., 2014) and maltreatment severity (Oshri et al., 2011) to be predictive of the outcomes of interest.

Due to evidence in the literature of the predictive value of number of maltreatment subtypes and severity of maltreatment for psychopathology, substance use, and revictimization, these variables were considered as predictors that may better capture

the variance. An examination of the correlation between number of subtypes and total severity demonstrated these to have substantial shared variance ( $r = .88, p < .001$ ). Due to the highly positive correlation between these maltreatment-related indicators, number of maltreatment subtypes was chosen as the exogenous variable for the respecified model in order to maintain consistency with original predictions comparing maltreated and non-maltreated youth and consistency with the way in which revictimization is measured.

Revised predictions are as follows:

- (1) Number of subtypes of child maltreatment occurring prior to Wave 1 (childhood; ages 6-9 years) will predict significantly higher levels of psychopathology, substance use, and revictimization at Wave 2 (early-mid adolescence; ages 13-15 years).
- (2) (Unchanged) Revictimization, psychopathology and substance use will display stability and elicit cross-lagged effects from Wave 2 (early-mid adolescence) to Wave 3 (mid-late adolescence).
- (3) New revictimization experiences reported between Wave 2 (early-mid adolescence) and Wave 3 (mid-late adolescence) will partially mediate the effect of number of subtypes of child maltreatment on psychopathology and substance use in Wave 3 (mid-late adolescence).

**6.4.1.1 Results of path analysis using maltreatment subtypes.** The proposed statistical model remains the same as Figure 1 with the dichotomous Wave 1 child maltreatment (yes/no) variable being replaced with Wave 1 number of maltreatment subtypes. Once again, a path analysis was conducted using the lavaan package in R version 3.4.1 (R Core Team, 2017) of the proposed model. However, examination of fit

indices for this model indicated that it also did not provide an adequate fit to the data,  $\chi^2(58) = 328.96, p < .01, CFI = .84, TLI = .74, RMSEA = .09, SRMR = .10$ . Notably, the values of the fit indices were nearly identical to those from the original model.

**6.4.2 Endogenous variables.** Model respecification continued with various manipulations to the endogenous variables in the model. These manipulations were based on information from the current literature in an attempt to identify if specific variables were contributing to the inadequate model fit.

**6.4.2.1 Psychopathology.** With regard to psychopathology, this was measured in the model as a latent variable comprised of internalizing, externalizing, and PTSD symptom scores. Although a CFA revealed that this measurement model provided a strong fit to the data, previous literature has found maltreatment to be linked with higher rates of internalizing psychopathology, externalizing psychopathology, individual internalizing and externalizing mental health and behavioral problems (e.g., depression, anxiety, aggression), and PTSD when these relationships are examined separately (Cicchetti & Rogosch, 1997; Kim & Cicchetti, 2004; Lansford et al., 2002; Manly et al., 2001; Whitbeck et al., 2007). Thus, the model in Figure 1 was respecified by entering internalizing, externalizing, and PTSD symptom scores in place of the latent variable, psychopathology, at both Waves 2 and 3 and by running three separate path analyses for each indicator of psychopathology. Additionally, number of maltreatment subtypes was preserved as the exogenous variable in each of these model manipulations due to minimal differences from the model using the dichotomous yes/no maltreatment variable as a predictor and evidence from the literature that number of subtypes is a better predictor.



However, model fit was substantially poorer overall. Thus, it was determined that considering various forms of psychopathology using a latent variable was optimal.

**6.4.2.2 Alcohol and cannabis abuse and dependence symptoms.** With regard to substance use/abuse, this was measured as a combination of alcohol and cannabis abuse and dependence symptoms. Similar to psychopathology, previous literature has found child maltreatment to be significantly related to both alcohol and marijuana use/abuse when examined separately. Furthermore, previous studies conducted with the current data set examined the influence of maltreatment on cannabis abuse/dependence symptoms only using the dichotomous yes/no variable and maltreatment severity as predictors (Handley et al., 2015; Oshri et al., 2011; Rogosch et al., 2010). Despite these studies not examining number of subtypes as predictors, other studies have found that experiencing a greater number of maltreatment subtypes does further increase risk for substance use and one review determined the relation between maltreatment and alcohol use to be the most consistent finding out of the substances (Hamburger et al., 2008; Moran et al., 2004; Tonmyr et al., 2010). Based on these findings, two separate path analyses were run that replaced the combined alcohol and cannabis abuse and dependence symptoms variables in Wave 2 and 3 with cannabis abuse and dependence symptoms and then, alcohol abuse and dependence symptoms at the respective time points. All other variables were left unchanged from the model displayed in Figure 1 and number of maltreatment subtypes was used as the exogenous variable, or predictor. Neither manipulation led to an improvement in model fit and for the model examining alcohol abuse and dependence symptoms in particular, fit indices remained almost identical to those indicated for the first respecified model that examined the original prediction using maltreatment subtypes.

**6.4.2.3 Revictimization.** When it comes to revictimization, for the present study, this was measured by assessing the number of different types of experiences of physical and sexual assault and threats endorsed by participants using a community violence measure. Three of the six questions included being beaten up or mugged, attacked or stabbed with a knife, or shot with a gun. Though these questions likely reflect infrequent occurrences, only 28.6% of the sample reported not having experienced any of the six forms of victimization assessed in Wave 2 and of the sample, 65.3% had experienced one to three forms of Wave 2 victimization. Nonetheless, previous studies that have found maltreatment to predict revictimization often focus on sexual revictimization and/or adulthood revictimization, including when examining revictimization as a potential mediator between previous victimization and psychopathology and/or substance use (Arata, 2002; Kilpatrick et al., 1997; Lilly et al., 2014). Furthermore, due to the measure not specifying a time frame, the assessment of new revictimization was rather stringent. Specifically, only types of victimization reported in Wave 3 that were not reported in Wave 2 were counted as new revictimization to prevent inclusion of revictimization experiences that were already reported at Wave 2. However, it is highly likely that many participants experienced the same type of victimization that was reported at Wave 2 again between Waves 2 and 3. Additionally, 61.9% of the sample that did complete this measure at Wave 3 did not report any new revictimization using this stringent criterion. Thus, it is possible that this strict measure of new revictimization impeded efforts to fully examine the potential mediating impact of adolescent revictimization. Additionally, the potential mediating effect of revictimization could be more prominent in adulthood when

it is likely that individuals have had more experiences during which revictimization often occurs, e.g., dating and intimate relationships.

To explore this idea, a path analysis was run that examined the first two predictions only (main effects of maltreatment on Wave 2 revictimization, psychopathology, and substance use and cross-lagged effects between revictimization, psychopathology, and substance use across Waves 2 and 3). Thus, analyses examining the mediation of new revictimization (i.e., pathways from number of maltreatment subtypes to new revictimization and Wave 3 psychopathology and substance use, as well as pathways from new revictimization to these Wave 3 variables), were removed. This did not lead to an improvement in model fit and values of fit indices continued to remain mostly unchanged.

Revisiting the limitations of the current measure for assessing revictimization, as noted, this measure does not indicate a time frame and participants are simply asked to rate the frequency with which they have experienced various types of community violence. Though the way in which new revictimization is measured helps to ensure that these experiences occurred in adolescence, it is unclear at what point in development these incidents reported in Wave 2 may have occurred. It is possible that many of these events may have transpired prior to adolescence, making such experiences closer in proximity to already documented maltreatment and thus, not a true measure of revictimization occurring in adolescence. Due to this limitation, an additional path analysis was run that removes Wave 2 revictimization from the model altogether and, by default, its covariate, number of bad life events. Additionally, sex is removed as a categorical control for Wave 2 revictimization. Pathways were preserved for all other

variables including pathways examining new revictimization as a potential mediator of the relationship between number of maltreatment subtypes and Wave 3 psychopathology and substance use. The removal of Wave 2 revictimization from the model led to a substantial improvement in model fit with examination of fit indices revealing that this model provided a good fit to the data,  $\chi^2(36) = 111.70, p < .01, CFI = .95, TLI = .90, RMSEA = .06, SRMR = .05$ . Figure 3 displays this model with all path coefficients that were tested (nonsignificant paths are indicated using gray lines).

In this model, regarding the main effects of child maltreatment on Wave 2 variables, number of maltreatment subtypes was not a significant predictor of either alcohol and cannabis abuse and dependence symptoms or psychopathology at the  $p < .05$  level. Although, the relationship between maltreatment subtypes and Wave 2 psychopathology was marginally significant ( $p = .07$ ) and did trend in the expected direction. As anticipated, psychopathology and substance use did exhibit stability over time across adolescent waves. Additionally, there were significant cross-lagged effects from Wave 2 psychopathology to Wave 3 substance use. However, Wave 2 psychopathology did not predict new revictimization occurring between adolescent waves and Wave 2 substance use did not exhibit cross-lagged effects to Wave 3 psychopathology and did not predict new revictimization. With regard to the mediation of new revictimization experiences on the relationships between child maltreatment and Wave 3 psychopathology and substance use, this prediction was not confirmed. New revictimization did not mediate these relationships. However, it is notable that new revictimization was a significant predictor of both Wave 3 psychopathology and alcohol and cannabis abuse and dependence symptoms. Examination of relationships between

control variables and endogenous variables revealed that race was a significant predictor of maltreatment, in that Black race was negatively related to number of maltreatment subtypes. Additionally, child sex was a significant predictor of psychopathology at both waves with males exhibiting a lesser degree of psychopathology than females. Child sex was not related to substance use at either wave or new revictimization.

**6.4.3 Summary of model respecification.** Overall, the various manipulations to the model suggest that psychopathology as a latent variable comprised of internalizing, externalizing, and PTSD symptoms scores provides a better fit to the data than examining either of these individual types of psychopathology alone. Additionally, examining alcohol or cannabis abuse and dependence symptoms separately or combined did not make a difference in model fit. When it comes to revictimization, simply removing the mediating pathways for the influence of new revictimization on the relationship between number of subtypes of maltreatment and mid-late adolescent psychopathology and substance use also did not improve model fit. However, removing Wave 2 revictimization from the model altogether substantially improved model fit, which suggests that this variable in particular was directly responsible for the poor model fit in original analyses. It is likely that this is due to the limitations of the measure in not specifying a time frame during which reported experiences occurred. This limitation makes it unclear at what stage in development such experiences occurred, which does not allow for predictions to truly be tested regarding whether (1) early maltreatment predicts early-mid adolescent revictimization or (2) whether early-mid adolescent revictimization exhibits stability to new revictimization or cross-lagged effects to mid-late adolescent psychopathology and substance use.

## 7. Study 1 Discussion

### 7.1 Review of Findings and Relation to Previous Literature

This study examined whether revictimization provided a mediating pathway from early childhood maltreatment to mid-late adolescent psychopathology and substance use. The first prediction stated that child maltreatment would predict significantly higher levels of psychopathology, alcohol and cannabis abuse and dependence symptoms, and number of revictimization experiences reported in early-mid adolescence. Due to the limitations of the Wave 2 revictimization measure in that it is not possible to assure these experiences occurred in early-mid adolescence, the specific prediction that maltreatment would predict early-mid adolescent revictimization could not be tested. Though, the pathway from maltreatment subtypes to new revictimization occurring between Waves 2 and 3 used for mediation analyses was not significant. Thus, maltreatment subtypes did not significantly predict revictimization occurring between early-mid and mid-late adolescence. Regarding the relationship of maltreatment to psychopathology and substance use in this developmental period, this prediction was not confirmed. The relationship between number of maltreatment subtypes and Wave 2 psychopathology was only marginally significant ( $p = .07$ ) but did trend in the expected direction. However, child maltreatment was not related to Wave 2 alcohol and cannabis abuse and dependence symptoms. This is not consistent with the previous literature, which does indicate child maltreatment significantly predicting various forms of psychopathology and adolescent substance use.

The second prediction stated that revictimization, psychopathology, and substance use would display stability and elicit cross-lagged effects from Wave 2 to Wave 3. Again,

due to limitations of the Wave 2 revictimization measure, this variable was removed from the final model. However, stability and cross-lagged effects from Wave 2 to Wave 3 were still tested for psychopathology and substance use and pathways from Wave 2 psychopathology and substance use to new revictimization occurring between Wave 2 and Wave 3 were tested as well. As anticipated, both psychopathology and substance use displayed stability across both adolescent waves. Related to cross-lagged effects, Wave 2 psychopathology was a significant predictor of Wave 3 alcohol and cannabis abuse and dependence symptoms. However, Wave 2 psychopathology did not predict new revictimization and Wave 2 alcohol and cannabis abuse and dependence symptoms did not predict either new revictimization or Wave 3 psychopathology.

With relation to Wave 2 alcohol and cannabis abuse and dependence symptoms not predicting Wave 3 psychopathology but Wave 2 psychopathology predicting Wave 3 alcohol and cannabis abuse and dependence symptoms, review of the intercorrelations between variables in Table 1 provides some insight. Wave 2 substance abuse and dependence symptoms were significantly related only to externalizing symptoms across waves and not related to internalizing symptoms or PTSD symptoms at either wave. Additionally, the distribution of Wave 2 alcohol and cannabis abuse and dependence symptoms was highly positively skewed with a substantial majority of participants (83.1%) reporting no substance abuse and dependence symptoms. Thus, examining substance use in early-mid adolescence may not have predictive value for other measures of functioning such as psychopathology in later stages of development due to low base rates. Additionally, considering that Wave 2 psychopathology predicted Wave 3 alcohol and cannabis abuse and dependence symptoms, it is possible that at this stage in

development, psychopathology is more likely to precede substance use as opposed to substance use preceding psychopathology. This is supported by previous analyses with the current data set that demonstrated pre-adolescent externalizing psychopathology to provide a pathway from childhood maltreatment to early-mid adolescence cannabis use/abuse symptoms (Oshri et al., 2011), as well as increases in these problems in late adolescence (Rogosch et al., 2010).

Aside from cross-lagged effects between psychopathology and substance use, the relationships of these variables to new revictimization are particularly noteworthy. Neither psychopathology nor substance use in Wave 2 predicted new revictimization occurring between Waves 2 and 3. Additionally, the third prediction stating that new revictimization experiences occurring between Waves 2 and 3 would partially mediate the effect of child maltreatment on Wave 3 psychopathology and substance use was not confirmed. However, new revictimization experiences significantly and positively predicted both psychopathology and alcohol and cannabis abuse and dependence symptoms in Wave 3. Furthermore, when examining the direct effects of maltreatment on Wave 3 psychopathology and substance use, number of maltreatment subtypes was a weaker predictor of Wave 3 psychopathology ( $p = .02$ ) than new revictimization ( $p < .01$ ) and maltreatment did not predict Wave 3 alcohol and cannabis abuse and dependence symptoms ( $p = .26$ ).

Regarding Wave 2 psychopathology and substance use not predicting new revictimization but new revictimization predicting these variables in Wave 3, for substance use, this again may be due to the low base rates at this stage in development, making its predictive value limited. This is further supported by a study that did find



reciprocal relationships between revictimization and substance use in adult women (Kilpatrick et al., 1997). Specifically, in this particular three-wave longitudinal study, illicit drug use increased odds of new physical or sexual assault in the two subsequent waves. Additionally, after a new assault, odds of both illicit drug and alcohol use were significantly increased. It is possible that the sample in the current study could exhibit similar reciprocal relationships into adulthood. In the case of revictimization and psychopathology, it is possible that similar to psychopathology being more likely to precede substance use, that revictimization may be more likely to precede psychopathology. However, studies examining reciprocal effects between these two aspects of functioning are not as common and tend to focus on the cumulative effects of multiple victimization experiences on likelihood of psychopathology.

Related to revictimization not mediating the effect of child maltreatment on Wave 3 psychopathology and substance use, as noted, examining revictimization as a potential mediating variable of the relationship between maltreatment and adolescent outcomes at this stage in development may be premature. In adulthood, individuals will have likely had more exposure to situations when revictimization is likely to occur, e.g., dating and intimate relationships, and thus, examination of the potential mediating influence of revictimization at this stage may be more appropriate. Additionally, previous studies examining the influence of revictimization on psychopathology and substance use have generally demonstrated evidence of the cumulative impact of multiple victimization experiences on increased risk for psychopathology and substance use but not necessarily a mediating influence of revictimization (Classen et al., 2005; Cuevas et al., 2010; Hedtke et al., 2008; Heidt et al., 2005; Hughes et al., 2010; Noll et al., 2003; Thompson

et al., 2005). Furthermore, the assessment of new revictimization was stringent due to the limitations of the measure not specifying a time frame, which may have impeded efforts to fully examine its mediating impact. Examining the mediating impact of adolescent victimization on adult outcomes and/or a measure that allows for assessment of a broader range of victimization would allow for a more comprehensive examination of potential pathways from revictimization to psychopathology and substance use.

Considering the stringent way in which new revictimization is measured and, as reported previously, 61.9% of the participants who completed this measure at both adolescent waves not reporting any new revictimization, it is especially noteworthy that new revictimization was a significant predictor of both Wave 3 psychopathology and substance use. Conversely, maltreatment subtypes did not predict Wave 3 substance use and were a much weaker predictor of Wave 3 psychopathology than new revictimization. This particular finding is similar to a point brought up by Arata (2002) regarding the importance of studying adolescent revictimization as a potentially important mediating variable between child and adult sexual victimization. Specifically, the author suggests that the effects of CSA on risk for adult revictimization may actually be time-limited with reduced risk the more time that passes without revictimization. Though this study does not allow examination of whether these new revictimization experiences in adolescence mediate the relationship between maltreatment and adult revictimization, our finding is similar to studies that have shown CSA to not predict adult sexual victimization if adolescent victimization is considered. It is possible as well that the significant impact of childhood maltreatment on psychopathology and substance use may be diminished when adolescent revictimization is taken into account.

## 7.2 Strengths and Limitations

This study had several strengths. The large sample size allowed for adequate power to examine complex relationships among several variables using advanced statistical methodology. Additionally, the 3-wave longitudinal design made it possible to examine the influence of early childhood maltreatment on various outcomes over time, thus providing stronger evidence for causation. Furthermore, this study design made it possible to examine the potential mediating impact of adolescent revictimization on the relationship between maltreatment and psychopathology and substance use. Aside from the design of the study, this particular sample included boys and girls, was ethnically diverse, and there was a demographically similar non-maltreated comparison sample, which allowed for greater generalizability of results, as well as comparisons between groups. The ways in which study variables were measured was also a strength. Specifically, maltreatment was measured using CPS records rather than retrospective self-report and all four primary subtypes of maltreatment, which are highly co-occurring, were included, whereas much of the literature focuses on CSA only. Similarly, whereas most of the revictimization literature is limited to assessing sexual assault, the current study inquires about multiple types of victimization including physical assault, sexual assault, and threats.

Despite the numerous strengths of the current study, there are still limitations. Though this sample was ethnically diverse, the majority of study participants came from very low SES backgrounds with 92.7% of caregivers having reported ever receiving public assistance. Thus, results may not generalize to children and families from higher SES backgrounds. Furthermore, though measuring maltreatment using CPS records helps

to eliminate bias in retrospective reporting, child abuse and neglect are severely underreported. Thus, the sample is limited to children whose incidents have been reported to CPS and substantiated, which may limit generalizability to the overall population of individuals who have experienced child maltreatment. Also related to assessment, Wave 2 and Wave 3 variables were based on adolescent self-report only and multiple raters (e.g., parents or teachers) would certainly provide more insight into potential relationships between outcomes. Additionally, as expected, there is attrition between Wave 2 and Wave 3 and although FIML was utilized to model relationships between study variables for all 545 participants, complete data for all variables measured in the current study was only available for 321 participants. Thus, it is possible that predictions for anticipated relationships would have been confirmed with complete data. Notably, when FIML is not used for the model presented in Figure 3 and analyses include data for the 321 participants with complete data only, number of maltreatment subtypes is significantly related to Wave 2 alcohol and cannabis abuse and dependence symptoms ( $p = .02$ ) and has a slightly stronger relationship to Wave 2 psychopathology ( $p = .06$ ). However, new revictimization still does not mediate relationships between maltreatment and Wave 3 psychopathology and substance use and model fit is slightly reduced.

Additionally, measuring revictimization using a community violence measure has its limitations. Reports of previous victimization were retrospective in nature and there is potential that adolescent reports of these experiences in Wave 2 and 3 overlapped with substantiated reports of maltreatment. However, steps were taken to minimize this potential overlap by only including victimization reported to be perpetrated by a stranger, friend, or someone you know. Responses indicating someone in your family or “don’t

know” were not included. Additionally, number of victimization experiences reported in Wave 2 was excluded from analyses because although participants reported on experiences of victimization during early-mid adolescence, this particular measure asks participants to simply rate the frequency with which they have experienced these forms of community violence ranging from “never” to “5 or 6 times” or “almost every day.” All other measures of endogenous variables in the study specified reporting on experiences or symptoms that have occurred within the last six months to one year, thus ensuring reports were reflective of the adolescent time period. Therefore, it is unclear at what point in development the incidents reported in Wave 2 on the community violence measure occurred and possible that many of them may have transpired prior to adolescence, making such experiences closer in proximity to already documented maltreatment. Additionally, due to the time frame not being specified on this measure, new revictimization between Waves 2 and 3 was only counted if it had not been reported in Wave 2, precluding assessment of whether victimization of the same type also recurred during this time period. Furthermore, this measure differs from how victimization is typically assessed. Specifically, measures of victimization tend to ask directly about various acts of dating/domestic violence victimization, sexual victimization, and in some cases, peer victimization such as the Juvenile Victimization Questionnaire (JVQ; Finkelhor, Hamby, Turner, & Ormrod, 2011). Measures such as the JVQ also allow for specific questioning about victimization that has occurred in the past year. The use of such measures would help to provide a more complete picture of victimization experiences, facilitate better comparison with studies in the revictimization literature, and

ensure that reported experiences occurred in the time period in which they are meant to be assessed.

### **7.3 Future Research Directions**

Future research should continue to use multi-wave longitudinal designs to examine the impact of child maltreatment on various outcomes such as revictimization, psychopathology, and substance use in tandem in order to model relationships between these outcomes at different points in child and adolescent development. Specifically, more examination of the cross-lagged effects between them would help to inform our knowledge of the usual temporal order of these outcomes. Such relationships are often examined once study participants reach adulthood. However, as noted by (Kilpatrick et al., 1997), first substance use and victimization tend to occur before the age of 18, which highlights the importance of conducting longitudinal research with younger age cohorts, e.g., adolescent and preadolescent groups. If not, then our conclusions about the temporal sequence of such outcomes are based solely on long-term retrospective report. This would also help to further inform prevention and intervention through consideration of which children and adolescents may be most at risk for developing certain negative outcomes based on developmental stage and adversity that is already present.

Furthermore, more research is needed to understand revictimization in males. The revictimization literature is largely focused on the prevalence and impacts of revictimization in female samples. Research efforts with male or mixed-sex samples could help to inform prevention and intervention efforts with male victims who are often overlooked and who may be more reluctant to discuss victimization history due to stigma or other factors. In addition, the revictimization literature is limited by its focus on CSA

and sexual assault despite a wealth of evidence that experiencing multiple subtypes of maltreatment or victimization further increases risk for revictimization, psychopathology, and substance use (Arata, 2002; Classen et al., 2005; Cuevas et al., 2010; Hughes et al., 2010) and that victimization of any type increases risk of future victimization, even of different types (Finkelhor et al., 2007). Thus, future research should continue to examine multiple types of maltreatment and victimization within the same study.

Related to revictimization, it is also important for future research to inform understanding of the mechanisms by which revictimization increases risk for psychopathology and substance use. Most studies in this area have provided evidence for the cumulative impact of multiple victimization experiences. However, whether revictimization in adolescence mediates the relationship between initial victimization (e.g., child maltreatment) and outcomes such as psychopathology and substance use is not clear. A cross-sectional study using SEM found childhood maltreatment to indirectly affect posttraumatic stress symptoms through adult intimate partner violence (Lilly et al., 2014). However, in line with common limitations of the revictimization literature, this study was cross-sectional, conducted with an adult female-only sample, and did not have a comparison group of participants who had not experienced childhood abuse.

Furthermore, similar to our study, researchers at Medical University of South Carolina have found evidence in multiple studies that occurrences of new assault/violence between time points in multi-wave investigations does increase risk for substance use and PTSD (Hedtke et al., 2008; Kilpatrick et al., 1997) but these studies were conducted with adult women only. In order to understand the potential mediating impact of adolescent revictimization, prospective multi-wave longitudinal studies that follow maltreated

individuals from childhood through adolescence and into adulthood may help to illuminate the ways in which adolescent revictimization influences adult outcomes.

Aside from the mediating impact of revictimization, there is a need for further examination of whether child maltreatment truly exhibits weaker relationships with certain outcomes that have been well-established when more proximal victimization is taken into account. One study with runaway and homeless adolescents found that a history of maltreatment was associated with PTSD, even after controlling for more proximal victimization (Whitbeck et al., 2007), which suggests that this might not always be the case. Regardless of the mechanism though, considering there is strong evidence for the cumulative impact of multiple victimization, trauma-informed interventions such as Trauma-Focused Cognitive Behavioral Therapy (TF-CBT; Cohen, Mannarino, & Deblinger, 2016) that include components such as safety planning to help prevent future trauma provide useful tools for contributing to interrupting the cycle of victimization.

## **8. Study 2 Additional Background and Literature Review**

Whereas Study 1 examines whether revictimization places maltreated children at a more heightened risk for psychopathology and substance use problems in adolescence, Study 2 shifts the focus to a protective factor. As previously noted, not all maltreated children go on to develop negative outcomes and some may actually fare off quite well, which necessitates examination of what may protect them from proceeding on a negative developmental trajectory.

### **8.1 Maltreatment and Parent-Child Relationship Quality**

Much of the research examining factors that protect children who have experienced significant adversity from developing negative outcomes has focused on the



presence of supportive relationships and these studies have contributed greatly to illuminating the pathway to resilience for these children. One of the two most widely reported predictors of resilience of children who have experienced significant adversity in general (not necessarily maltreatment) appears to be relationships with caring, prosocial adults and research points to the importance of the parent-child relationship in particular as a crucial context for the development of competence (Masten & Coatsworth, 1998). One study looking at the influence the parenting relationship has on the association between maltreatment specifically and psychopathology into adulthood reported that the presence of at least one parent rated as very caring helped to explain the absence of mental health problems in adult life for those reporting repeated or severe physical or sexual abuse in childhood (Collishaw et al., 2007). Another study found that parent attachment partially mediates the relationship between childhood abuse and adolescent depression (Zhang, Zhang, Yang, & Zhang, 2010).

However, the finding that parents are important for fostering resilience in the lives of maltreated children is complicated and inconsistent. One longitudinal study of maltreated vs. non-maltreated comparison children found that a secure mother-child relationship was negatively related to internalizing and externalizing symptomatology one year later, but only via its influence on self-esteem. There was no interaction effect between maltreatment and perceived mother-child relationship quality on internalizing and externalizing symptomatology. This suggests an additive risk model in which an insecure mother-child relationship increases probability of child maladjustment as opposed to a secure relationship reducing this risk (Kim & Cicchetti, 2004). Similarly, one study that aimed to examine whether protective adult relationships in general

moderate the link between cumulative adverse childhood experiences (ACEs) and substance use in 11- to 17-year-old youth found that at lower levels of such relationships, cumulative ACEs were related to increased substance use but this moderation effect was not present at higher levels of these relationships (Brown & Shillington, 2017). Another study examining relationships between experiences of physical abuse, attachment to parents and peers, and social and behavioral outcomes in adolescents with and without a history of abuse found that when the sample was examined as a whole, parent attachment significantly mediated the relationship between abuse and externalizing behaviors, total behavior problems, and social competence. Peer attachment did not play a significant role in this relationship. However, when abused and non-abused samples were examined separately, parent attachment was only predictive of outcomes for adolescents without a history of abuse (Stagg, 2016). In a systematic review of cohort studies investigating factors associated with substantiated maltreatment recurrence in children, quality of attachment or closeness of relationship between parent and child did not emerge as a significant factor in predicting maltreatment recurrence (Hindley et al., 2006).

The complicated and inconsistent findings that parents play a protective role for maltreated children are understandable given that for many of these children, by definition, the quality of the caregiver-child relationship is sorely lacking. Maltreated children's primary caregivers are often the perpetrators of the very abuse and neglect these children have experienced, resulting in devastating impacts to the attachment organization system that, without extensive intervention (Cicchetti, Rogosch, & Toth, 2006), may prove difficult to ameliorate. Due to this, some interventions addressing recovery from abuse and neglect, such as TF-CBT, emphasize involving non-offending

caregivers for support (Cohen et al., 2016). However, when children experience maltreatment in single parent households, when the child feels that the non-offending caregiver was complicit in allowing maltreatment to occur, or when the non-offending caregiver was also significantly traumatized by the experience, e.g., in cases of domestic violence, efforts to make use of this option are further frustrated.

## **8.2 Maltreatment and Friendship/Peer Relationship Quality**

Another potential source of social support to consider when understanding pathways to resilience in maltreated children is friendship or peer relationship quality, as support from friends may actually be more beneficial than support from parents/caregivers considering that the parent is often the perpetrator of abuse (Musliner & Singer, 2014). Unfortunately for maltreated children, it is well established that they experience profound difficulties in peer relations (Cicchetti & Toth, 2016; Cicchetti & Valentino, 2006; Flynn, Cicchetti, & Rogosch, 2014), often behaving toward peers with either excessive aggression or excessive withdrawal and avoidance (Mueller & Silverman, 1989). Furthermore, previous research has demonstrated their friendships to be characterized by less caring and validation and more conflict and betrayal than non-maltreated children (Cicchetti & Toth, 2016), with one study finding friendships dyads containing a physically abused 9- to -14-year-old child to involve less intimacy and more conflict than friendships dyads without an abused child (Parker & Herrera, 1996). For this reason, when positive peer relations are achieved in spite of adversity, resilience may follow and our understanding of how peers may protect maltreated children from, or put them at further risk for maladjustment can be enhanced by studying both maltreated children who are having difficulties with peers and those who seem to be coping successfully in spite

of adversity (Mueller & Silverman, 1989). However, true to a developmental psychopathology perspective in which normative development can help to inform abnormal developmental processes, it is important to first consider the normative trajectory of peer experiences for children and adolescents who have not experienced maltreatment (Choukas-Bradley & Prinstein, 2014).

**8.2.1 Normative development of peer relationships.** Establishing successful relations with peers is recognized to be a central task of childhood (Mueller & Silverman, 1989) and the nature of such relationships transforms across development. Specifically, Mueller and Silverman (1989) note that during middle childhood, ages 6-10 years, children began to spend a higher proportion of time with peers and peers come to replace parents as the primary agents of the child's socialization. As children continue to grow and develop, during age 11-15 years, friendships move from instrumental quality (e.g., considering what the person can do for you) to mutual caring in which friends hold greater emotional significance. During this period, peer relations become the primary system for emotional gratification, supplanting the role of the family in this regard. In later adolescence, 16 years and above, peer intimacy and the level of trust placed in peers becomes as intense as that previously given only to one's parents or to no one at all. Indeed, adolescence marks a developmental stage in which the proportion of time spent with friends is at its highest (Hartup & Stevens, 1997) and almost double the amount spent, with parents and other adults with markedly less adult guidance and control than at younger ages (Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006). Furthermore, this transition to adolescence, a developmental period characterized by marked changes in peer relationships, also signifies a critical developmental vulnerability period for a range

of psychological symptoms and disorders, as well as health risk behaviors (Prinstein & Giletta, 2016).

**8.2.2 The relationship of peer difficulties to maladjustment.** Considering how important peers become over the course of childhood and adolescence, it is understandable that peers become a primary source of social support in adolescence for many distressed youths. However, due to the critical role of peers, in the same way that they are able to provide support, stressors and difficulties within the peer context also have the potential to be especially damaging and detrimental to normative adjustment (Choukas-Bradley & Prinstein, 2014). Decades of research in this area have demonstrated that the quality of child's peer relations is identified as one of the most powerful predictors of concurrent and future mental health problems (Mueller & Silverman, 1989), with strong support that poor peer adjustment and problems in peer relationships increases risk for later life difficulties and the development of psychopathology and substance abuse (Choukas-Bradley & Prinstein, 2014; Deater-Deckard, 2003; Parker & Asher, 1987; Parker et al., 2006; Prinstein & Giletta, 2016). Peer difficulties are also among the most common reasons for referrals to child specialist clinics and school psychologists (Parker et al., 2006). Furthermore, peer and social difficulties are associated with or a part of the diagnostic criteria for many psychiatric disorders in childhood and across the life span such as ADHD, Conduct Disorder, anxiety disorders, Depression, eating disorders, and Pervasive Developmental Disorders, e.g., Autism Spectrum Disorder (Parker et al., 2006). When it comes to examining the relationship of peer difficulties to maladjustment, the most frequently examined predictor of developmental outcomes in this literature is sociometric status or peer

acceptance/rejection (Choukas-Bradley & Prinstein, 2014; Parker et al., 2006) in which a group of peers (e.g., in a classroom or a summer camp), usually in middle childhood, are each asked to indicate who in the group they like the most and like the least. Those children receiving a high number of “liked least” nominations and a low number of “liked most” nominations are considered to be “rejected” by peers and there is a strong role of peer rejection in the development of psychopathology in childhood, adolescence, and adulthood across clinic, school, and other samples (Deater-Deckard, 2003; Parker & Asher, 1987; Parker et al., 2006).

Another area of peer difficulties implicated in maladjustment is peer victimization, which explains variance in psychopathology and maladjustment not shared with peer rejection. Peer victimization is also associated with internalizing and externalizing symptoms, suicidal ideation, and engagement in nonsuicidal self-injury (Choukas-Bradley & Prinstein, 2014; Hodges, Boivin, Vitaro, & Bukowski, 1999). Certainly, aspects of peer relationships and peer difficulties have strong implications for (ab)normal development, as demonstrated by research on peer rejection and peer victimization. However, much less attention in the literature on the relation of peers to maladjustment has been devoted to friendship or the quality of relationships with peers (Parker et al., 2006).

**8.2.3 The role of friendship/peer relationship quality in maladjustment.** Having friends in general is correlated with a sense of well-being across the life span and studies show that when it comes to having friends vs. not having friends, individuals with friends enjoy greater psychological well-being throughout adulthood and old age than those who do not, including less likelihood of seeking services for psychological problems (Hartup

& Stevens, 1997). In addition to being associated with greater well-being in general, there also may be a protective role of friendship, in that friends can protect children from developing negative outcomes. For example, children with close friends are less likely to show the deleterious consequences of problems with peers in school when compared to children who do not have close friends (Deater-Deckard, 2003). Also, the most consistent finding on the study of friendship suggests that participation in a reciprocated friendship, particularly one characterized by high levels of positive friendship qualities, moderates the associations between various types of risk factors or stressors and later maladjustment or even further negative peer experiences, e.g., increases in peer victimization (Choukas-Bradley & Prinstein, 2014; Hodges et al., 1999; Prinstein & Giletta, 2016). Conversely, negative experiences in friendships or poor friendship quality, e.g., friendships characterized by overt and covert hostility in adolescence, are positively correlated with alcohol use, delinquency, and depressive symptoms (Hartup & Stevens, 1997).

Most children, even those who have been rejected, have at least one very best friendship (Prinstein & Giletta, 2016) but the children who are less likely to have friends tend to be those most in need of the protective effects of friendship (Choukas-Bradley & Prinstein, 2014). Thus, understanding the role of friendship in such populations that may benefit the most from its protective effects is critical. However, most of the literature examining the impact of friends on maladjustment has focused on the psychological risks of normative youth who have experienced peer difficulties as opposed to children with psychiatric/psychological disorders or other risk factors (Parker et al., 2006; Prinstein & Giletta, 2016). When it comes to individuals who have experienced child maltreatment, research measuring whether friendships provide a protective factor for these individuals

is surprisingly rare (Merritt & Snyder, 2015) and for the few studies that do examine its impact, there is mixed support for the notion that friends can mitigate negative outcomes (Ezzell, Swenson, & Brondino, 2000).

**8.2.4 The role of friendship/peer relationship quality in the maladjustment of maltreated children.** Some studies have examined the impact of friendship on the outcomes of adults with a history of child maltreatment. One such study with undergraduate students examined the role of social support from friends (and family) in buffering long-term outcomes following cumulative child maltreatment (CCM). This study found a strong positive main effect of social support, in that social support was associated with a reduction in symptoms of anxiety/depression and anger/hostility (Folger & Wright, 2013). Notably, the effects of friend support were more robust than family support and higher levels of friend support were related to less dating abuse. However, support generally acted as a buffer against negative outcomes for individuals with lower, not higher, levels of CCM. Thus, it is possible that social support may be insufficient in protecting individuals with more severe abuse histories. However, the study's lack of ethnic and socioeconomic diversity and the study being retrospective and cross-sectional in nature limits the generalizability of the findings and precludes the opportunity to make causal inferences. Another retrospective, cross-sectional study with adults included a study of men and women recruited from medical clinics which found that, in females only, perceived social support from friends protected against adult depression, even after accounting for the contributions of abuse and neglect. Interestingly, social support from family did not make a difference (Powers, Ressler, & Bradley, 2008).



Other studies have investigated the role that family and friends may play in mitigating the impact of maltreatment in young and school-aged children. One three-year longitudinal study of 8- to 10-year-old maltreated and non-maltreated children revealed that maltreated children who had a close reciprocal friendship were significantly more likely than those who did not to be later classified as resilient during at least one of the three longitudinal time points examined. However, this protective effect was found for self-esteem but not internalizing or externalizing psychopathology (Bolger & Patterson, 2003). Although, in another study of 6- to 14-year-old physically abused children, perceived peer support was significantly negatively correlated to children's self- and parent-reported depression and anxiety but neither perceived teacher nor family support were significantly related to any indices of adjustment. Using regression analyses, the researchers found that perceived peer support continued to be significantly and negatively related to the same indices of adjustment after controlling for perceived teacher support. Neither source of support (i.e., peers, family, or teachers) impacted the relationship of physical abuse on externalizing behaviors (Ezzell et al., 2000). Though, this study was conducted with a small sample (N=37) and focused on only one subtype of maltreatment (physical abuse). However, the study conducted by Hodges and colleagues (1999) referenced previously suggest that friendships may actually be able to impact externalizing behaviors in victimized children. Specifically, though internalizing and externalizing behaviors predicted increases in peer-reported victimization, this relationship was attenuated for children with a protective friendship. Additionally, peer victimization was predictive of increases in internalizing and externalizing psychopathology, but only for children without a mutual best friendship. In fact, having a

best friend completely eliminated the effects of peer victimization on increases in internalizing problems and considerably reduced the relation of peer victimization to increases in externalizing problems, whereas this relationship was exacerbated for children without a best friend. In relation to revictimization, Finkelhor and colleagues (2007), using a national sample of 2- to 17-year-old children, found that for children who were poly-victimized (had experienced at least four subtypes of victimization) at baseline, desistence from polyvictimization one year later was associated with having more good friends.

The development of quality friendships is especially important for adolescents who are at a crucial time in their life when they are increasingly less reliant on adults and more likely to be influenced by peer groups (Merritt & Snyder, 2015; Mueller & Silverman, 1989; Prinstein & Giletta, 2016), and for whom the development of positive peer relations and friendships is considered a critical stage-salient task of development. Although, considering the sparse literature on how such relationships can influence the association between maltreatment and negative outcomes in general, such studies in this area with adolescents are lacking and have their limitations. One longitudinal study of adolescent mothers (ages 13 to 22 years) analyzed a subsample of mothers who reported sexual victimization during a baseline assessment and found that previous victimization involving forceful rape or being hit by a partner increased likelihood of reported sexual victimization one year later. However, indicating satisfaction with social relationships reduced risk of revictimization (0.72 odds ratio) but did not significantly predict risk of revictimization (Collins, 1998). This particular study was limited in that it only focused on sexual revictimization and did not indicate the source of social support, e.g., friends or

parents/family. Another such study focusing only on sexual victimization evaluated the effects of emotional support from friends at two time points (adolescence and adulthood) on adult depression in a nationally representative sample of CSA survivors. This study found that support from friends in adulthood was significantly associated with lower odds of adult depression in CSA survivors who reported non-parent/caregiver abuse. However, among survivors of parent/caregiver abuse, emotional support from friends was not significantly associated with adult depression and emotional support from friends in adolescence did not influence the relationship between CSA and adult depression. Thus, emotional support from friends only reduced odds of adult depression in CSA survivors when abuse was perpetrated by someone other than the caregiver and when support was available at the time depression was assessed (Musliner & Singer, 2014).

There is one study, which has examined the impact of relational experiences with peers on the functioning of children with a broad range of maltreatment experiences as opposed to focusing on one particular subtype. This study utilized a large sample of 1,054 11-to-17-year-old majority Black and Hispanic children referred to child welfare services for suspected maltreatment. Focusing on an outcome of “nonproblematic” behavior as opposed to negative behaviors, the researchers found that stronger school peer connectedness was a protective factor. Specifically, children who perceived strong peer connections at school were more likely to classify below the problem behavior threshold than those with weaker peer connections. Though, experiencing physical abuse had a negative impact on the protective nature of strong peer connections in that school peer connectedness may not be a buffer for physically abused children when it comes to behavior (Merritt & Snyder, 2015). This study had a number of strengths including the

use of a large sample size, examining a sample with more than one subtype of maltreatment, and its unique focus on “nonproblematic” behavior as an outcome as opposed to negative or problematic behaviors. However, it is limited by its cross-sectional nature and the lack of a non-maltreated comparison sample.

Two other cross-sectional studies examined the role of interpersonal relationships, including peer relationships or friendships, in youth with high levels of risks who have high rates of experiencing childhood maltreatment. One such study examined the role of several resilience resources, including family and peer support, on the relationship between lifetime victimization and mental health problems among adolescents residing in residential care facilities in Spain (Segura, Pereda, Guilera, & Hamby, 2017). The researchers found that having less peer support was associated with significantly greater internalizing symptoms but family support did not demonstrate effects on internalizing symptoms; however, peer support moderated the relationship between victimization and externalizing symptoms in that polyvictimized adolescents (those with four or more subtypes of victimization) with higher peer support unexpectedly reported more externalizing symptoms than those with lower levels of peer support. A similar unexpected finding emerged in a study that investigated the association of living in foster care with substance use and subjective well-being in 32,479 secondary school students (ages 11-16 years) in Wales. As expected, the youth in foster care were significantly more likely to report substance use, poorer peer relationships and well-being, and having experienced bullying and dating violence. Their reported ability to count on their friends was associated with improved subjective well-being. Although, ability to count on friends was also related to higher likelihood of binge drinking (Long et al., 2017). Though both

of these studies are cross-sectional and do not examine maltreated children specifically, both highlight the mixed support that quality relationships with peers or friends can mitigate negative outcomes. Specifically, though friend or peer support was associated with reductions in some adverse outcomes (i.e., internalizing symptoms and poor subjective well-being), higher quality of peer relationships or friendships was also related to greater likelihood of negative outcomes (i.e., externalizing symptoms and substance use).

The studies described highlight critical limitations in our understanding of how friendship or the quality of relationships with peers may influence the impact of maltreatment on negative outcomes, especially for children and adolescents. Limitations of the current literature include reliance on retrospective self-reports of child maltreatment experiences and/or cross-sectional designs (Folger & Wright, 2013; Long et al., 2017; Merritt & Snyder, 2015; Powers et al., 2008; Segura et al., 2017); focus on only one subtype of maltreatment or victimization (Collins, 1998; Ezzell et al., 2000; Musliner & Singer, 2014) despite the high co-occurrence of maltreatment subtypes; lack of a comparison sample (Merritt & Snyder, 2015); and not specifying the source of social support (Collins, 1998) despite multiple studies showing differing results of the impact of social support depending on the source (Ezzell et al., 2000; Folger & Wright, 2013; Musliner & Singer, 2014; Powers et al., 2008; Segura et al., 2017). For the few studies not characterized by these limitations, one focused on peer victimization as opposed to maltreatment (Hodges et al., 1999), another focused on a broad range of victimization (i.e., child maltreatment, conventional crime, property crime, physical assault, peer/sibling victimization, sexual victimization, and witnessing and indirect

victimization; Finkelhor et al., 2007), and one focused only on school-aged children (Bolger & Patterson, 2003).

## **9. Study 2 Aims and Predictions**

The aim of this study is to examine whether friendship quality mediates the impact of child maltreatment on psychopathology, substance use, and revictimization. This study uses the same data set as in Study 1 and thus, addresses the limitations of the literature on how friendship may influence the impact of maltreatment on negative outcomes by utilizing a multi-wave longitudinal design to follow-up school-aged children at two time points in adolescence. Furthermore, child maltreatment is assessed using CPS records rather than retrospective self-report questionnaires and all four primary subtypes of maltreatment (i.e., physical abuse, sexual abuse, emotional maltreatment, and neglect) are included, as opposed to focusing on one. Additionally, peer relationships are assessed using a measure of friendship quality as opposed to peer acceptance/rejection.

### **9.1 Previously Conducted Studies with the Current Sample**

There are two additional manuscripts that have already been published using this data that examined the influence of interpersonal relationships on the developmental trajectory of these children. Flynn and colleagues (2014) determined that low maternal relationship quality in early-mid adolescence mediated the relationship between number of maltreatment subtypes in childhood and internalizing, but not externalizing, symptoms in mid-late adolescence. Low friendship quality was not examined in longitudinal path models utilized in this study due to inconsistent associations among low friendship quality and the study variables of interest across waves (e.g., number of maltreatment subtypes and internalizing and externalizing symptoms). Another study with this sample

of children found that low maternal relationship quality in Wave 2 was a marginally significant mediator of the association between maltreatment and Wave 3 depressive symptoms for females. Additionally, peer social acceptance in Wave 2 significantly mediated the relationship between maltreatment and Wave 3 depressive symptoms for both genders. Furthermore, greater depressive symptoms at Wave 3 were predicted by lower peer social acceptance (Alto, Handley, Rogosch, Cicchetti, & Toth, 2018).

## **9.2 Predictions**

The predictions for the proposed study are based on the literature review and findings from previous studies conducted with this dataset. These predictions are as follows:

- (1) Number of maltreatment subtypes occurring prior to Wave 1 (childhood; ages 6-9 years) will predict higher levels of psychopathology and substance use at Wave 2 (early-mid adolescence; ages 13-15 years) and new revictimization occurring between Wave 2 and Wave 3 (mid-late adolescence; ages 15-18 years).
- (2) Psychopathology and substance use will display stability and elicit cross-lagged effects from early-mid (Wave 2) to mid-to late adolescence (Wave 3) and new revictimization occurring between Wave 2 and 3 will predict psychopathology and substance use in Wave 3.
- (3) Friendship quality in early-mid adolescence (Wave 2) will partially mediate the effects of child maltreatment on psychopathology in mid-late adolescence (Wave 3) and new revictimization occurring between Waves 2 and 3.

Due to findings in two previous cross-sectional studies that higher peer support/ability to count on friends was associated with more externalizing symptoms and binge drinking, a

specific prediction was not made about whether friendship quality will mediate the relationship between maltreatment and substance use.

## 10. Study 2 Method

### 10.1 Participants

Participants in this study were the same participants examined in Study 1. To summarize, there were a total of 545 children (295 maltreated, 250 non-maltreated) assessed at three time points: Wave 1 (approximately 6 to 9 years), Wave 2 (approximately 13 to 15 years), and Wave 3 (approximately 15 to 18 years). Maltreated children were identified with the help of a DHS liaison and DHS records were coded using the Maltreatment Classification System (MCS; Barnett et al., 1993) to make independent determinations of maltreatment experiences including subtypes of maltreatment (i.e., sexual abuse, physical abuse, emotional maltreatment, and neglect), severity of maltreatment for respective subtypes measured on a 5-point scale (1 = *Minor*, 2 = *Moderate*, 3 = *Serious*, 4 = *Severe*, 5 = *Extremely Severe*), and other characteristics. Mothers of maltreated children also completed the Maternal Maltreatment Classification Interview (MCMI; Cicchetti, Toth, & Manly, 2003). Demographically comparable families without a history of maltreatment were recruited through the Aid to Families with Dependent Children program. Parental consent was provided to review DHS records and the absence of maltreatment experiences was verified through DHS records and completion of the MMCI (Cicchetti et al., 2003).

The complete sample of 545 maltreated and non-maltreated children consisted of 328 boys (60.2%) and 217 girls (39.8%) who were diverse in race (52.8% Black, 27.5% White, 12.8% Bi-racial, 6.4% Other) and ethnicity (13.4% Latino). Maltreated and non-



maltreated youth did not differ in terms of sex, ethnicity, family marital status, family's history of receipt of public assistance, or family annual household income. However, child's race did differ across groups, in that White children were significantly more likely to belong to the maltreated group and Black children were significantly more likely to belong to the non-maltreated group than expected by chance.

## **10.2 Procedure**

Procedures were the same as used in Study 1. During Wave 1, children attended a week-long summer day camp program and participated in various research assessments. Youth were subsequently recruited to participate at two waves during early-mid and mid-late adolescence (Wave 2 and Wave 3) spaced approximately two years apart and assessments were conducted in a laboratory setting. Adolescents and parents were administered a comprehensive battery of assessments, which included measures of demographic characteristics, psychopathology, substance use, victimization as assessed by community violence, and friendship quality.

## **10.3 Measures**

**10.3.1 Psychopathology.** As indicated in Study 1, psychopathology was assessed using the Youth Self-Report (YSR; Achenbach, 1991), which is a self-report measure that was administered to youth at Waves 2 and 3 and yields two broadband continuous dimensions of internalizing and externalizing symptoms. Raw scores are summed for internalizing and externalizing symptoms and transformed into T-scores based on normative data, with higher scores reflecting greater symptoms.

Additionally, PTSD symptoms were assessed using the Checklist of Child Distress Symptoms (CCDS; Richters & Martinez, 1993), which was also administered to

adolescent participants at Waves 2 and 3. An overall total CCDS score is computed with higher scores corresponding to more adverse psychological symptoms.

**10.3.2 Substance use.** As stated in Study 1, the substance use module of the Diagnostic Interview Schedule for Children (DISC; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000), which is a semi-structured psychiatric interview, was administered at Waves 2 and 3 to adolescents. Total counts of alcohol and cannabis abuse and dependence symptoms for the past year are summed.

**10.3.3 Revictimization.** As in Study 1, the Community Violence Survey (Richters & Martinez, 1993) was administered at Waves 2 and 3 and asks children to rate the frequency with which they have experienced, witnessed, or heard about various acts of violence in their community. To measure revictimization that occurs outside of the family, responses to six questions were considered, which asked about how many times the participant has been (1) threatened with serious physical harm by someone; (2) slapped, punched, or hit by someone; (3) beaten up or mugged; (4) sexually assaulted, molested, or raped; (5) attacked or stabbed with a knife; or (6) shot with a gun. For each question, participants are asked to indicate who the perpetrator was of the incident and were permitted to circle one or more options from a stranger, someone you know, a friend, someone in your family, and don't know. Responses were only counted for participants indicating a stranger, someone you know, or a friend as the perpetrator in order to reduce the likelihood of confounding reporting of these incidents with experiences of child maltreatment. To assess for revictimization experiences occurring between Waves 2 and 3, a total of the types of revictimization experiences reported at Wave 3 that were not also reported at Wave 2 was computed.

**10.3.4 Friendship quality.** The Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) was administered to participants at Wave 2 and assesses quality of relationships with parents and close friends. Regarding peer attachment, this 25-item self-report questionnaire assesses perceptions of cognitive and affective attributes that characterizes the adolescents' relationships with close friends. Three domains of the relationship are measured: (1) degree of mutual trust; (2) quality of communication; and (3) extent of anger and alienation. Participants are asked to rate each item on a scale from 1 (almost never or never true) to 5 (almost always or always true) based on how true the statement is for them now. Negatively keyed items are reverse coded and a composite of the means for each domain are computed as the average of the subscales. Higher scores are indicative of higher quality relationships with close friends. This measure has good reliability and validity (Armsden & Greenberg, 1989).

**10.3.5. Social Skills Inventory.** The Social Skills Inventory (SSI; Riggio, 1986; Riggio & Carney, 2003), administered at Wave 2, is a 90-item self-report measure that was designed to measure the possession of basic emotional and social communication skills. The SSI consists of six scales that measure communication skills on two dimensions/levels – emotional (nonverbal) and social (verbal). Expressivity (the skill with which individuals communicate and send messages to others), sensitivity (the skill with which communicated messages from others are received and interpreted), and control (the skill with which they are able to regulate and manage communication processes) are evaluated in each. Respondents answer using a 9-point Likert-type scale indicating the extent to which the description in the item applies to them from 1 (Not at all true for me) to 9 (Very true for me). An overall SSI score is computed that indicates

the global level of social skill or competence, with higher scores indicating greater levels of social skill development. This overall score will be used as a covariate for friendship quality at Wave 2, as the social skills of adolescents have been found to be associated with the quality of their peer relations (Engels, Deković, & Meeus, 2002).

### **11. Study 2 Data Analysis Plan**

Pearson correlation analyses were conducted to determine associations between variables of interest. In order to examine study predictions over time, a path analysis within a structural equation modeling (SEM) framework was conducted using the lavaan package in R, which was developed for latent variable modeling (Rosseel, 2012). Specifically, a cross-lagged panel mediation model was used, which allows for examination of cross-lagged and mediation effects simultaneously (Cole & Maxwell, 2003). A similar path analytic model was used to examine pathways from child maltreatment to relevant outcomes in a previous study published on this data (Flynn et al., 2014). Figure 4 displays the proposed statistical model for the relations between the primary variables of interest. Due to observed group differences in race across maltreated and non-maltreated youth in the sample, maltreatment was regressed on race, which was transformed into a dummy variable with “Black” race as the reference group. To account for the influence of child sex on psychopathology in Study 1 and the potential influence of sex on friendship quality in this study, this was used as a categorical control for each of these variables by regressing them on child sex.

In the proposed model, psychopathology is treated as a latent variable at both time points, which consists of YSR internalizing T-score, YSR externalizing T-score, and CCDS PTSD symptoms score at their respective time points. As indicated in Study 1, a

CFA was conducted for the psychopathology measurement model (see Figure 2) using the lavaan package in R and examination of fit indices revealed that this model provided a strong fit to the data,  $\chi^2(5) = 8.93$ ,  $p = .11$ , CFI = 1.0, TLI = .99, RMSEA = .04, SRMR = .02.

### 11.1 Missing Data

For the present study, information on number of maltreatment subtypes and child sex was provided for all participants. Child race was not reported for two participants (0.4%). Regarding variables examined at Wave 2, the percentages of missing data on each measure for the entire sample were as follows: YSR internalizing score – 1.5%, YSR externalizing score – 1.5%, CCDS PTSD score – 0.9%, DISC alcohol and cannabis abuse and dependence symptoms – 10.5%, IPPA average friendship quality score – 4.4%, SSI – 5.1%. Of note, adolescents completed a total of five visits over both adolescent waves. The YSR and CCDS were both administered at Visit 1. The IPPA and SSI were administered at Visit 2 and the DISC was administered at Visit 3.

Of the 385 participants who had follow up data for Wave 3, percentages of missing data on each measure for these participants were as follows: YSR internalizing score – 0.5%, YSR externalizing score – 0.5%, CCDS PTSD score – 0.3%, DISC alcohol and cannabis abuse and dependence symptoms – 8.1%, Community Violence Survey new revictimization occurring between Wave 2 and 3 – 4.7%. Again, the YSR and CCDS were completed at Visit 1 of this wave and the DISC was administered at Visit 3. The Community Violence Survey was administered during Visit 2 of both Waves 2 and 3. As indicated in Study 1, participants followed up at Wave 3 did not differ from participants who only completed Wave 2 on child sex, race, or ethnicity. Furthermore, as in Study 1,

participants followed up at Wave 3 vs. those who completed Wave 2 only did not differ on Wave 2 internalizing psychopathology, externalizing psychopathology, PTSD symptom score, or alcohol and cannabis abuse and dependence symptoms. For this study, they also did not differ on friendship quality,  $t(261.24) = .50, p = 0.62$ . Participants followed up at Wave 3 did have a slightly lower number of maltreatment subtypes and SSI score than those who were not, but these differences did not reach significance: maltreatment subtypes,  $t(300.16) = 1.72, p = 0.09$ ; overall social skills,  $t(315.59) = 1.88, p = 0.06$ . Due to lack of differences between participants followed up vs. those who completed Wave 2 only, path analyses proceeded as planned.

For path analyses, as in Study 1, missing data were addressed using full information maximum likelihood (FIML), a method that maximizes the likelihood of the model with the observed data (Arbuckle, 1996). This method is currently the most common approach at present for handling missing data in SEM (Graham & Coffman, 2012), is considered to be superior to ad hoc techniques across missing data patterns (Enders, 2001), and was utilized in previous studies using this data. The use of this cross-lagged path analytic model and FIML will help to ensure continuity and facilitate comparison with previous findings.

## **11.2 Power Analysis**

There is no universally agreed upon way to determine the minimum required sample size for path models in SEM and guidelines, as well as calculators for the appropriate sample size, vary widely. However, a few basic guidelines include that the sample size should be at least 200 or an ideal ratio for sample size to number of parameters is 20:1. However, ratios of 10:1 or 5:1 are considered acceptable (Kline,

2005). The number of parameters in the model is 20, thus requiring a sample size range of 100 to 400 to be considered acceptable to ideal. Another guideline is that the sample size should be at least 50 more than eight times the number of variables in the model. Since there are ten variables in the model, based on this guideline, the required minimum sample size is 130. Based on these guidelines, there is adequate power to detect effects in this sample.

## **12. Study 2 Results**

### **12.1 Descriptive Statistics**

As noted in Study 1, within the sample of maltreated youth, experiences of neglect were most common (82%) followed by emotional maltreatment (61%), physical abuse (43%), and sexual abuse (15%). Most of the maltreated sample (62%) had been exposed to more than one subtype of abuse ( $M = 2.0$ ,  $SD = .96$ ) and the average severity score was 3.10 ( $SD = .89$ ), indicating that overall, the maltreated sample had experienced serious maltreatment (Barnett et al., 1993).

### **12.2 Correlations between Endogenous Study Variables and Covariate**

Table 2 displays descriptive information and correlations among measures administered at Wave 2 and Wave 3. As in Study 1, Wave 2 and 3 internalizing, externalizing, and PTSD symptoms, and Wave 3 alcohol and cannabis abuse and dependence symptoms were all significantly and positively correlated with each other. However, Wave 2 alcohol and cannabis abuse and dependence symptoms were only significantly and positively correlated with externalizing symptoms at both waves and with Wave 3 alcohol and cannabis abuse and dependence symptoms. Additionally, number of new revictimization experiences from Wave 2 to Wave 3 were only associated

with variables at Wave 3 (internalizing symptoms, externalizing symptoms, PTSD symptoms, and alcohol and cannabis abuse and dependence symptoms). There were no relationships between number of new revictimization experiences and these same variables at Wave 2.

Regarding friendship quality and social skills at Wave 2, these two variables were significantly and positively correlated with one another. However, other than this relationship, Wave 2 friendship quality was only significantly and negatively related to Wave 2 internalizing and PTSD symptoms. Social skills were only significantly and positively related to Wave 2 externalizing symptoms.

### **12.3 Path Analysis**

Despite the lack of significant bivariate correlations between friendship quality and other endogenous variables, path analyses proceeded as planned using the lavaan package in R version 3.4.1 (R Core Team, 2017) to examine the proposed model in Figure 4 as a whole. Examination of fit indices for the overall model indicated that it provided an adequate fit to the data,  $\chi^2(60) = 178.83$ ,  $p < .01$ , CFI = .92, TLI = .88, RMSEA = .06, SRMR = .06 (Bentler & Bonett, 1980; Brown, 2014; Hu & Bentler, 1999; Kline, 2010; Yu & Muthen, 2002).

Figure 5 displays the results of path analysis for this model (nonsignificant paths are displayed in gray). Regarding the main effects of child maltreatment on Wave 2 psychopathology and substance use and new revictimization occurring between Wave 2 and Wave 3, number of maltreatment subtypes was not significantly related to either of these outcomes at the  $p < .05$  level. However, the relationship between maltreatment subtypes and Wave 2 psychopathology did trend in the expected direction and was



marginally significant ( $p = .07$ ). As in Study 1, Waves 2 and 3 psychopathology and substance use did exhibit stability over time. Regarding cross-lagged effects, Wave 2 psychopathology significantly predicted Wave 3 alcohol and cannabis abuse and dependence symptoms, but Wave 2 substance use did not predict Wave 3 psychopathology. Additionally, new revictimization occurring between Wave 2 and Wave 3 was a significant predictor of Wave 3 psychopathology and substance use in the positive direction. Related to the prediction that friendship quality would partially mediate the relationship between number of maltreatment subtypes and Wave 3 psychopathology and new revictimization occurring between Waves 2 and 3, this was not confirmed. Friendship quality did not mediate the relationship between maltreatment subtypes and either psychopathology or new revictimization. Furthermore, Wave 2 friendship quality also did not mediate the relationship between maltreatment subtypes and Wave 3 substance use and, unexpectedly, was not related to any of the primary variables (i.e., Wave 1 number of maltreatment subtypes, new revictimization occurring between Waves 2 and 3, or Wave 3 psychopathology and substance use).

Regarding control variables and the covariate, there were statistically significant path coefficients between child sex and Waves 2 and 3 psychopathology, as well as Wave 2 friendship quality. Specifically, males reported significantly less psychopathology symptoms at both adolescent time points than females, as well as significantly lower friendship quality. Race was also a significant predictor of maltreatment, in that Black race was negatively related to number of maltreatment subtypes. Additionally, overall social skills were a significant covariate of friendship quality in the positive direction.

#### **12.4 Post-hoc Analyses**

Although there was a lack of relationships between overall friendship quality and the exogenous variable, maltreatment subtypes, as well as the endogenous variables in the model, previous literature has indicated that maltreated children's friendships are characterized by lower levels of positive qualities (e.g., intimacy, caring, and validation) and higher levels of negative qualities such as conflict and betrayal (Cicchetti & Toth, 2016; Parker & Herrera, 1996). In order to examine the nature of these specific qualities further, post-hoc analyses were conducted entering the individual interpersonal domains that comprise the overall IPPA friendship quality score (i.e., degree of mutual trust, quality of communication, and anger/alienation) into the model in place of overall friendship quality. Notably, when degree of mutual trust is entered into the model, model fit was adequate,  $\chi^2(60) = 166.87, p < .01$ , CFI = .93, TLI = .89, RMSEA = .06, SRMR = .05 and there were some changes in relationships between variables. Figure 6 displays the results of this path analysis. Unexpectedly, number of maltreatment subtypes significantly predicted degree of mutual trust reported in close friendships in the positive direction. Additionally, degree of mutual trust was a marginally significant predictor ( $p = .06$ ) of Wave 3 psychopathology in the negative direction. However, similar to overall friendship quality, degree of mutual trust was unrelated to new revictimization occurring between adolescent waves and Wave 3 alcohol and cannabis abuse and dependence symptoms and it did not mediate the relationship between maltreatment subtypes and either of these outcomes.

Regarding the other friendship qualities, model fit was inadequate for anger/alienation,  $\chi^2(60) = 233.57, p < .01$ , CFI = .88, TLI = .83, RMSEA = .07, SRMR = .07 and thus relationships between variables could not be interpreted. Entering quality of

communication into the model did provide a good fit to the data,  $\chi^2(60) = 158.40$ ,  $p < .01$ , CFI = .94, TLI = .90, RMSEA = .06, SRMR = .05. Though, relationships between variables were unchanged and similar to overall friendship quality, quality of communication was also unrelated to maltreatment subtypes, Wave 3 psychopathology and substance use, and new revictimization occurring between Waves 2 and 3.

### **13. Study 2 Discussion**

#### **13.1 Review of Findings and Relation to Previous Literature**

This study examined whether friendship quality mediates the relationship between childhood maltreatment and three adolescent outcomes – psychopathology, alcohol and cannabis abuse and dependence symptoms, and revictimization – using data from a three-wave longitudinal study. The first prediction, which stated that early child maltreatment would predict higher levels of psychopathology and substance use symptoms in early-mid adolescence, as well as new revictimization experiences occurring between early-mid adolescence and mid-late adolescence, was not confirmed. Number of maltreatment subtypes was only weakly related to psychopathology at Wave 2 in the positive direction ( $p = .07$ ) but was unrelated to Wave 2 substance use and new revictimization. Previous literature has demonstrated that child maltreatment is a strong and significant predictor of all three of these outcomes (Cicchetti & Toth, 2016; Finkelhor et al., 2007; Tonmyr et al., 2010).

The second prediction states that psychopathology and substance use will display stability and cross-lagged effects from early-mid adolescence to mid-late adolescence and new revictimization occurring between Waves 2 and 3 will predict psychopathology and substance use in Wave 3. As anticipated and also demonstrated in Study 1,

psychopathology and substance use did display stability across both adolescent waves. Furthermore, Wave 2 psychopathology was a significant predictor of Wave 3 alcohol and cannabis abuse and dependence symptoms and new revictimization occurring between Waves 2 and 3 significantly predicted Wave 3 psychopathology and substance use. It was only Wave 2 substance use that did not predict Wave 3 psychopathology. However, as noted in Study 1, the distribution of Wave 2 alcohol and cannabis abuse and dependence symptoms was highly positively skewed with the substantial majority of participants (83.1%) not reporting any substance abuse and dependence symptoms. Thus, the low base rate of substance abuse symptoms in early-mid adolescence may not allow for much predictive power. Furthermore, it is possible that psychopathology is more likely to precede substance use rather than substance use preceding psychopathology, which is supported by previous analyses with the current data set (Oshri et al., 2011; Rogosch et al., 2010).

The third prediction, which was the primary focus of the current study, stated that friendship quality will partially mediate the effects of early childhood maltreatment on mid-late adolescent psychopathology and new revictimization occurring between early-mid and mid-late adolescence. No prediction was made about whether friendship quality would mediate the relationship between maltreatment and mid-late adolescent substance abuse symptoms. This prediction was not confirmed and unexpectedly, friendship quality was not related to any of these variables. Specifically, number of maltreatment subtypes did not predict lower friendship quality as expected and a simple t-test comparing the friendship quality of maltreated vs. non-maltreated participants revealed no significant differences between groups,  $t(511.79) = 0.58$ ,  $p = 0.56$ . Furthermore, it was notable that

on average, maltreated participants, and the overall sample, rated the quality of their friendship at about a 4 out of 5, indicating that they believed various statements describing positive qualities of close friends to be “Often True” of their friends. Additionally, post-hoc analyses entering the individual qualities of friendship that comprise the overall IPPA score revealed that number of maltreatment subtypes was significantly and positively related to degree of mutual trust. This is inconsistent with previous literature that has detailed maltreated children’s profound difficulties with peer relations in general and their friendships to be characterized by lower levels of intimacy, caring, and validation and higher levels of conflict and betrayal (Cicchetti & Toth, 2016; Cicchetti & Valentino, 2006; Parker & Herrera, 1996). Though, when examining differences between maltreated and non-maltreated adolescents on the individual domains that make up the overall friendship quality score on the IPPA using simple t-tests, maltreated adolescents did exhibit significantly higher levels of anger/alienation in their friendships than non-maltreated adolescents,  $t(518.87) = -2.26, p = 0.02$ . However, there were no differences between groups for degree of mutual trust or quality of communication using these analyses.

Friendship quality also had no relations to new revictimization, psychopathology, or substance use, which is also inconsistent with the abundance of literature highlighting the influence of friendship and peer relationship quality on maladjustment including psychological problems, peer victimization, and substance use (Choukas-Bradley & Prinstein, 2014; Hartup & Stevens, 1997; Hodges et al., 1999; Prinstein & Giletta, 2016). Although, degree of mutual trust was weakly related to Wave 3 psychopathology when entered into the model ( $p = .06$ ).

This inconsistency with the literature could be due to way in which the influence of peer relationships is typically measured. Much of the research tends to focus on peer acceptance/ rejection or peer victimization, with much less attention paid to the influence of friendships (Parker et al., 2006). Furthermore, even within the subset of literature focusing on friendship, the research questions tend to examine the presence of friends or whether individuals do have a close friendship or not as opposed to the quality of relationships with those close friends (Deater-Deckard, 2003; Hartup & Stevens, 1997). Per a review by Prinstein and Giletta (2016), most children, even those who have been rejected, have at least one very best friendship. Thus, it is also true that having a high quality relationship with a friend is not mutually exclusive with experiencing peer difficulties and for maltreated children in particular, who experience a greater degree of peer rejection and victimization (Cicchetti & Toth, 2016; Cicchetti & Valentino, 2006), such high quality friendships may be with individuals who are also experiencing profound peer difficulties and/or may be maladjusted as well.

Furthermore, research examining the influence of positive friendships or peer relationships as a potential protective factor for maltreated children is surprisingly rare (Merritt & Snyder, 2015) and within the existing literature, there is conflicting support as to whether such relationships do help to mitigate the negative influence of maltreatment. For example, Folger and Wright's (2013) study with undergraduates revealed that support from friends was only associated with a reduction in anxiety/depression and anger/hostility for individuals with low, but not high levels of cumulative child maltreatment. In another study, though stronger school peer connectedness was a protective factor from problematic behavior for 11- to 17-year-old maltreated children,

having experienced physical abuse had a negative impact on this protective effect (Merritt & Snyder, 2015). Additionally, Powers and colleagues' (2008) study found perceived social support from friends protected against adult depression in females only, after accounting for child abuse and neglect. One study found having a close reciprocal friendship had a protective effect for self-esteem in maltreated children but not internalizing or externalizing psychopathology (Bolger & Patterson, 2003) and in Ezzell and colleagues' (2000) study of physically abused 6- to 14-year-old children, perceived peer support was significantly negatively related to anxiety/depression but not externalizing symptomatology. Findings from another study found specific protective effects of emotional support from friends, in that such support reduced odds of adult depression in CSA survivors but only when abuse was perpetrated by someone other than the caregiver and when support was available at the time depression was assessed in adulthood. Furthermore, emotional support from friends in adolescence did not influence adult outcomes (Musliner & Singer, 2014). Adding to the conflicting support of the protective effects of friendships, less peer support was associated with greater internalizing symptoms but those with higher peer support reported more externalizing symptoms in one study with adolescents living in residential care facilities (Segura et al., 2017). Similarly, for 11- to 16-year-old children living in foster care, reported ability to count on friends was associated with improved subjective well-being but higher likelihood of binge drinking (Long et al., 2017).

Considering the complexity of the protective effects of friendships even within the same study, it is apparent that friendships operate differently for individuals who have experienced childhood maltreatment and other high degrees of risk, e.g., living in

residential care facilities or foster care. Thus, the typical rules regarding the normative development of peer relationships and friendships how they protect children from adversity may not apply for maltreated children. It is clear that the complexity of maltreated children's experiences with their peers and close friends is in need of further examination to disentangle the ways in which such critical relationships at this stage in development confer risk for or protection from adverse outcomes.

### **13.2 Strengths and Limitations**

This study has several strengths. The large sample size and 3-wave longitudinal design allows for adequate power to examine complex relationships among variables including the influence of childhood maltreatment on adolescent outcomes and the potential mediating impact of friendships. Furthermore, the ethnic diversity of the sample and the presence of a demographically similar non-maltreated comparison sample allows for greater generalizability. Using CPS records to assess all four primary subtypes of child maltreatment is an additional strength, as much of the literature examining the influence of child maltreatment tends to use retrospective self-report questionnaires or focus on only one subtype of maltreatment. Additionally, the examination of the friendship quality as opposed to peer acceptance/rejection or victimization adds to the very limited literature on how the nature of relationships with friends may influence outcomes for maltreated children.

The present study also has its limitations. Specifically, the low SES nature of the sample may preclude generalizability to families from higher SES backgrounds. Furthermore, generalizability to the overall population of maltreated children may be limited, considering that the maltreated sample was identified using substantiated CPS



records when child abuse and neglect is severely underreported. Waves 2 and 3 measures were also based solely on adolescent self-report and although FIML is the most ideal method to account for missing data, attrition between Waves 2 and 3 does not allow for examination of the proposed model with complete data from all participants. Furthermore, the assessment of new revictimization is very stringent to ensure that experiences reported were specific to the adolescent time period because of the community violence measure not indicating a time frame. Measures of victimization such as the Juvenile Victimization Questionnaire (JVQ; Finkelhor, Hamby, Turner, & Ormrod, 2011) would allow for assessment of a broad range of victimization that has occurred in the past year.

### **13.3 Future Research Directions**

Future research would continue to benefit from the use of multi-wave longitudinal designs to examine the impact of maltreatment on adverse outcomes in adolescence and provide information to enhance our understanding of the temporal order of such outcomes. With regard to peer relationships, it is very important that future research seek to further understand the complexity of these relationships for maltreated children and the implications they have for functioning. Though there is an abundance of literature demonstrating that these individuals are at greater risk of experiencing peer rejection and victimization, the nature of maltreated children's relationships with those they do identify as friends and how such relationships may influence risk for certain adverse outcomes is less well understood. The existing literature is largely conflicting and suggests that protective effects of friendships may be highly specific in nature for maltreated children despite appearing to be generally protective for children proceeding on normative

developmental pathways (Choukas-Bradley & Prinstein, 2014; Deater-Deckard, 2003; Parker & Asher, 1987; Parker et al., 2006; Prinstein & Giletta, 2016). Specifically, it may be useful for future studies to examine peer acceptance/rejection, victimization, and friendship quality together. Indeed, the examination of peer victimization and friendship quality was highly informative in one study, which found that although peer victimization predicted increases in internalizing and externalizing psychopathology, this was only the case for children without a mutual best friendship. The presence of such a friendship completely eliminated the effects of victimization on increases in internalizing problems and considerably reduced victimization's relations to increases in externalizing problems (Hodges et al., 1999). Though this study was not conducted with maltreated children, it does provide evidence for the protective effects of friendship against the negative impact of peer victimization, which as noted, maltreated children are at greater risk for. Studies examining varying aspects of maltreated children's interactions with peers may help to elucidate the mechanisms by which the quality of relationships with close friends may buffer, or even exacerbate, risks for adverse outcomes as a result of peer rejection or victimization. This could in turn influence prevention and intervention efforts with maltreated children and adolescents, especially those experiencing peer rejection and/or victimization.

Furthermore, findings from post-hoc analyses in the present study demonstrate differences in relationships between maltreatment and friendships qualities based on whether overall friendship quality or individual aspects of friendships are examined. This suggests that future research would also benefit from in-depth examination of specific friendship qualities and how these may influence outcomes for maltreated children.

#### **14. General Conclusion**

It is well established that childhood maltreatment increases risk for a range of adverse outcomes throughout the lifespan including but not limited to psychopathology, substance abuse/dependence, and revictimization. However, considering that not all maltreated individuals go on to develop these outcomes, the current studies sought to understand what places some individuals at a more heightened risk of proceeding on a negative developmental trajectory, whereas others appear to be doing quite well in spite of such adversity.

Study 1 focused on revictimization as a potential risk factor, which, according to the current literature, appears to further increase the likelihood of developing psychopathology and substance abuse/dependence. Despite abundant evidence for the cumulative risk of revictimization, the mechanisms by which this occurs are not fully understood. Although this study did not find a mediating impact of revictimization, adolescent revictimization exhibited significant relationships with later adolescent psychopathology and substance use, whereas childhood maltreatment exhibited a much weaker relationship with adolescent psychopathology and no relationship with adolescent substance use. This suggests that future research should seek greater understanding of these complex relationships between adverse outcomes, particularly in adolescence when such vulnerabilities develop or become heightened. Such efforts will help to further enhance our understanding of the developmental trajectories of maltreated individuals.

Beyond risks for individual maladjustment such as psychopathology and substance use, the difficulties maltreated individuals experience with interpersonal relationships is well-established. Peer rejection and victimization, both which have clear

links to adverse outcomes, are unfortunately a common occurrence for individuals who have experienced maltreatment and may be especially detrimental in adolescence when youth are spending increasingly more time with peers and the influential nature of peer relationships becomes more prominent. Thus, it is critical that a greater understanding of the nature of maltreated children's peer relationships is gleaned beyond rejection and victimization. To address this, Study 2 shifted the focus to the potential protective factor of friendship. This study did not find friendship quality in early-mid adolescence to play a mediating role in the relationship between childhood maltreatment and later adolescent psychopathology, substance use, or revictimization. These results and the highly conflicting nature of previous literature suggests that though the presence of high quality friendships typically appears to protect against adverse outcomes for youth proceeding on a normal developmental trajectory, the influence of such relationships for maltreated children presents a much more complicated picture that will require continued efforts to decipher. A greater understanding of maltreated adolescents' friendships will be critical to helping interrupt developmental pathways toward maladaptation.

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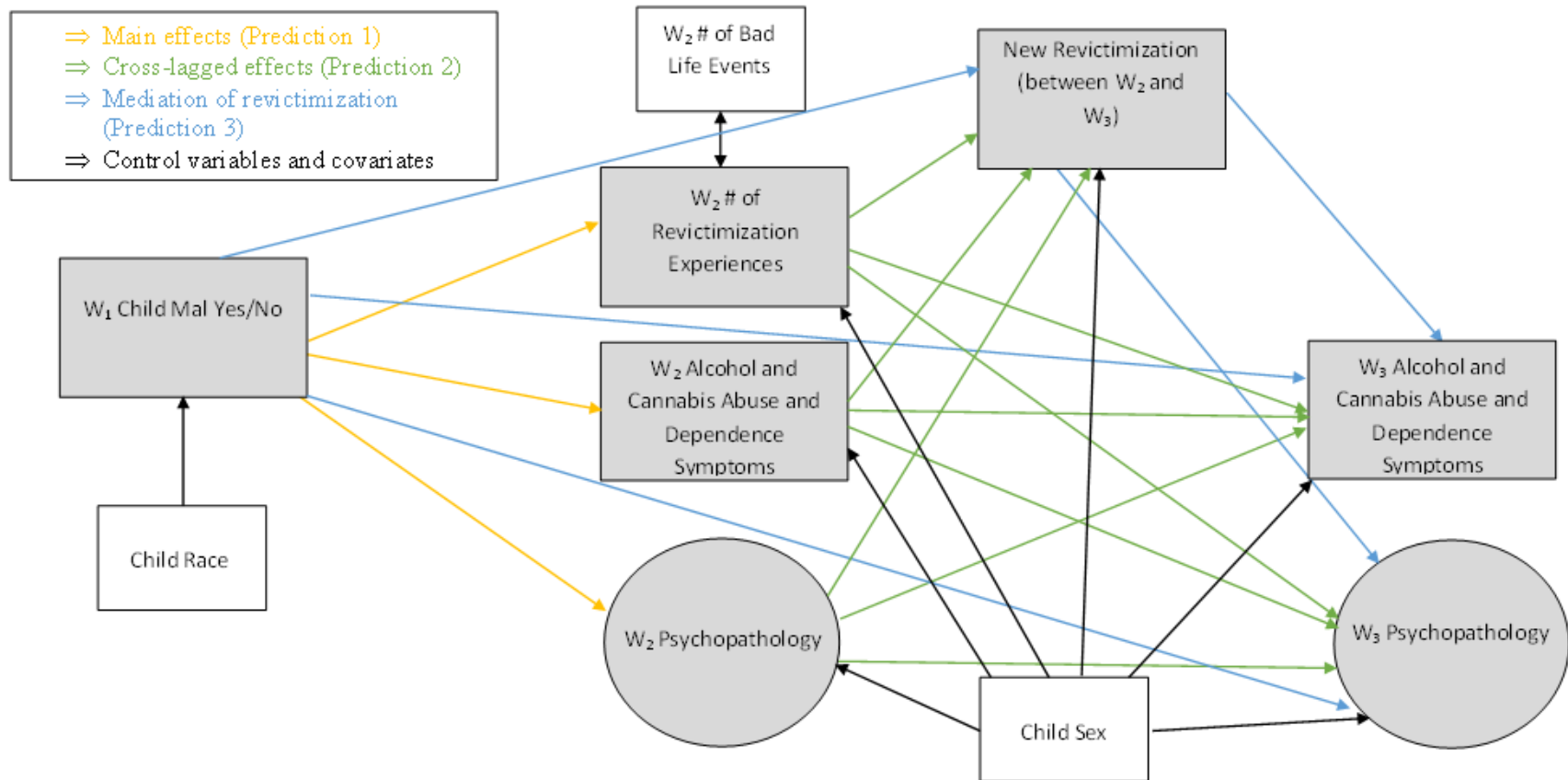


Figure 1: Study 1 model for the proposed relationships between Wave 1 child maltreatment, Wave 2 revictimization, new revictimization occurring between Wave 2 and 3, and psychopathology and alcohol and cannabis abuse and dependence symptoms at Wave 2 and Wave 3 with control variables. Mal = Maltreatment; W<sub>1</sub> = Wave 1; W<sub>2</sub> = Wave 2; W<sub>3</sub> = Wave 3.

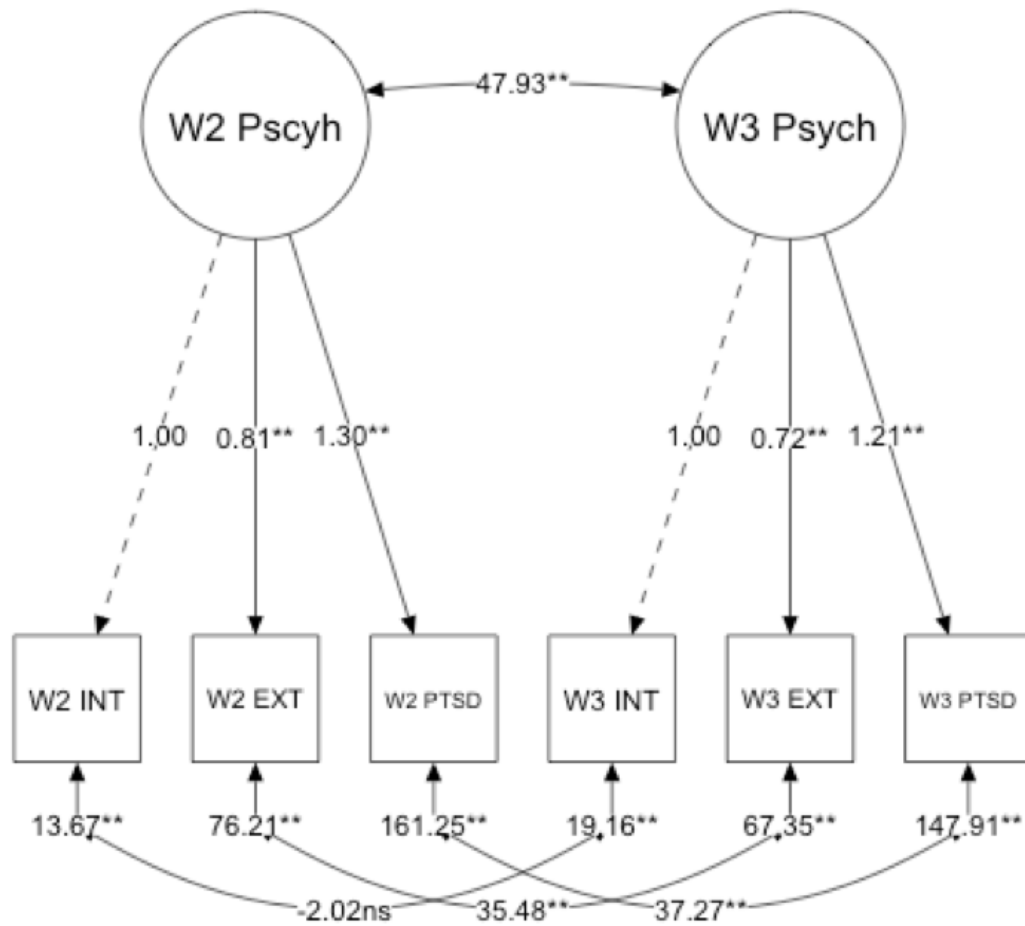


Figure 2: Results of confirmatory factor analysis (CFA) for the measurement model for psychopathology. W2 = Wave 2; W3 = Wave 3; Psych = Psychopathology; INT = Youth Self Report Internalizing T-score; EXT = Youth Self Report Externalizing T-score; PTSD = Checklist of Child Distress Symptoms PTSD symptom score. \*\* $p < .01$ ,  $ns$  = not significant

Table 1: Descriptive Information and Intercorrelations Among Endogenous Variables and Covariate for Study 1

Variable	N	M (SD)	1	2	3	4	5	6	7	8	9	10	11
1. W <sub>2</sub> revictimization experiences	535	1.33 (1.16)	—										
2. New revictimization experiences from W <sub>2,3</sub>	367	0.56 (0.82)	-.17**	—									
3. W <sub>2</sub> bad life events	541	4.57 (3.42)	.30**	.01	—								
4. W <sub>2</sub> internalizing symptoms	537	48.26 (10.44)	.23**	.06	.37**	—							
5. W <sub>3</sub> internalizing symptoms	383	47.03 (10.45)	.12*	.21**	.15**	.42**	—						
6. W <sub>2</sub> externalizing symptoms	537	50.99 (11.76)	.30**	.06	.41**	.62**	.35**	—					
7. W <sub>3</sub> externalizing symptoms	383	50.84 (10.83)	.18**	.27**	.22**	.30**	.60**	.53**	—				
8. W <sub>2</sub> PTSD symptoms	540	61.31 (18.05)	.26**	.01	.45**	.67**	.30**	.48**	.24**	—			
9. W <sub>3</sub> PTSD symptoms	385	61.48 (16.63)	.11*	.17**	.17**	.39**	.62**	.34**	.44**	.40**	—		
10. W <sub>2</sub> substance abuse and dependence symptoms	488	0.55 (2.36)	.18**	.01	.07	.07	.04	.17**	.18**	.06	.09	—	
11. W <sub>3</sub> substance abuse and dependence symptoms	355	1.59 (3.48)	.15**	.35**	.20**	.15**	.21**	.27**	.33**	.14*	.18**	.38**	—

Note. W<sub>1</sub> = Wave 1; W<sub>2</sub> = Wave 2; W<sub>3</sub> = Wave 3; \* $p < .05$ ; \*\* $p < .01$

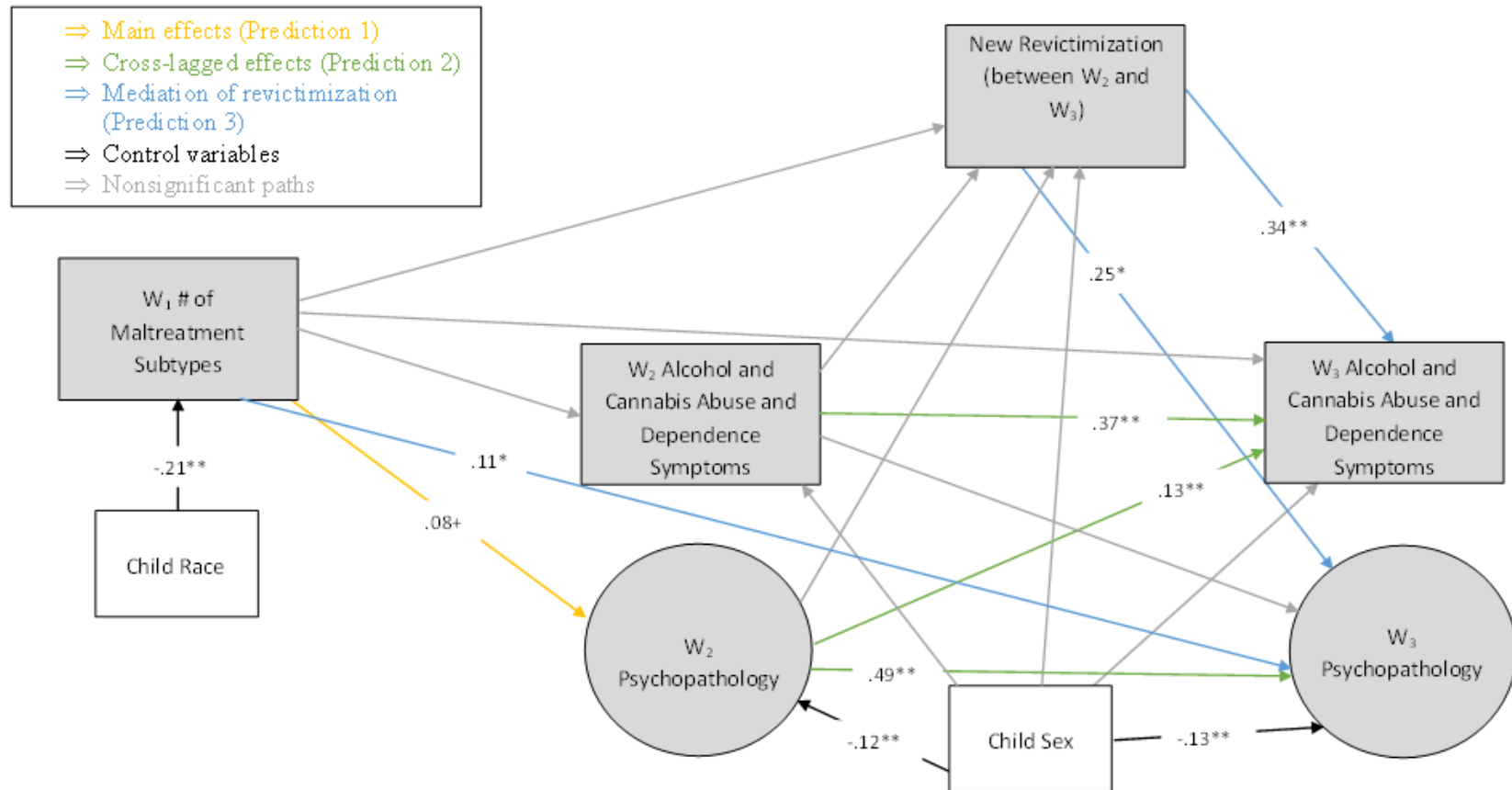


Figure 3: Study 1 results of post-hoc path analysis, which removes Wave 2 revictimization from the model in Figure 1. All other pathways are preserved. Significant paths are color coded based on prediction. Nonsignificant paths are displayed in gray. W<sub>1</sub> = Wave 1; W<sub>2</sub> = Wave 2; W<sub>3</sub> = Wave 3. + $p < .10$ ; \* $p < .05$ ; \*\* $p < .01$ .

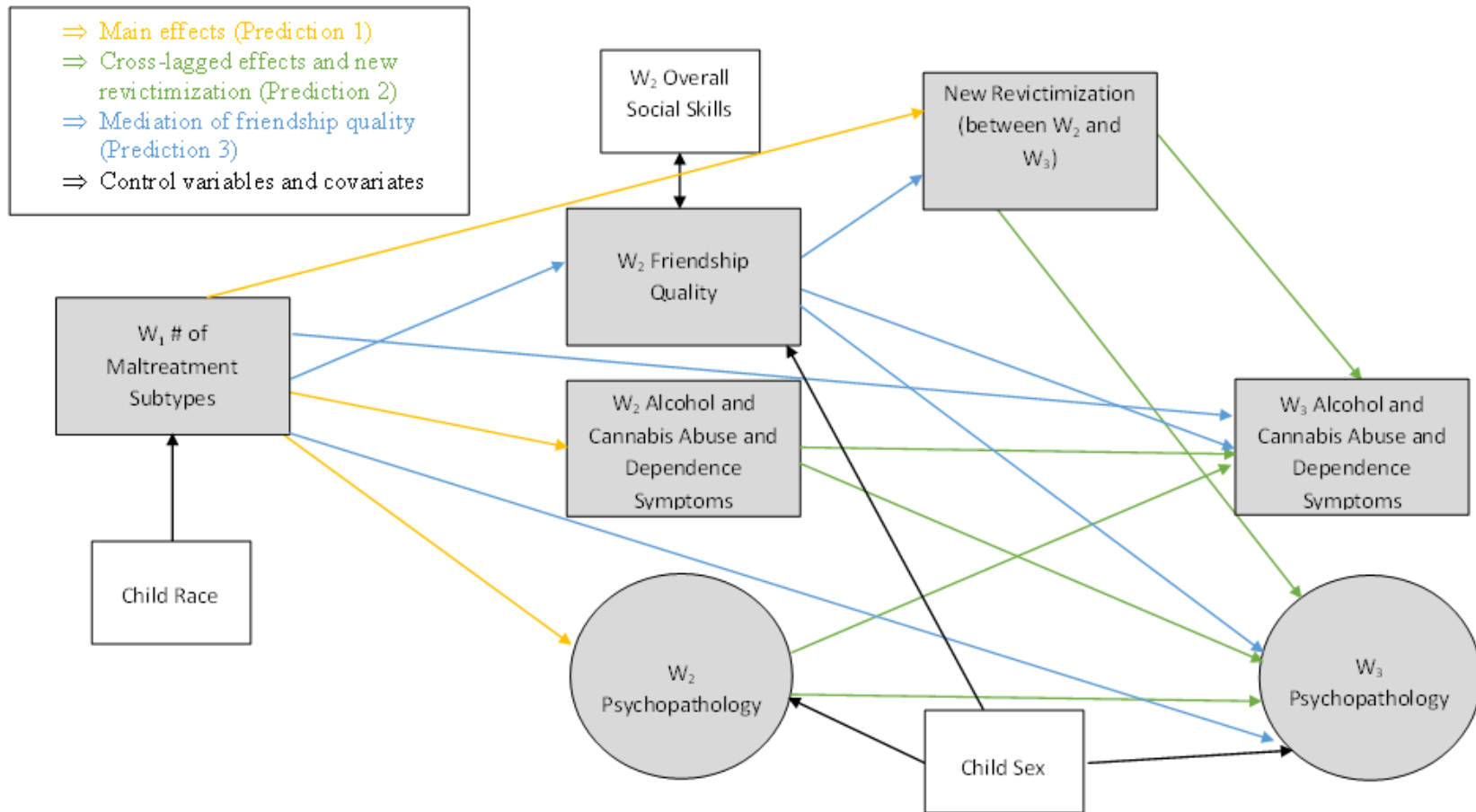


Figure 4: Study 2 cross-lagged mediation model for the proposed relationships between Wave 1 child maltreatment, Wave 2 friendship quality, new revictimization occurring between Wave 2 and 3, and psychopathology and alcohol and cannabis abuse and dependence symptoms at Wave 2 and Wave 3 with control variables. W<sub>1</sub> = Wave 1; W<sub>2</sub> = Wave 2; W<sub>3</sub> = Wave 3.



Table 2: Descriptive Information and Intercorrelations Among Endogenous Variables and Covariate for Study 2

Variable	<i>N</i>	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10	11
1. <i>W</i> <sub>2</sub> friendship quality	521	4.01 (.63)	—										
2. <i>W</i> <sub>2</sub> social skills	517	468.40 (57.97)	.38**	—									
3. New revictimization experiences from <i>W</i> <sub>2-3</sub>	367	0.56 (.82)	-.05	-.07	—								
4. <i>W</i> <sub>2</sub> internalizing symptoms	537	48.26 (10.44)	-.14**	.01	.06	—							
5. <i>W</i> <sub>3</sub> internalizing symptoms	383	47.03 (10.45)	-.08	-.09	.21**	.42**	—						
6. <i>W</i> <sub>2</sub> externalizing symptoms	537	50.99 (11.76)	-.06	.12**	.06	.62**	.35**	—					
7. <i>W</i> <sub>3</sub> externalizing symptoms	383	50.84 (10.83)	-.02	-.03	.27**	.30**	.60**	.53**	—				
8. <i>W</i> <sub>2</sub> PTSD symptoms	540	61.31 (18.05)	-.11*	.07	.01	.67**	.30**	.48**	.24**	—			
9. <i>W</i> <sub>3</sub> PTSD symptoms	385	61.48 (16.63)	-.07	-.04	.17**	.39**	.62**	.34**	.44**	.40**	—		
10. <i>W</i> <sub>2</sub> substance abuse and dependence symptoms	488	0.55 (2.36)	-.02	.00	.01	.07	.04	.17**	.18**	.06	.09	—	
11. <i>W</i> <sub>3</sub> substance abuse and dependence symptoms	355	1.59 (3.48)	-.03	-.03	.34**	.15**	.21**	.27**	.33**	.14*	.18**	.38**	—

Note. *W*<sub>1</sub> = Wave 1; *W*<sub>2</sub> = Wave 2; *W*<sub>3</sub> = Wave 3; \**p* < .05; \*\**p* < .01

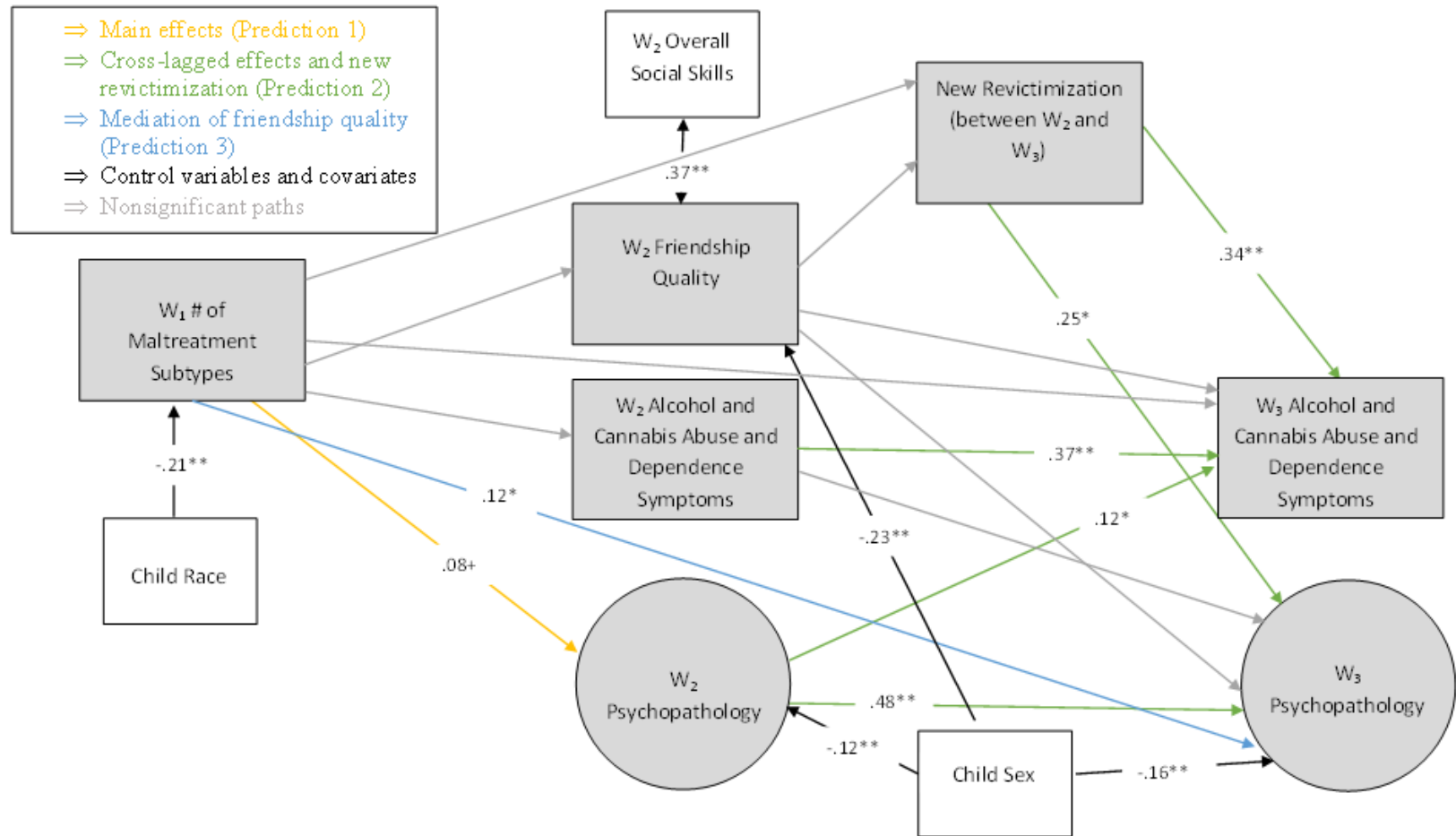


Figure 5: Study 3 results of path analysis for the proposed cross-lagged mediation model displaying the relationships between Wave 1 # of maltreatment subtypes and study variables. W<sub>1</sub> = Wave 1; W<sub>2</sub> = Wave 2; W<sub>3</sub> = Wave 3. +*p* < .10; \**p* < .05; \*\**p* < .01. Significant paths are color coded based on predictions. Nonsignificant paths are displayed in gray.

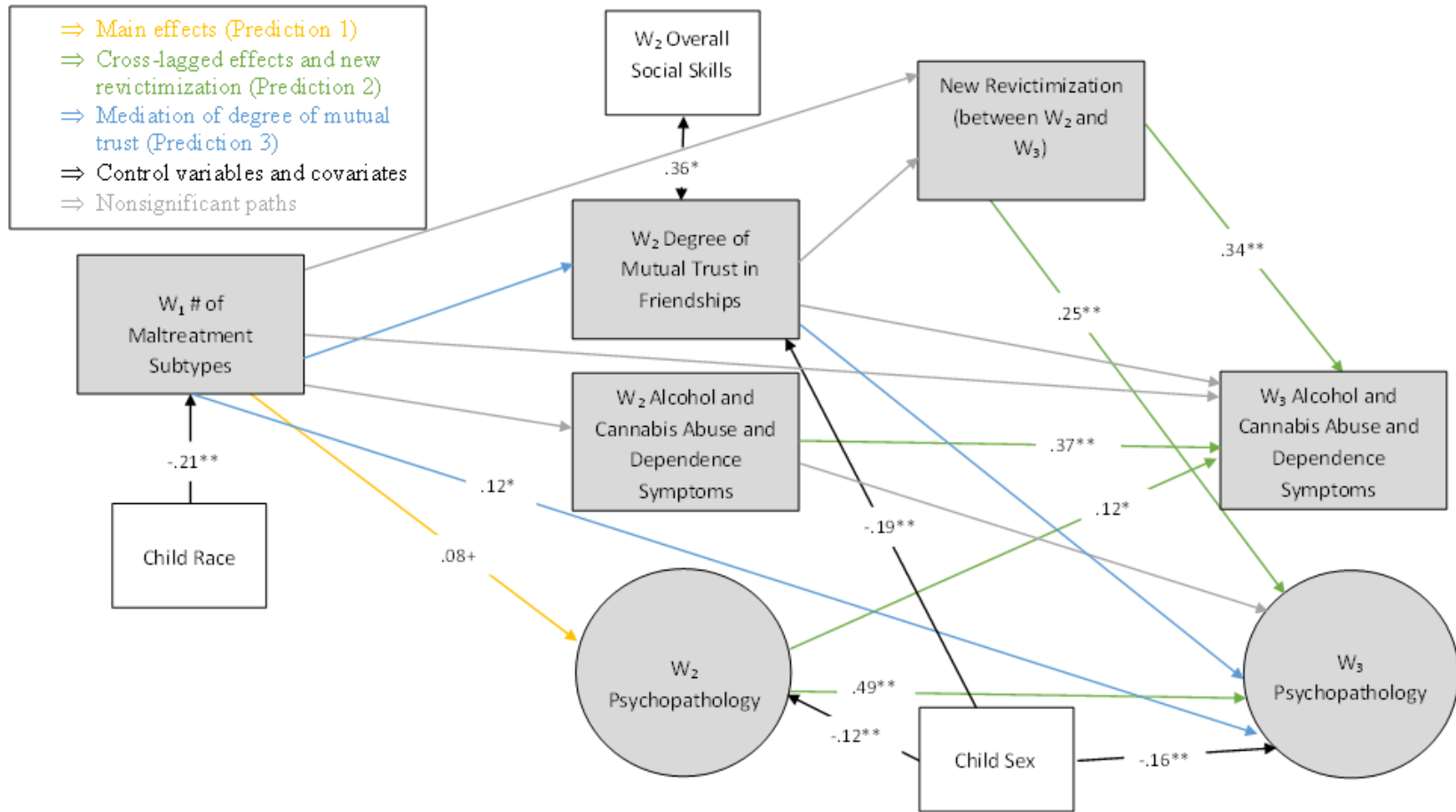


Figure 6: Study 2 results of path analysis entering degree of mutual trust in place of overall friendship quality for the model proposed in Figure 4. W<sub>1</sub> = Wave 1; W<sub>2</sub> = Wave 2; W<sub>3</sub> = Wave 3. +*p* < .10; \**p* < .05; \*\**p* < .01. Significant paths are color coded based on predictions. Nonsignificant paths are displayed in gray.