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J. Bart Klika

Multi-Type Maltreatment and Adolescent and Adult Mental Health and Substance Use
Outcomes: A Latent Class Analysis

Jeffry Barton Klika

A dissertation

submitted in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

University of Washington

2014

Reading Committee:

Todd Herrenkohl, Chair

Jon Conte

Sabrina Oesterle

Program Authorized to Offer Degree:

School of Social Work

University of Washington

Abstract

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Jeffrey Barton Klika

Chair of the Supervisory Committee:

Professor Todd Herrenkohl

School of Social Work

Child abuse and neglect pose a significant threat to the health and well-being of children. Research shows that child abuse and neglect rarely occur in isolation from one another. Limited research has investigated the ways in which child abuse and neglect co-occur and whether these patterns are similar for males and females. Further, little is known as to whether particular combinations of abuse and neglect share similar predictors or result in similar impairments in substance use and mental health outcomes.

The current study used latent class analysis (LCA) to empirically examine the overlap of child abuse and neglect using data from the Lehigh Longitudinal Study. LCA models were run separately for males and females to understand whether the overlap of maltreatment was similar across gender. Childhood stressors were examined as a predictor of class membership using

multinomial logistic regression. As a final step, class differences in adolescent and adulthood mental health and substance use outcomes were examined.

LCA identified 3 subgroups of maltreatment for both males (Class 1: Physical abuse, sexual abuse, & neglect; Class 2: Low maltreatment; Class 3: Physical abuse & emotional abuse) and females (Class 1: Sexual abuse & neglect; Class 2: Low maltreatment; Class 3: Physical abuse & emotional abuse). While the interpretation of the classes was similar across gender for two of the three identified classes, males and females differed in the interpretation of one class. Examining childhood stressors as a predictor of class membership, males and females demonstrated a similar pattern. High levels of stressors differentiated between those in the low maltreatment class and the other identified maltreatment classes however childhood stressors did not differentiate between the identified maltreatment classes. Overall, few differences between the classes were identified for males and females across substance use outcomes in adolescence and adulthood. Mental health difficulties were higher for both males and females in classes defined by child sexual abuse. Results for both males and females did not suggest that one combination of child abuse and neglect resulted in worse outcomes compared to other combinations of abuse and neglect.

These findings suggest that males and females experience the overlap of child abuse and neglect in similar ways. Further, little evidence was found for differences among the identified maltreatment classes suggesting that little information is gained by knowing the particular combination of maltreatment an individual experienced. Limitations of the current study are discussed.

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Acknowledgements

I have too many people to thank and acknowledge as I reflect upon the support and guidance I received to enable me to complete my doctoral studies. To the teachers, friends, family, colleagues and many “et al.’s” whom I encountered along the way: my deepest appreciation.

There are a few noteworthy individuals who helped push, pull, drag, and throw me across the final finish line. To my chair and mentor, Todd Herrenkohl: thank you for the endless support, patience, and opportunity during my time in the program. Your mentorship is the reason I was able to complete this degree. To Jon Conte: thank you for your honesty and willingness to indulge in my developing ideas—even when you disagreed with my thinking. To Sabrina Oesterle: because of you, I will always “go back to my research questions.” To my friends old and new: thank you for understanding when I was unable to hang-out and for making the time when I was free. Particularly, I would like to thank Aaron Gingerelli for being the eternal optimist that he is. Thanks to Dana, Allison, Cindy, and Mark, my cohort mates, for supporting me through this process. To my parents, Larry and Linda: thank you for always riding the roller coaster with me and supporting me when I wanted to get off. To my wife, Erika Klika: thank you for your patience, understanding, and unwavering support during my time as a graduate student (I told you I would eventually finish). Last, but certainly not least, to the light of my life, my daughter, Lucy: thank you for being you—funny, smart, feisty, stubborn, caring, and loving. You gave me perspective to finish this “diss-tation.”

Chapter 1: Background & Significance

Introduction

Child abuse and neglect are major public health problems facing children across the world. The consequences of abuse and neglect are in some cases severe, long-lasting, or even fatal. Efforts are being made to understand the context in which maltreatment occurs, its etiology and life-course outcomes so maltreatment can be prevented. In this dissertation, I use Latent Class Analysis (LCA) to empirically identify overlapping forms of child abuse and neglect and examine whether this overlap is similar for males and females. In addition, I explore the risk contexts in which child abuse and neglect occur and examine the relationship between different combinations of maltreatment and adolescent and adulthood mental health and substance abuse outcomes.

Statement of the problem

According to data from the National Child Abuse and Neglect Data System (NCANDS), a national data system used to track child abuse and neglect reports, nearly 3.4 million referrals were placed to child welfare agencies in 2012 for suspected child abuse and/or neglect (USDHHS, 2012). Of these, 678,810 cases were determined, through formal investigation, to meet criteria for child welfare involvement. Approximately 78% of substantiated cases in 2012 were due to child neglect; 18% due to physical abuse; 9% were due to psychological or emotional abuse; and nearly 9% were due to sexual abuse.

The NCANDS relies on official reports of maltreatment which are generated by states that may differ in their definitions of what constitutes child abuse and/or neglect. Because not all cases of child abuse and neglect come to the attention of official reporting agencies, estimates based on the NCANDS system do not reflect the true magnitude of the problem. Recent projections by Wilderman et al. (2014) based on current rates of child abuse and neglect suggest that 1 in 8 children will be abused or neglected by the age of 18 years.

There are four federally recognized forms of child abuse and neglect which are tracked as a mandate of the Child Abuse Prevention and Treatment Act (CAPTA): physical abuse, emotional/psychological abuse, sexual abuse, and neglect. Each state is responsible for defining the different forms of abuse and neglect although each state definition must meet the following minimum requirements established by (CAPTA):

Any recent act or failure to act on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation; or an act or failure to act which presents an imminent risk of serious harm. (Child Welfare Information Gateway [CWIG], 2013, p.2)

From this definition, states define each individual form of abuse and neglect. Physical abuse encompasses non-accidental forms of injury through the use of physical force committed by a parent or caretaker of the child. Examples of physically abusive behavior include such

things as hitting a child with sufficient force to leave a bruise, biting a child, or hitting a child with an object (e.g. strap, rope, belt) (CWIG, 2013). Emotional or psychological abuse¹ refers to any behavior by a caregiver that impacts the self-esteem or self-worth of the child. Examples of emotionally abusive behavior include extreme criticism of the child, threatening a child, or rejecting the emotional needs of the child (CWIG, 2013). Sexual abuse of a child occurs when a parent or caregiver engages in sexual acts with a child (e.g. fondling child, penetration), exposes the child to such acts (e.g. watching pornography), or exploits the child in sexual ways (e.g. prostitution) (CWIG, 2013). Finally, child neglect occurs when a parent or guardian fails to adequately meet the physical, emotional, medical, or educational needs of the child (CWIG, 2013).

The negative consequences of child abuse and neglect are often severe and long- lasting. Research documents the relationship between experiences abuse and neglect in childhood with various forms of psychopathology (depression and anxiety) (Nanni, Uher, Danese, 2012; Penza, Heim, & Nemeroff, 2003; Herrenkohl, Hong, Klika, Herrenkohl, & Russo, 2013), substance use and abuse (Dube et al., 2002; Lo & Cheng, 2007; Lansford, Dodge, Pettit, & Bates, 2010), delinquent/antisocial behavior (Smith & Thornberry, 1995; Ireland, Smith, & Thornberry, 2002;

¹ Some prefer the term “psychological abuse” over “emotional abuse” because the former “denotes a category that is sufficiently broad to include both the cognitive and affective meanings of maltreatment (psychological) as well as perpetrator acts of both commission and omission (maltreatment) (Hart, Brassard, Binggeli, & Davidson, 2002, p. 79).

Klika, Herrenkohl, & Lee, 2011; Widom, 1989, 1998; Widom et al., 2006), and future perpetration of child abuse and neglect (Berlin, Appleyard, & Dodge, 2011; Dixon, Browne, & Hamilton-Giachritsis, 2009; Herrenkohl, Klika, Brown, Herrenkohl, & Leeb, 2013; Thornberry & Henry, 2013). The financial toll associated with early maltreatment is substantial. The estimated yearly cost of child abuse and neglect in the United States tops \$124 billion (Fang, Brown, Florence, & Mercy, 2012). Each unique victim of child abuse and neglect is hypothesized to incur a lifetime cost of nearly \$210,000 due to losses in productivity, child healthcare costs, adult medical costs, special education costs, child welfare costs, and criminal justice costs. Clearly, abuse and neglect not only pose threats to the healthy development of children but also places a large financial burden on society.

Over the years, researchers have refined the methods and theories for understanding the link between risk factors, child maltreatment and later adverse outcomes. Through this process, researchers have begun to isolate the effects and unique causal pathways associated with individual forms of abuse and neglect (e.g. physical abuse) (Daro, 1988). Knowing whether individual forms of abuse or neglect result in unique outcomes helps researchers and practitioners develop “type-specific” programs to prevent maltreatment and to address its adverse consequences (tertiary prevention).

Accumulating research however, suggests that few individuals experience a single form of child abuse or neglect in isolation from other forms (Herrenkohl & Herrenkohl, 2009; Scott-Storey, 2011; Edwards, Holden, Felitti, Anda, 2003; Higgins & McCabe, 2000; Herrenkohl,

Sousa, Tajima, Herrenkohl, & Moylan, 2008; Dong et al., 2004; Gewirtz & Edleson, 2007; Finkelhor, Ormrod, & Turner, 2007). The overlap of different forms of child abuse and neglect is commonly referred to as “multi-type maltreatment” (Higgins & McCabe, 2000).

One of the methods used by researchers to examine the overlap in child abuse and neglect is to look at frequency counts of overlap between the various forms of maltreatment. Studies range in the frequency with which multi-type maltreatment is reported, yet most studies identify the fact that children are experiencing multiple forms of abuse and neglect. For example, in studies of maltreated children, frequency of overlap has been noted as follows: 33% (Herrenkohl & Herrenkohl, 1981), 65% (Bolger, Patterson, & Kupersmidt, 1998), 73% (Cicchetti & Rogosch, 1997), and 94% (McGee, Wolfe, & Wilson, 1997). Despite the variation in the frequency in rates of overlap across studies, research consistently demonstrates that different forms of child abuse and neglect occur together.

Another way to understand the overlap among the different forms of child abuse and neglect is to look at correlations between different forms of maltreatment. In their review of the literature, Herrenkohl and Herrenkohl (2009) examined correlations among different combinations of child abuse and neglect. Small to large effect sizes were observed across the reviewed studies for the combination of physical abuse and emotional abuse ($r=.13 - r=.78$). The range of effect sizes also varied for other combinations of maltreatment. For example, the range of effect sizes (r) for the combination of physical abuse and neglect was between $-.26$ and $.63$ across the studies. The authors note that the range of correlations is directly related to the

method by which the data were collected, with self-report measures producing the largest correlations. Despite the variation in the association among the various combinations of abuse and neglect, many studies find significant correlations among the various forms of child abuse and neglect.

Although advances have been made in documenting the overlap of child abuse and neglect far less attention has been given to the theoretical and conceptual reasons why different forms of child abuse and neglect occur together. There are a couple plausible explanations for why certain forms of abuse and neglect may occur together. For example, a parent who uses physical force with their child (i.e. physical abuse) is likely using harsh forms of emotional discipline (i.e. ridicule) while the physical abuse is occurring. In this way, one might expect the combination of physical and emotional abuse to occur in tandem. On the other hand, child sexual abuse may occur in families where there is a general lack of supervision (i.e. neglect). Without proper supervision, children may be left or placed in situations where child sexual abuse is possible.

If it is known that different forms of child abuse and neglect occur together, it is important to account for this overlap when examining the etiology and consequences associated with its occurrence. Research that fails to account for multi-type maltreatment when examining the relationship with risk factors or later outcomes leads to issues of overestimation of associations between individual forms of maltreatment and risk and/or outcome variables.

One of the most common approaches to the study of multi-type maltreatment is one in which a researcher compiles the number of different types of maltreatment a child experiences using what amounts to an additive risk score. Higher scores on these additive measures reflect more different types (variety) of maltreatment that an individual experienced. Research consistently finds that as the number of different forms of child abuse and neglect increases, so too does the risk for negative outcomes. The “more is worse” finding is important for theory development regarding the adverse effects of overlapping maltreatment however, this method gives similar weight to each form of abuse and neglect. For example, a person who experiences the combination of physical abuse and sexual abuse (cumulative score of “2”) is treated conceptually the same as a person who experiences the combination of neglect and emotional abuse (cumulative score of “2”) (Evans, Li, & Whipple, 2013). It is possible that different combinations of abuse and neglect are not just additive in their effects but synergistic, meaning that different combinations of abuse and neglect can result in more severe consequences than will other combinations. The additive approach overlooks the potential synergistic nature of different combinations of maltreatment and leads to theories that may not capture the nuanced effects associated with different combinations of abuse and neglect.

A growing number of researchers are beginning to use analytic approaches such as Latent Class Analysis (LCA) as a way to empirically identify subpopulations of individuals who share similar patterns of child abuse and neglect (Pears, Kim, & Fisher, 2008; Romano, Zoccolillo, & Paquette, 2006; Berzenski & Yates, 2011; Armour, Elklit, & Christoffersen, 2013; Nooner et al., 2010; Walsh, Senn, & Carey, 2012; Hazen, Connelly, Roesch, Hough, & Landsverk, 2009;

Petrenko, Friend, Garrido, Taussig, & Culhane, 2012). One of the assumptions of these studies is that different combinations of abuse and neglect have distinct relationships with predictor and outcome variables. Across these studies, researchers often identify multiple subpopulations (classes) of maltreatment within their respective samples. Typically, researchers identify one class distinguished by low rates of child abuse and neglect. This class often becomes the “reference class” to which classes of maltreatment are compared in relation to predictors and outcomes. A number of these studies also identify a class of individuals who experience the overlap in child physical abuse and emotional abuse (Berzenski & Yates, 2011; Hazen et al., 2009). Beyond these two patterns of maltreatment, studies vary widely in the particular patterns of maltreatment overlap identified.

Once patterns of maltreatment are identified, researchers often examine whether particular classes of maltreatment are more or less related to outcomes than other classes of maltreatment. Studies using LCA methods often examine internalizing (e.g. depression) and externalizing (e.g. behavioral problems) outcomes at a single point in time. Most studies find that, in comparison to those with low rates of maltreatment, those who experience any combination of child abuse and neglect experience higher rates of internalizing and externalizing problems. When comparisons are made between different patterns of child abuse and neglect (classes), these studies largely fail to find differences in outcomes between the different classes of child maltreatment. For example, Hazen et al. (2009) found that those who experience the combination of sexual abuse, physical abuse, and emotional abuse and those who experienced the combination of physical abuse and emotional abuse fared worse than those with low rates of

maltreatment on Child Behavior Checklist measures of withdrawn behavior, somatic complaints, anxiety/depression, social problems, thought problems, attention problems, delinquent behavior, and aggression. No differences were observed on any of these measures when those in the sexual abuse, physical abuse, and emotional abuse class were compared with those in the physical abuse and emotional abuse class. Findings such as this raise the question about whether particular forms of abuse and neglect are more deleterious than other combinations of abuse and neglect.

The current dissertation advances the research on multi-type maltreatment, specifically studies utilizing LCA methods, in a couple important ways. First, I use LCA to examine whether different patterns of overlap in child abuse and neglect exist for males and females. Within the literature on multi-type maltreatment, there is limited research examining whether males and females experience the overlap in child abuse and neglect in similar or different ways. Research examining the prevalence (not the overlap) of different forms of abuse and neglect across genders provides some mixed findings yet suggest that males and females may experience different forms of abuse and neglect at different rates. Ackerman, Newton, McPherson, Jones, and Dykman (1998) found that males in their sample experienced higher rates of physical abuse than females and that females experienced higher rates of sexual abuse than males. Research by Edwards, Holden, Felitti, and Anda (2003) also found higher rates of sexual abuse for females than males and higher rates of physical abuse for males compared to females. Briere and Elliot (2003) also found that females experienced sexual abuse at a significantly higher rate than males although no significant gender differences were noted for physical abuse. Finkelhor (1994) also

found that females experience higher rates of child sexual abuse than males. If males and females experience different rates of child abuse and neglect, it is also possible that they are experiencing the overlap in maltreatment in different ways. For example, if females experience higher rates of child sexual abuse, it may be that multiple subgroups of maltreatment would be identified with high probabilities of sexual abuse for females. If males have higher rates of physical abuse than females, it may be that multiple subgroups of maltreatment would be identified with high probabilities of physical abuse for males.

Feminist theories (e.g. radical feminism, post-modern feminism) and theories of gender socialization help explain why differences may be observed between males and females in the prevalence of different forms of child abuse and neglect. Feminist perspectives suggest that sexual abuse impacts females at a higher rate as a result of patriarchal values and beliefs which place value in male dominance over females (Purvis & Ward, 2006). Theories of gender socialization suggest that males who deviate from strict “sex-typed behavior” (masculine behavior) may be harshly corrected by a parent in the form of physically abusive discipline (Ryle, 2011). Knowing whether males and females experience the overlap of maltreatment in similar ways, then examining the predictors and outcomes associated with these different patterns of maltreatment, has important implications for potentially developing gender specific treatment and prevention approaches (Kristman-Valente & Wells, 2013).

This dissertation moves beyond simple, single-factor models of risk and examines additive risk, across levels of the social ecology (e.g. family, community) as a predictor of the

different classes of child abuse and neglect. An ecological framework (Bronfenbrenner, 1979) suggests that to understand human development, it is necessary to place child development within the context of families, communities, and larger society. Viewing children as embedded within families, families embedded within communities, and communities embedded within larger social structures allows us to unpack the multitude of factors which can impinge on healthy child development. Child abuse and neglect create what Cicchetti (1996) terms a “pathogenic relational environment” for children and parents. From an ecological perspective, these pathogenic relational environments are embedded within broader community and social contexts which can work to either buffer the risk experienced in the home environment or further hinder development of the child by posing additional risk or adversity (Belsky, 1980; Belsky, 1993).

Often, children raised in maltreating families are being exposed to other family and community risk factors which pose significant challenges for healthy development (e.g. parental substance abuse, parental psychopathology, community violence) (Cicchetti, 1996). Work from the Adverse Childhood Experiences Study (ACEs) demonstrates that experiencing one adversity (e.g. abuse, neglect, household adversity) increases the risk for experiencing another adversity. For example, compared to those with no self-reported emotional abuse, those who reported emotional abuse were significantly more likely to report having a parent with a mental illness while individuals who reported child sexual abuse were significantly more likely to report a parent with a substance abuse problem compared to those who did not report sexual abuse. In this dissertation, I explore whether different patterns of child abuse and neglect (classes) can be differentiated based upon the accumulation of family and community contextual risk factors. An

answer to this particular question identifies whether different patterns of child abuse and neglect are associated with different levels of risk, making a significant contribution to the study of the etiology of multi-type maltreatment.

Research suggests that child abuse and neglect are related to both mental health and substance use problems (Herrenkohl, Hong, Klika, Herrenkohl, & Russo, 2013; Thornberry, Henry, Ireland, & Smith, 2010; Bensley, Spieker, van Eenwyk, & Schoder, 1999; Bernet & Stein, 1999; Springer, Sheridan, Kuo, & Carnes, 2007; Cohen, Brown, & Smailes, 2001; Fergusson, Boden, & Horwood, 2008). However, few studies have accounted for the overlap in child abuse and neglect when examining mental health and substance use outcomes. Failure to account for the overlap of child abuse and neglect can lead to an overestimate of the relationship between individual forms of maltreatment and later outcomes. In addition, most studies of multi-type maltreatment rely on cross-section research designs which only allow for the examination of outcomes at a single point in time. As noted by Cicchetti and Toth (2005) “by conducting research that elucidates the developmental processes whereby maltreatment exerts its deleterious impact on children, theoretically and empirically informed interventions for maltreated children and their families can be developed, provided, and evaluated for effectiveness” (p. 428). This dissertation advances the field by examining mental health and substance abuse outcomes associated with different patterns of maltreatment at two points on the developmental continuum (i.e. adolescence & adulthood).

The following research questions guide the current dissertation:

Research Question #1a: Are there qualitatively different combinations of child abuse and neglect for the participants in the Lehigh Longitudinal Study.

Research Question #1b: Are there differences in the combinations of child abuse and neglect for males and females in the Lehigh Longitudinal Study?

Research Question #2: Does the level of adversity and stressors in childhood help distinguish between the latent classes of child abuse and neglect in the Lehigh Longitudinal Study?

Research Question #3: Are particular classes of child abuse and neglect related to higher rates/levels of adolescent and adulthood substance use problems in comparison to other classes of child abuse and neglect for individuals in the Lehigh Longitudinal Study?

Research Question #4: Are particular classes of child abuse and neglect related to higher rates/levels of adolescent and adulthood mental health problems in comparison to other classes of child abuse and neglect for individuals in the Lehigh Longitudinal Study?

In the next section, I provide a conceptual framework for understanding multi-type maltreatment and its association to mental health and substance use outcomes.

Conceptual framework

Multi-type maltreatment.

It is now widely accepted that differing forms or types of abuse and neglect co-occur (Higgins & McCabe, 1998; Higgins & McCabe, 2000; Finkelhor, Ormrod, & Turner, 2007; Felitti et al., 1998; Herrenkohl & Herrenkohl, 2009). The conceptual framework explaining the

overlap in different types of child abuse and neglect is commonly referred to as “multi-type maltreatment” (Higgins & McCabe, 1998). Higgins and McCabe (2000) define multi-type maltreatment as “the coexistence of one or more of the following maltreatment types: sexual abuse, physical abuse, psychological maltreatment, neglect, witnessing family violence” (p. 7).

Higgins and McCabe (2001) conducted one of the first major literature reviews on the topic of multi-type maltreatment. Their review included 29 retrospective studies that examined studies measuring more than one type of abuse or neglect. A couple patterns emerged including a robust association between physical abuse and psychological abuse and between physical abuse and sexual abuse. Interestingly, child sexual abuse did not always demonstrate an association with other forms of maltreatment. In their concluding remarks, the authors noted that few studies examine all forms of maltreatment (i.e. physical abuse, emotional abuse, sexual abuse, neglect) but, of those studies that do, most find that various types of child abuse and neglect are correlated and that those who experience multi-type maltreatment demonstrate worse outcomes than those who experience single-forms of abuse (or no abuse). This review was instrumental in beginning to identify patterns of association between various forms of abuse and neglect.

The research conducted on multi-type maltreatment has largely been conducted using additive scales of abuse and neglect, which link the number of different types of child abuse and neglect an individual experiences to later outcomes. This line of research is guided by theories of cumulative risk/adversity proposed initially by Rutter (1979). In his work with children on the Isle of Wight, Rutter found that those who experienced multiple forms of risk and adversity (i.e.

marital discord, low SES, household crowding, paternal criminality, maternal psychiatric disorder, child foster care) were functioning less well than those who experienced no risk/adversity or single forms of risk/adversity over time. Research from the Adverse Childhood Experiences study (ACEs) shows that as an individual experiences an increasing number of adversities their risk for poor mental and physical health problems also increases (Felitti et al., 1998).

Finkelhor and colleagues (Finkelhor, Ormrod, & Turner, 2007; Finkelhor, Turner, Hamby, & Ormrod, 2011) describe “poly-victims” as those individuals who experience multiple different forms of victimization (not just child abuse and neglect). Instead of focusing on the experience of a single adversity over time, polyvictimization is concerned with the ways in which individuals experience multiple, different forms of adversity simultaneously (e.g. physical abuse, poverty, community violence). Using a nationally representative sample of children between the ages of 2-17 years, Finkelhor, Ormrod, and Turner (2007) found that approximately 22% of the sample experienced four or more different forms of victimization in the past year. In addition, individuals who experienced poly-victimization demonstrated more trauma symptoms than those who experienced a single type of victimization over time.

Finkelhor, Ormrod, Turner, and Holt (2009) provide a conceptual explanation for why children experience multiple overlapping forms of victimization rather than single, isolated forms. Their conceptual framework describes four, complimentary pathways in which multiple victimization may occur. First, children who experience victimization are often living in

environments with high levels of community violence. These environments are often characterized by poor social connections among members of the community, lack of adequate supervision of children, and concentration of violent or deviant populations. Children within these environments could be at an increased risk for neglect due to lack of supervision, sexual abuse as a result of violent/deviant populations within the community in combination with lack of adequate supervision of children, and/or physical and emotional abuse as parents attempt to control/protect their children from the environmental stressors. Second, children who experience abuse and/or neglect in the family environment may develop poor social interaction skills and difficulties in processing social information which may place them at an increased likelihood to be victimized by peers. Third, families experiencing multiple, overlapping, cross-context stressors (e.g. poverty, parental substance abuse/mental illness, single-parenthood) may reside in environments where victimization is more likely. If parents are emotionally unavailable or unresponsive due to substance use or mental illness, they may be less likely to meet the developmental needs of their children. These children, in turn, may place themselves in dangerous or compromising situations (e.g. sexual relationships) to get their physical and emotional needs met. Finally, characteristics of a child may place him/her at increased risk for being multiply victimized. Children who demonstrate difficult or challenging temperaments may elicit negative feedback from caregivers or peers, potentially in the form of physical abuse or peer victimization.

Evidence of the overlap in multiple forms of victimization is well established, as is the research on the relationship between multiple victimization and later negative outcomes.

Knowing that child abuse and neglect often overlap, it is possible that different combinations of abuse and neglect may result in worse outcomes in comparison to other combinations of abuse and neglect and, these patterns may vary by gender. Further research is warranted, preferably with longitudinal data, to develop a more clear understanding of how maltreatment overlaps for males and females and how these patterns of overlap are associated with predictors and outcomes.

Gender and child maltreatment.

Research suggests that males and females may experience the different types of abuse and neglect at higher rates. For example, males are reported to experience higher rates of physical abuse in comparison to females (Ackerman, Newton, McPherson, Jones, and Dykman, 1998) while females report higher rates of sexual abuse than males (Finkelhor, 1994). For the study of multi-type maltreatment, these findings raise an important question about whether differences in prevalence rates of the different types of abuse and neglect result in unique patterns of overlap in child abuse and neglect for males and females. It is possible that males and females experience different combinations of abuse and neglect and that these different combinations of maltreatment have unique predictors or unique associations with later outcomes when compared to other combinations of maltreatment. Doom, Cicchetti, Rogosch, and Dackis (2013) propose that males and females may have different neuroendocrine responses to stress, resulting in different levels and rates of psychopathology for traumatized males and females. Such hypotheses may explain differences observed for males in females in levels of mental

health and substance use functioning following experiences of child maltreatment. Exploring whether or not males and females demonstrate the same or similar patterns in child maltreatment overlap and whether different combinations of abuse and neglect have unique predictors or result in worse outcomes than other combinations has important implications for the development of type-specific, gendered treatment and prevention approaches.

Developmental traumatology

While no theory has been articulated specifically linking multi-type maltreatment to later substance abuse and mental health outcomes, developmental traumatology begins to explain the mechanisms for how early adversity (i.e. toxic stress) may impact later functioning.

Developmental traumatology is defined as “the systemic investigation of the psychiatric and psychobiological impact of overwhelming and chronic interpersonal violence (e.g. child maltreatment) on the developing child” (De Bellis, 2001, p. 539). The framework integrates work from the attachment theory, developmental psychopathology, and neuroscience to help explain the relationship between abuse and neglect and later mental health and substance abuse problems.

Attachment theory.

Attachment theory is one component of a developmental traumatology framework which helps explain the ways in which child abuse and neglect can contribute to mental health and substance abuse problems later in life. A basic premise of attachment theory is that the parent-child relationship (most of the time referring to the relationship between a child and his/her

mother) is central to the emotional and social development of the child (Bowlby, 1969). According to attachment theory, children are instinctually drawn towards nurturing and sensitive caregivers for safety, security, and nurturance. At a basic level, the infant is reliant on the adult caregiver for life-sustaining nutrition and protection from harm. During the critical period during the first few months of life, infants establish attachment relationships with caregivers who are able to consistently and sensitively meet the basic needs for survival. In the context of a safe and secure relationship, a child learns to regulate his/her emotions and begins to view relationships as necessary during times of stress for co-regulation of these intense emotions (Sroufe, Carlson, Levy, & Egeland, 1999). Over time children develop what Bowlby (1969) terms an “internal working model” of the “self” and “other.” These models, or scripts, are internalized views regarding relational expectations based upon prior experience in dyadic relationships (Siegel, 1999). It is the internal working models that children carry forward into future relationships to use as a guide for forming and maintaining significant relationships.

Cicchetti and Toth (2005) suggest that “child maltreatment exemplifies a pathogenic relational environment that poses substantial risk for undermining biological and psychological development across a broad spectrum of domains of functioning” (p. 414). Recognizing that nearly 81% of substantiated child abuse and neglect cases are perpetrated by a parental figure it is important to consider the ways in which disrupted attachment as a result of child abuse and neglect can set in motion a pattern of maladaptation across the life-course (USDHHS, 2013).

Neuroscience.

Disruptions that occur in the context of significant attachment relationships (e.g. child abuse and neglect) can have severe and long-lasting impacts on the development of the major biological stress response systems and, ultimately, the structure of the brain (DeBellis, 2002; van Voorhees & Scarpa, 2004). As noted by Watts-English, Fortson, Gibler, Hooper, and DeBellis (2006), at least three interconnected neurobiological stress response systems are impacted by early trauma: the sympathetic nervous system (SNS- catecholamine system), the serotonin system, and the limbic-hypothalamic-pituitary-adrenal (LHPA) axis. These systems are responsible for biological functions of the body (e.g. physical activity), emotional regulation, and the release and regulation of cortisol. During times of stress or trauma, these stress response systems become activated. Continual activation of the major stress response systems and the ensuing release of cortisol can lead to loss or diminished functioning of major neuronal systems (DeBellis, Keshavan, Clark, Casey, Giedd, Boring, Frustaci, & Ryan, 1999). Damage to these neuronal systems through child abuse or neglect can exert a toll on the developing brain, for example the hippocampus (memory) and amygdala (emotional regulation). Neuroimaging studies document marked differences in brain maturation for those with histories of child abuse and neglect (Watts-English, Fortson, Gibler, Hooper, and DeBellis, 2006).

Developmental psychopathology.

The third component of a developmental traumatology framework, developmental psychopathology, refers to “the study and prediction of maladaptive behaviors and processes

across time” (Lewis, 2000, p. 3). From the developmental psychopathology framework, the failure of the child to meet “stage-salient developmental tasks,” places the child at-risk for later developmental delays and potential psychopathology, including depression and anxiety (Cicchetti, 1993). Each developmental stage brings about a new set of challenges which are, in part, mastered by the integration of learning which took place during earlier stages of development (Sroufe & Rutter, 1984). The integration of learning and successful attainment of earlier developmental milestones places the child in a position to meet the challenges of future developmental periods.

Child abuse and neglect, or what Cicchetti and Toth (2005) term a “pathogenic relational environment,” can set in motion a cascade of events, starting with impairments to the attachment relationship, which can place children at risk for not meeting developmental milestones. For example, a child who does not experience safe and consistent adults, either through experiences of physical abuse or neglect, may begin to not trust or seek-out adults for comfort and soothing in the face of overwhelming emotions. This child may in turn begin to internalize his or her negative feelings, leading to later manifestation of depression or anxiety. After prolonged experiences with depression or anxiety, the individual may turn to alcohol or marijuana to blunt or mask these unwanted feelings.

Pathways to mental health & substance use problems

The pathways leading from a disturbed attachment relationship as a result of child abuse and neglect, to functional and structural changes to the major biological stress response systems

and brain maturation, and ultimately the manifestation of mental health and substance use problems are complicated at best. As noted by DeBillis (2002),

Psychiatric symptoms of mood and anxiety disorders, particularly symptoms of PTSD are thought to be caused by dysregulation of biological stress response systems. Hence, changes in biological stress response systems associated with childhood trauma can render one vulnerable to primary psychiatric disorders and thus lead to ‘self-medicating’ with alcohol and various illicit substances. Additionally, dysregulated biological stress response systems can be associated with maturation failures in the frontal and prefrontal cortex, which may lead to failures in self-regulation and a greater incidence of impulsive behaviors (i.e. alcohol and substance abuse). (p. 158).

Much of the work in disentangling the sequence of events leading from maltreatment to later mental health and substance abuse problems suggests that the problems with affect regulation (i.e. depression) often precede the onset of substance use. The “self-medication” hypothesis is one of the most cited explanations for the link between early maltreatment and later substance use and abuse (Khantzian, 1985). From this perspective, drugs and/or alcohol are used as a coping mechanism to deal with potential underlying mental health problems (e.g. depression, anxiety) (Robinson, Sareen, Cox, & Bolton, 2011). Drugs and/or alcohol serve to temporarily change or remove the psychological and emotional pain associated with earlier experiences of victimization although repeated use of substances can lead to drug and alcohol tolerance and dependence (Khantzian & Albanese, 2008). As individuals develop tolerance for a particular

substance, they often require more of the substance to feel the same effects, leading to health risk behaviors such as binge drinking.

Chapter 2: Literature Review

Multi-type maltreatment

Different forms child abuse and neglect (i.e. physical abuse, sexual abuse, emotional abuse, neglect) often co-occur, meaning that children more often than not experience multiple forms of maltreatment together (Herrenkohl & Herrenkohl, 2009; Scott-Storey, 2011; Edwards, Holden, Felitti, Anda, 2003; Higgins & McCabe, 2000; Herrenkohl, Sousa, Tajima, Herrenkohl, & Moylan, 2008; Dong et al., 2004; Gewirtz & Edleson, 2007; Finkelhor, Ormrod, & Turner, 2007). To capture this overlap when analyzing data that pertain to child abuse and neglect, researchers have suggested using various analysis techniques. As reviewed previously, some researchers have used variable-focused techniques such as additive risk indexes, which amount to summing the number of different forms of abuse and neglect that are recorded in a dataset and then using this index as a predictor of hypothesized outcomes. Research consistently finds that “more is worse” when examining the impact of multiple, overlapping forms of child abuse and neglect; that is, compared to those who experience little or no abuse, those who experience multiple types of abuse and neglect demonstrate increased impairments. In one study, Rodgers, Lang, Laffaye, Satz, Dresselhaus, and Stein (2004) examined unique and additive effects of sexual abuse, physical abuse, emotional abuse, emotional neglect, and physical neglect on later substance abuse and health-risk behaviors using a sample of female military veterans. The

authors compared women who experienced four or five types of maltreatment with women who experienced none or one type of maltreatment. They found that those with four or five types were 4.42 times more likely to receive a positive screen on the CAGE², 3.63 times more likely to drive while intoxicated, and 1.66 times more likely to use tobacco. Crooks, Scott, Wolfe, Chiodo, and Killip (2007) examined the relationship between additive experiences of child abuse and neglect (i.e. physical abuse, emotional abuse, sexual abuse, & emotional neglect) and violent delinquency in a prospective sample of 1,788 9th graders from 23 schools. The authors found that as the number of maltreatment types increased, so too did the odds of later violent delinquency. As these studies suggest, the more forms of child abuse and neglect a person experiences, the higher the risk for adverse outcomes.

One of the major critiques of the additive modeling approach is that all adversities are weighted equally and different combinations of maltreatment types result in the same score. For example, a combination of physical abuse and sexual abuse is treated the same as a combination of emotional abuse and neglect. A small body of research demonstrates however, that particular combinations (e.g. sexual abuse and physical abuse) of maltreatment may lead to higher levels of impairment when compared to individuals without exposure to maltreatment (Fergusson, Boden, & Horwood, 2008; Bonomi et al., 2008; Butt, Chou, & Browne, 2011; Liebschutz et al., 2002; Simpson & Miller, 2002; Shin, Edwards, & Heeren, 2009). Bonomi et al. (2008) found that, in

² The CAGE is a screening tool for alcohol dependence.

comparison to those without a history of physical and sexual abuse, those who experienced both forms of maltreatment reported more severe depression and health related impairments than did controls. Shin, Edwards, and Heeren (2009) found that individuals who experienced the combination of physical abuse and neglect were 1.3 times more likely to binge drink than those who experienced no maltreatment. What is less clear is whether particular combinations of abuse and neglect (e.g. physical abuse & emotional abuse) result in worse outcomes than other combinations of maltreatment (e.g. sexual abuse & neglect).

Latent class analysis is another method used to examine patterns of overlap in child abuse and neglect. One of the benefits of LCA is that patterns of overlap in child abuse and neglect are empirically derived based upon response patterns to a set of observed variables. The goal of LCA is to identify and classify together individuals who are similar in their responses to a set of observed variables.

A growing number of researchers have empirically identified different patterns of child abuse and neglect using LCA (Pears, Kim, & Fisher, 2008; Romano, Zoccolillo, & Paquette, 2006; Berzenski & Yates, 2011; Armour, Elklit, & Christoffersen, 2013; Nooner et al., 2010; Walsh, Senn, & Carey, 2012; Hazen, Connelly, Roesch, Hough, & Landsverk, 2009; Petrenko, Friend, Garrido, Taussig, & Culhane, 2012) (see Table 1). Across these studies, researchers are able to empirically identify multiple, qualitatively distinct classes of child abuse and neglect, although the number and interpretation of the classes vary widely across studies. For example, using a sample of 2,637 undergraduate students, Berzenski and Yates (2011) identified multiple,

qualitatively distinct classes of maltreatment: 1.) domestic violence and physical abuse (violent home); 2.) emotional abuse and domestic violence (hostile home); 3.) emotional abuse and physical abuse (harsh parenting); 4.) sexual abuse (sexual abuse). Hazen, Connelly, Roesch, Hough, and Landsverk (2009) identified three profiles of maltreatment using latent profile analysis with a random sample of 1,131 youth (ages 6-18) from five service systems in San Diego California. The three maltreatment profiles identified were: 1.) low maltreatment; 2.) sexual/physical/emotional maltreatment; 3.) physical/emotional maltreatment. Pears, Kim, and Fisher (2008) examined profiles of physical abuse, sexual abuse, physical neglect, supervisory neglect, and emotional maltreatment in a sample of preschool aged foster children. Four maltreatment profiles were identified: 1.) supervisory neglect and emotional maltreatment; 2.) sexual abuse, emotional maltreatment, supervisory neglect, and physical neglect; 3.) physical abuse, emotional maltreatment, supervisory neglect, and physical neglect; and 4.) sexual abuse, physical abuse, emotional maltreatment, supervisory neglect, and physical neglect. As these studies highlight, LCA methods help researchers empirically identify multiple, qualitatively distinct classes of child abuse and neglect however few similarities exist in the structure and interpretation of these classes across studies. The lack of consistency could be a result of the measures used to assess maltreatment experiences (e.g. official reports, self-reports) or the samples used (e.g. clinical, convenience) across studies. Regardless of the structure and interpretation of the identified latent classes, similarities do exist in the patterns of association between latent classes and outcomes.

After maltreatment classes are empirically derived, researchers often move to examine differences in outcomes based upon class membership. Most studies find that those individuals who experience multiple forms of abuse and neglect (in any combination) are experiencing increased levels of impairment when compared to those who experience no or low rates of maltreatment. For example, Romano et al. (2006) identified only two latent classes in their sample of pregnant adolescent women: 1.) no maltreatment; 2.) multiple maltreatment. Those women who were members of the multiple maltreatment class reported higher rates of conduct problems in comparison to those in the no maltreatment class. These findings corroborate other research suggesting that those who experience multiple forms of abuse and neglect will experience worse outcomes than those who experience no maltreatment (Fergusson, Boden, & Horwood, 2008; Bonomi et al., 2008; Butt, Chou, & Browne, 2011; Liebschutz et al., 2002; Simpson & Miller, 2002; Shin, Edwards, & Heeren, 2009).

What is less clear from these studies, however, is whether particular combinations of abuse and neglect are more deleterious than are other combinations. Only a few studies have examined and identified differences in outcomes based upon different patterns of child abuse and neglect. For example, Pears, Kim, and Fisher (2008) found that children who experienced the combination of physical abuse, supervisory neglect, or physical neglect demonstrated the lowest cognitive functioning compared to those in the other maltreatment classes. Those in the sexual abuse, physical abuse, emotional abuse, supervisory neglect, and physical neglect class scored highest on measures of externalizing behavior. Finally, children who experienced either sexual abuse or physical abuse (in any combination) scored highest on measures of internalizing

behavior. Berzenski and Yates (2011) found that emotional abuse, in any combination, resulted in higher rates of psychopathology compared to other combinations of maltreatment not including emotional abuse. Petrenko, Friend, Garrido, Taussig, and Culhane (2012) identified four classes of maltreatment in their sample of 334 youth in out-of-home placement: 1.) supervisory neglect; 2.) physical neglect; 3.) physical abuse; 4.) sexual abuse/mixed. The authors found higher rates of externalizing behavior for those in the physical abuse class and higher rates of internalizing behavior for those in the physical neglect class in comparison to those in the supervisory neglect class. In addition, those who were members of the sexual abuse/mixed class reported lower verbal IQ scores than those in the supervisory neglect class. While these studies vary widely in the structure and interpretation of the latent classes and the outcomes examined, they raise an important question as to whether particular combinations of abuse and neglect lead to worse outcomes than other combinations of abuse and neglect. The current research literature suggests that, with a few exceptions, different combinations of abuse and neglect result in similar outcomes. Further research could help identify whether particular combinations of abuse and neglect lead to worse outcomes than other combinations and whether these patterns are similar across gender.

A few researchers have examined the role of gender in patterns of child abuse and neglect using LCA methods. Commonly researchers will include gender as a predictor of latent class membership to explore if males or females have a higher likelihood of being a member of a particular maltreatment class. The findings across these studies are mixed. Nooner et al. (2010) failed to identify differences by gender in their identified latent classes while Armour et al.

(2013) found that females were at an increased likelihood for being in the psychological maltreatment class. Knowing from prior research that differences exist in the prevalence of different forms of abuse and neglect for males and females (Ackerman et al., 1998; Edwards et al., 2003; Briere & Elliot, 2003; Finkelhor, 1994), it is possible that the overlap in child abuse and neglect differ for males and females. To date, researchers have not examined whether males and females experience the overlap of child abuse and neglect in similar ways. Understanding whether males and females experience similar combinations of abuse and neglect has important implications for theory building and the development of gender specific models of intervention (Kristman-Valente & Wells, 2013).

Risk factors of child maltreatment

One of the initial steps in the prevention of child abuse and neglect is to identify risk factors associated with its occurrence (Whitaker, Lutzker, & Shelley, 2005). When risk factors for child abuse and neglect are identified, programs can be developed to lessen these risk factors. In their meta-analysis of 155 studies, Stith et al. (2009) identified a number of risk factors for physical abuse and neglect. The risk factors for both physical abuse and neglect included such factors as parental depression, unemployment, and single parenthood, child factors such as low social competence, internalizing/externalizing behavior problems, and family factors such as low socio-economic status. Some factors were identified to be more strongly associated with particular forms of abuse or neglect. For example, parental anxiety, alcohol abuse, and drug abuse were identified as risk factors for physical abuse but not child neglect. Examining the socio-economic, family/parental, and individual level correlates of child sexual abuse and child

physical abuse, Fergusson, Boden, and Horwood (2008) noted that some of these risk factors were more significantly associated with child physical abuse (e.g. SES at birth) but not child sexual abuse, while some factors were associated with child sexual abuse (e.g. female gender) but not physical abuse.

While research has made strides towards identifying the risk factors for individual forms of abuse and neglect (e.g. physical abuse), less research has been done to identifying the risk factors for multi-type maltreatment. In studies using LCA to examine different patterns of abuse and neglect, researchers often examine gender or child welfare status (Armour, Elklit, & Christoffersen, 2013; Nooner et al., 2010) as predictors of latent class membership. The findings for gender are largely mixed with only one study finding an increased likelihood for class membership for females (Armour et al., 2013). Studies generally find that involvement with child welfare (or having an out-of-home placement) helps distinguish between those individuals with low probabilities for maltreatment and those who have experienced multiple types of abuse and neglect (Armour et al., 2013; Nooner et al., 2010; Petrko et al., 2012).

Risk factors for child abuse and neglect rarely occur in isolation from one another. For example, results from the Adverse Childhood Experiences Study have documented the association between child maltreatment and various forms of household dysfunction (i.e. parental substance abuse, parental mental health problems, divorce, incarceration, IPV). Dong et al. (2004) found that having any form of childhood adversity (either maltreatment or household dysfunction) increased the risk for having an additional childhood adversity by 2 to 18 times

compared to those with no adverse childhood experiences. For example, compared to those with no self-reported emotional abuse, those who reported emotional abuse were 4.2 times more likely to report having a parent with a mental illness. Additionally, those who reported child sexual abuse were 2.1 times more likely to report a parent with a substance abuse problem compared to those who did not report sexual abuse. These findings suggest that risk factors tend to co-occur, that is, having one risk factor significantly increases the likelihood that a person will experience another risk factor. In statistical terms, these factors share variance (Herrenkohl & Herrenkohl, 2009). For this reason, it is imperative that researchers account for this overlap in risk factors when examining the relationship between risk factors and experiences of child maltreatment. Much of the current research however, examines single-risk factor models when attempting to understand the risk factors and correlates of child abuse and neglect. Additional research is needed to understand the complex ways in which risk factors overlap and influence the likelihood for child abuse and neglect.

Substance use outcomes

For children who experience abuse and neglect, the risk for substance use problems across the life-course may be elevated compared to those who do not experience abuse or neglect although more research is needed to document this relationship. Much of the research documenting this association has been based upon studies examining single forms of maltreatment (e.g. physical abuse) or a general construct of maltreatment (e.g. child maltreatment) (Herrenkohl, Hong, Klika, Herrenkohl, & Russo, 2013; Thornberry, Henry, Ireland, & Smith, 2010; Bensley, Spieker, van Eenwyk, & Schoder, 1999). According to

Trickett, Negriff, Ji, and Peckins (2011), no one type of maltreatment has consistently been linked to an increased risk for substance abuse. At the same time, due to the limited number of studies examining multi-type maltreatment, the association between multiple forms of child abuse and neglect and substance use outcomes is not well understood.

Research using additive counts of child abuse and neglect find that as the number of maltreatment types increases, so too does the risk for substance use problems (Rodgers et al., 2004). For example, using a sample of 1,452 middle and high school children from urban schools, Arata, Langhinrichsen-Rohling, Bowers, and O'Brien (2007) found that those who experienced three types of maltreatment reported more problems with negative affect (e.g. depression, suicide proneness) and externalizing problems (e.g. delinquency, substance use) than those who experienced no maltreatment.

Other researchers have examined the issue of multi-type maltreatment by looking at whether particular combinations of abuse and neglect place an individual at increased risk for later substance use problems in comparison to those who do not experience any form of maltreatment. Studies using this approach often find that individuals experiencing maltreatment in any combination have worse outcomes in comparison to those individuals who do not experience any maltreatment. Bensley et al. (1999) found that combined abuse (i.e. physical abuse and molestation) demonstrated the strongest link with heavy drug use. For example, compared to those with no reported maltreatment history, those reporting physical abuse and sexual molestation were 12 times more likely to use marijuana by 10 years of age. Shin,

Edwards, and Heeren (2009) examined the effects of various combinations of child abuse and neglect on later binge drinking behavior using data from the National Longitudinal Study of Adolescent Health (n= 12,748). The authors found that adolescents who experienced all forms of maltreatment (i.e. physical abuse, sexual abuse, and neglect) were 1.79 times more likely to binge drink than their non-maltreated counterparts.

Some research documents that combinations of abuse and neglect have a stronger association with negative outcomes in comparison to single forms. Moran, Vuchinich, and Hall (2004) examined substance abuse outcomes as they related to retrospective reports of physical abuse, emotional abuse, sexual abuse, and the combination of physical and sexual abuse using a convenience sample of high school students. The authors found that emotional abuse, physical abuse, sexual abuse, and the combination of physical and sexual abuse, were all associated with later substance use (i.e. tobacco, alcohol, & illicit drugs). Tests of the magnitude of the associations between various types of maltreatment and later outcomes differed by type of maltreatment with the combination of physical and sexual abuse demonstrating the strongest association. These findings raise an important question as to whether particular combinations of abuse and neglect result in higher rates of substance use than other combinations of maltreatment.

Limited evidence suggests that particular combinations of abuse and neglect result in worse outcomes compared to other combinations when looking at substance use outcomes. Using LCA/LPA, Berzenski and Yates (2011) found that those who experienced the combination

of physical and emotional abuse reported higher rates of problem behavior including substance use compared to those experiencing other combinations of abuse and neglect. If particular combinations of abuse and neglect are found to be more deleterious than other combinations of abuse and neglect or lead to a different set of outcomes, combination-specific intervention approaches must be developed to address the nuances associated with different combinations of maltreatment. Additional research is needed to understand whether particular combinations of abuse and neglect result in worse or different substance use outcomes than other combinations.

Gender and substance use outcomes.

It has been hypothesized that gender moderates the association between maltreatment and substance use outcomes. Some research finds that there is a direct association between child maltreatment and substance use problems for females but not males. Widom, White, Czaja, and Marmorstein (2007) found that, in comparison to non-abused women, those women with a history of substantiated abuse or neglect drank significantly higher quantities of alcohol and reported increased rates of binge drinking. No significant differences in substance use outcomes were observed between abused and non-abused males in the sample. Lansford, Dodge, Pettit, and Bates (2010) found that parent reported physical abuse predicted early onset substance abuse for females but not for males. For females, physical abuse predicted substance abuse at age 12, substance abuse at age 12 predicted substance abuse at age 16, and substance abuse at age 16 predicted substance abuse at age 24. No direct effects were found between physical abuse and substance abuse at age 16 or 24 years for females.

Other research suggests that maltreated males may be at increased risk for substance use outcomes compared to females. Bensley et al. (1999) found that boys demonstrated an increased risk for early initiation of substance use and heavy drinking compared to females in their sample. Rates of light to moderate drinking were similar across genders. Liebschutz, Savetsky, Saitz, Horton, Lloyd-Travaglini, and Samet (2002) found that maltreated men reported significantly more consequences associated with substance abuse than females and also higher levels of alcohol addiction.

MacMillian et al. (2001) found that females with a history of physical or sexual abuse reported higher rates of both alcohol and illicit drug abuse/dependence compared to those without a reported history of physical or sexual abuse. Males with a reported history of physical or sexual reported higher rates of alcohol abuse/dependence than those without a reported history of physical or sexual abuse however no differences were observed on measures of illicit drug abuse/dependence. Using data from the National Comorbidity Survey, Molnar, Buka, and Kessler (2001) found that female child sexual abuse increased the risk for alcohol and drug problems and dependence compared to females without a history of sexual abuse. Males with a history of child sexual abuse reported increased risk for alcohol dependence (but not alcohol problems) as well as drug problems and dependence.

Together, these studies suggest that differences may exist in the relationship between child abuse and neglect and later substance use outcomes for males and females. In addition to differing in the patterns of maltreatment overlap, it is possible that different combinations of

abuse and neglect lead to higher rates of substance use than other combinations and that these associations differ by gender.

Mental health outcomes

Child maltreatment is a known risk factor for mental health problems in adolescents and adults (Leeb, Lewis, & Zolotor, 2011; Arnow, 2004). Depression and anxiety are among the most common mental health diagnoses studied in relation to child abuse and neglect. As with other outcomes (e.g., substance use), findings on mental health are based upon studies examining single forms of maltreatment (Bernet & Stein, 1999; Springer, Sheridan, Kuo, & Carnes, 2007; Cohen, Brown, & Smailes, 2001; Fergusson, Boden, & Horwood, 2008) or a general construct of child maltreatment that is based on child welfare reports, which do not allow for analyses of abuse and or neglect subtypes (Herrenkohl, Hong, Klika, Herrenkohl, & Russo, 2013; Thornberry, Henry, Ireland, & Smith, 2010). Relatively few studies have examined the mental health effects of multi-type maltreatment.

Of those studies that have examined the mental health effects associated with multi-type maltreatment, some have used additive counts of abuse and neglect. These studies find that, in comparison to those who experience no maltreatment or single forms of maltreatment, those experiencing multiple types of maltreatment are at increased risk for mental health problems. For example, Clemmons, DiLillo, Martinez, DeGue, and Jeffcott (2003) found that the number maltreatment types (0, 1, 2+) was significantly related to TSC scores (a measure of adult adjustment, including dissociation, anxiety, depression). Post-hoc comparisons revealed that

those reporting two or more forms of maltreatment had increased levels of impairment compared to those reporting only one form of maltreatment or no maltreatment. Similarly, Higgins and McCabe (2000) found that, in comparison to those who experienced one or two forms of maltreatment, those reporting three or more types demonstrated significantly more impairments in adult psychological adjustment (e.g. dissociation, anxiety, depression) as measured by the TSC-40.

Other researchers have examined the mental health outcomes associated with particular combinations of abuse and neglect. These studies find that individuals who experienced different combinations of abuse and neglect had worse mental health outcomes than those who did not experience any form of maltreatment (Bonomi et al., 2008). Using latent profile analysis, Hazen et al. (2009) found differences between their two identified maltreatment classes (i.e. physical abuse & emotional abuse class; sexual abuse, physical abuse & emotional abuse class) and the no maltreatment class on CBCL and YSR subscales of depression/anxiety and withdrawn behavior however, no differences in these subscales were identified between the two identified maltreatment classes. Indeed, very few studies have yet found differences in mental health outcomes when comparing different combinations of abuse and neglect. In their study of adolescents, Arata, Langhinrichsen-Rohling, Bowers, and O'Brien (2007) examined the correlates of physical abuse, sexual abuse, emotional abuse, and neglect. Planned post-hoc comparisons were made between all types and combinations of maltreatment to understand if particular types or combinations of maltreatment were more deleterious than others. The authors found that those who reported the combination of physical abuse, sexual abuse, and neglect

reported higher depression levels than all other types and combinations of maltreatment (except for the physical abuse and neglect group).

Gender and mental health outcomes.

Whether or not gender moderates the relationship between child maltreatment and later mental health problems continues to be debated in the research literature. Some studies suggest no differences in outcomes based upon gender yet most of these studies do not account for the overlap in experiences of child abuse and neglect. For example, Fergusson, Boden, and Horwood (2008) found no evidence of gender moderation in mental health outcomes based upon retrospectively measured physical and sexual abuse. In contrast, a number of studies find evidence of different patterns of mental health outcomes for males and females who have experienced child maltreatment. Using data from the National Comorbidity Study, Molnar, Buka, and Kessler (2001) found that child sexual abuse increased the likelihood for depression in females but not males. MacMillian et al. (2001) found females with a history of physical or sexual abuse reported higher rates of anxiety disorders, major depression, and “other” psychiatric disorders compared to females without a reported history of physical or sexual abuse with data from the Ontario Health Survey. Males with a history of physical abuse reported higher rates of anxiety disorders and “other” psychiatric disorders but not higher rates of major depression compared to those without a reported history of physical abuse. For males with a history of sexual abuse only one marginally significant difference was noted for “other” psychiatric disorders in comparison to those without a reported history of sexual abuse.

What these studies suggest is the possibility that males and females experience different mental health outcomes following child abuse and neglect. What remains unclear is whether males and females experience similar patterns of overlap in child abuse and neglect and whether particular combinations of abuse and neglect result in worse mental health outcomes than other combinations for males and females.

Summary

The review of relevant literature highlights a few unanswered questions regarding the overlap of different forms child abuse and neglect, similarities and differences in patterns of overlap for males and females, the relationship of stress and adversity in predicting patterns of maltreatment, and whether particular combinations of abuse and neglect are associated with higher rates of substance use and mental health problems in comparison to other combinations. As such, the current dissertation is guided by the following research questions:

Research Question #1a: Are there qualitatively different combinations of child abuse and neglect for the participants in the Lehigh Longitudinal Study.

Research Question #1b: Are there differences in the combinations of child abuse and neglect for males and females in the Lehigh Longitudinal Study?

Research Question #2: Does the level of adversity and stressors in childhood help distinguish between the latent classes of child abuse and neglect in the Lehigh Longitudinal Study?

Research Question #3: Are particular classes of child abuse and neglect related to higher rates/levels of adolescent and adulthood substance use problems in comparison to other classes of child abuse and neglect for individuals in the Lehigh Longitudinal Study?

Research Question #4: Are particular classes of child abuse and neglect related to higher rates/levels of adolescent and adulthood mental health problems in comparison to other classes of child abuse and neglect for individuals in the Lehigh Longitudinal Study?

Table 1. Studies using latent class analysis to model child maltreatment overlap.

Authors	Sample	Measures	Class solution
Pears, Kim, & Fisher, 2008	117 children in the foster care system	Physical abuse, emotional maltreatment, sexual abuse, supervisory neglect, physical neglect (Maltreatment Classification System)	<p>Class 1: supervisory neglect and emotional maltreatment</p> <p>Class 2: sexual abuse, emotional maltreatment, supervisory neglect, and physical neglect</p> <p>Class 3: physical abuse, emotional maltreatment, supervisory neglect, and physical neglect</p> <p>Class 4: sexual abuse, physical abuse, emotional maltreatment, supervisory neglect, and physical neglect</p>
Romano, Zoccolillo, & Paquette, 2006	252 pregnant adolescent females from high schools, hospitals, and group home settings in Montreal, Canada	Physical abuse, emotional abuse, sexual abuse, emotional neglect, physical neglect (French version of the Childhood Trauma Questionnaire)	<p>Class 1: no maltreatment</p> <p>Class 2: multiple maltreatment (minus the physical neglect measure)</p>
Berzenski & Yates, 2011	2,637 undergraduate students in an introductory psychology class	Physical abuse, emotional abuse, sexual abuse, exposure to domestic violence (Childhood Maltreatment Interview Schedule)	<p>Class 1: domestic violence and physical abuse (violent home)</p> <p>Class 2: emotional abuse and domestic violence</p>

Authors	Sample	Measures	Class solution
Armour, Elklit, & Christoffersen, 2013	2,980 young adults from a Danish birth cohort	Physical abuse, psychological maltreatment, neglect, sexual abuse	<p>(hostile home)</p> <p>Class 3: emotional abuse and physical abuse (harsh parenting)</p> <p>Class 4: sexual abuse (sexual abuse).</p> <p>Class 1: non abuse</p> <p>Class 2: psychological maltreatment</p> <p>Class 3: sexual abuse</p> <p>Class 4: abused overall</p>
Nooner, Litrownick, Thompson, Margolis, English, Knight, Everson, & Roesch, 2010	795 youth who completed the age 12 survey of the LONGSCAN study	Physical abuse, sexual abuse	<p>Class 1: no maltreatment</p> <p>Class 2: high physical/low sexual abuse</p> <p>Class 3: no physical abuse/moderate sexual abuse</p> <p>Class 4: high physical and sexual abuse</p>

Authors	Sample	Measures	Class solution
Walsh, Senn, & Carey, 2012	481 women at a sexually transmitted disease clinic	Child maltreatment (physical abuse, psychological maltreatment, neglect, sexual abuse), intimate partner violence, community violence	<p>Class 1: low violence</p> <p>Class 2: predominately exposure to community violence</p> <p>Class 3: predominantly child maltreatment</p> <p>Class 4: multiply victimized</p>
Hazen, Connelly, Roesch, Hough, & Landsverk, 2009	1,131 youth (ages 6-18) from 5 service systems in San Diego, California	Physical abuse, emotional abuse, sexual abuse, physical neglect, emotional neglect	<p>Class 1: low maltreatment</p> <p>Class 2: sexual, physical, emotional maltreatment</p> <p>Class 3: physical & emotional maltreatment</p>

Chapter 3: Methods

Sample

The sample for the current study was originally drawn from a two-county region in Eastern Pennsylvania between 1976 and 1977. The original purpose of the study was to examine the correlates and consequences of child abuse and neglect. Families involved in the child welfare system for abuse and/or neglect within this two-county region of Pennsylvania were approached and asked if they would like to participate in the research study. In total, 249 children from the child welfare system consented to participate in the study. A comparison group was also identified from within the same two-county region. These additional 208 children were identified through Headstart programs (n= 70), daycare programs (n= 64), and from local nursery programs (n= 74). In total, 457 children, from 297 families, were enrolled in the study (Herrenkohl, Herrenkohl, Egolf, & Wu, 1991). In adulthood, nearly 80% of the original sample (N= 357) was assessed with nearly 75% of participants still living in the two county region where the initial assessment occurred (Herrenkohl et al., 2013; Herrenkohl et al., 2012).

The original sample of children was nearly gender balanced with 248 males and 209 females. The racial make-up of the sample was as follows: 80.7% Caucasian, 11.2% more than one race, 5.3% African American, 1.3% American Indian or Alaska Native, and 0.2% Native Hawaiian or other Pacific Islander. Approximately 7% of the sample identified as Hispanic or Latino. While this sample was predominately Caucasian, the racial make-up of the sample is

representative of the two-county region from where the sample was drawn. At the beginning of the study nearly 86% of children were living in two-parent households. Upwards of 60% of the sample was living below the poverty line when initially assessed in 1976.

Measures

Physical abuse.

The physical abuse measure consists of parent self-report of 12 different types of harsh physical discipline practices used by a mother, father, or other caregiver in the past three months. Data for this physical abuse measure were collected during the preschool wave of data collection. Caregivers (often the mother) were asked about their own, fathers', and others' use of the following harsh physical discipline practices with their children: putting pepper in the child's mouth, shaking child, slapping child in the face, pulling child's hair, biting a child as a form of discipline, hitting a child with a stick or paddle, hitting a child with a strap/rope/belt, biting a child as to leave a bruise, slap/spank a child as to leave a bruise, hit/paddle a child as to leave a bruise, burning child, burning a child as to leave a mark. Caregivers reported on how many of these 12 discipline practices were used by themselves, the fathers, and other adults. Questions asked of adult respondents pertain to their disciplining of children in the past three months.

For the LCA analysis, a dichotomous "physical abuse" variable was created. The indicators used to measure physical abuse variable represent harsh disciplining practices that are of a severity to trigger an investigation from child protective services. If a parent reported the use of any harsh physical discipline practice by the mother, father, or another caregiver, the child

was considered to have been “physically abused.” The physical abuse variable was coded “0” for no physical abuse and “1” for physical abuse.

Emotional abuse.

The emotional abuse measure consists of parent self-reports of 7 different types of harsh emotional discipline practices used by the mother, father, or other caregiver in the past three months. Data for this emotional abuse measure were collected during the preschool wave of data collection. Caregivers (often the mother) were asked about their own, fathers’, and others’ use of the following harsh emotional discipline practices with their children: take meals away, threaten to leave the child, embarrass child in front of others, threaten to send child away, isolate child in a dark room, ridicule or make fun of child, lock child out of the house. Caregivers reported on how many of these 7 harsh emotional discipline practices were used by herself, the father, or another caregiver in the past three months

For the LCA analysis, a dichotomous variable was created for emotional abuse. If the caregiver reported any harsh emotional discipline practice by the mother, father, or other caregiver in the past three months, the child was considered to have experienced emotional abuse. The emotional abuse was coded “0” for no emotional abuse and “1” for emotional abuse.

Sexual abuse.

Questions regarding child sexual abuse were not included in the preschool or school-age assessments. During the adolescent wave of the study, two questions were asked of youth

participants about their having been sexually abused or assaulted: (1.) “How many times has someone pressured or pushed you to do sexual things you didn’t want to do?”; and (2.) “How many times have you been sexually attacked or raped or an attempt made to do so?” In addition, adolescents were asked directly whether they had been sexually abused. However, not all adolescents were asked this question because it was through some of the initial interviews that it became clear an additional question on sexual abuse was needed to assess this particular form of abuse. To gather a more complete picture of sexual abuse in the sample, the research team utilized multiple sources to identify the presence of sexual abuse including: interview notes, examining responses to the physical and emotional neglect questions where some individuals identified sexual abuse, examination of case records, and adult retrospective reports of childhood sexual abuse.

A dichotomous sexual abuse variable was created from the multiple sources noted above. The sexual abuse variable represents those individuals who identified having been sexually abused as a minor (prior to the age of 18). The sexual abuse variable was coded “0” for no sexual abuse and “1” for sexual abuse.

Neglect.

Neglect was assessed within the sample during the adolescent wave of data collection. Adolescents were asked the following question: “Were you neglected as a child?” The neglect variable was coded “0” for no neglect and “1” for neglect.

Gender.

Gender is coded “1” for males (n=248) and “2” for females (n=209).

Childhood stressors.

During the preschool wave of data collection, caregivers reported on the presence of stresses experienced by the family. Caregivers were given the following prompt: “To what extent, if at all, are any of the following problems for you or any member of your household?” Childhood stresses included: unemployment, crowding in the home, crime in the neighborhood, break-up of the family, marital conflicts, lack of friends, physical illness, mental illness, alcohol use, and drug use. Response options were “none of the time” to “all of the time.” Responses of “none of the time” for coded “0”. Responses of “some of the time,” “most of the time,” or “all of the time,” were coded “1,” indicating that a particular stress was reported by a parent at the time. An index of childhood stress was created by adding all affirmative responses on these items. Higher scores on the childhood stress variable indicate more variety in the types of stressors that an individual was experiencing.

Mental health outcomes.

Depression. Symptoms of adult and adolescent depression were measured using the Beck Depression Inventory (BDI), a 21-item self-report measure examining the severity of depression symptoms (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Responses to questions were scored on a 4-point scale, with higher scores indicating higher severity of

depression. An example question includes: “Would you say...I do not feel sad (0), I feel sad (1), I am sad all the time and I can’t snap out of it (2), I am so sad or unhappy that I can’t stand it (3).” Scores across the 21-items were summed to create an overall BDI score in adolescence and adulthood. The BDI scale demonstrates acceptable reliability within the Lehigh sample ($\alpha=.91$).

A dichotomous depression variable was created for the adulthood wave. The BDI has the following cut-offs to determine severity levels of depression: 0-9= minimal depression, 10-18= mild depression, 19-29= moderate depression, 30-63= severe depression (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). For the current analysis, I was interested in separating individuals experiencing higher levels of depression symptoms from those experiencing fewer symptoms. The dichotomous variable was coded “0” for those reporting “minimal depression” or “mild depression” and “1” for those reporting “moderate depression” or “major depression.” This coding strategy was used in an earlier publication from this same dataset (Herrenkohl, Hong, Klika, Herrenkohl, & Russo, 2013).

Anxiety. Symptoms of anxiety were measured using the Generalized Anxiety Disorder 7-Item scale (GAD-7) (Spitzer, Kroenke, Williams, & Lowe, 2006). The GAD-7 is a 7 item scale measuring the frequency of anxiety symptoms in the past 2 week. Scores were measured on a 4-point Likert scale ranging from “not at all” to “nearly every day.” Sample questions include “In the past 2 weeks I have been bothered by feeling nervous, anxious, or on edge” and “in the past 2 weeks, I have been bothered by not being able to stop or control worrying.” Scores across all 7 items were summed to create an overall anxiety score. Higher

scores on the GAD-7 indicate a higher frequency of anxiety symptoms in the past 2 weeks. The GAD-7 scale has acceptable reliability with the Lehigh sample ($\alpha=.89$).

A dichotomous GAD variable was created for the adult wave. The GAD-7 has the following cut-off scores to determine levels of anxiety: 0-4= minimal anxiety, 5-9= mild anxiety, 10-14= moderate anxiety, 15-21= severe anxiety. For the current analysis, I was interested in separating individuals experiencing higher levels of anxiety symptoms from those experiencing fewer symptoms. The dichotomous variable is coded “0” for those reporting “minimal anxiety” or “mild anxiety” and “1” for those reporting “moderate anxiety” or “severe anxiety.” This coding strategy was used in an earlier publication from this same dataset (Herrenkohl, Hong, Klika, Herrenkohl, & Russo, 2013).

Substance abuse outcomes.

Drug and alcohol abuse. The Simple Screening Instrument for Substance Abuse (SSI-SA) was used to measure drug and alcohol abuse (Center for Substance Abuse Treatment, 1994). The SSI-SA is a 16-item screening instrument examining five domains of substance abuse: consumption, preoccupation and loss of control, adverse consequences, problem recognition, tolerance and withdrawal. Two of the questions in the SSI-SA are not used for scoring purposes: “have you used alcohol or other drugs?” and “have any of your family members ever had a drinking or drug problem?” The former question is used to determine whether the interview should continue and the latter question is used to assess family history of substance abuse. Subtracting both of these questions leaves 14 “yes” and “no” questions

regarding substance abuse. Sample questions include: “have you felt that you use too much alcohol or other drugs?” and “have you tried to cut down or quit drinking or using drugs?” “Yes” responses to the questions are coded “1” while no responses are coded “0.” Scores across the 14 items are summed to create an overall substance abuse score (continuous SSI-SA variable). Higher scores on this measure indicate greater problem substance abuse. The SSI-SA scale demonstrates acceptable reliability with the Lehigh sample ($\alpha=.87$).

A dichotomous SSI-SA variable was created for the adult wave. The SSI-SA has the following cut-off scores to indicate the level of substance abuse problems: 0-1= none to low, 2-3= minimal, 4 or more= moderate to high risk. In the current analysis, I wanted to separate those at high risk for substance abuse from those with lower levels of risk. The dichotomous variable is coded “0” for those reporting “none to low” or “minimal” problems and “1” for those reporting “moderate to high risk” (4 or more symptoms). This coding strategy was used in an earlier publication from this same dataset (Herrenkohl, Hong, Klika, Herrenkohl, & Russo, 2013).

In adulthood, participants were asked to report on current substance use behaviors. The following “yes/no” and open-ended questions were used as outcomes in the current analysis: On average, how many drinks do you have per week? In the past year, did you ever have 5+ drinks in one sitting? How many times in the past year did you have 5+drinks in one sitting? How many times did you drink in the past month? How many times did you binge drink in the past

month? Did you use marijuana in the past year? How many times did you use marijuana in the past year? How many times did you use marijuana in the past month?

In adolescence, participants were asked a series of questions regarding their substance use behaviors. The following questions were used as outcomes in the current analysis: Did you ever drink alcohol in grades 7-9? Have you ever used alcohol? How many times in the past year did you use alcohol? Have you ever used marijuana? How many times in the past year have you used marijuana?

Data analysis

Scaling of the analysis variables was completed in SPSS 21. Estimation of latent classes and subsequent analyses were conducted in Mplus 7.0.

Latent Class Analysis (LCA) has been used in the study of child maltreatment specifically for hypotheses regarding patterns of maltreatment within a given population (Pears, Kim, & Fisher, 2008; Romano, Zoccolillo, & Paquette, 2006; Berzenski & Yates, 2011; Armour, Elklit, & Christoffersen, 2013; Nooner et al., 2010; Walsh, Senn, & Carey, 2012; Hazen, Connelly, Roesch, Hough, & Landsverk). LCA is latent variable, mixture modeling approach which empirically identifies subgroups within a population who share similar response patterns to a set of observed variables (Neely-Barnes, 2010; Lanza & Rhoades, 2013). In the case of studying child abuse and neglect, LCA empirically identifies subgroups of individuals who experience particular combinations of child maltreatment (e.g. physical abuse & sexual abuse). These homogenous groups are referred to as “classes” (based upon probabilities). One of the

goals of LCA is to identify the most parsimonious model (smallest number of classes) to represent the response patterns in the data (Neely-Barnes, 2010). The classes in LCA are represented as a categorical latent variable. As with other latent variable modeling approaches, the latent factor in LCA models both the “true” covariation among a set of observed variables along with measurement error. One of the main differences between LCA and other latent variable modeling approaches, such as structural equation modeling (SEM), is that the latent factor in LCA is categorical, not continuous. In the current analysis, I examine classes of child maltreatment based upon indicators of physical abuse, sexual abuse, emotional abuse, and neglect.

Lanza, Bray, and Collins (2012) note that selection of a latent class solution is a balance between examining information criteria, likelihood ratio tests, and the theoretical interpretation of the derived classes. In regards to statistical information criteria, the following criteria were used to select the best fitting latent class model in the current analysis: Akaike’s information criteria (AIC), the Bayesian information criteria (BIC), entropy, the Lo-Mendell-Rubin likelihood ratio test (LMR-LRT), the VLMR, and the bootstrap likelihood ratio test (BLRT). The Akaike information criteria (AIC) and Bayesian information criteria (BIC) are measures of relative fit of estimated models whereby lower values indicate “optimal balance between model fit and parsimony” (Lanza & Rhoades, 2013, p. 4). The AIC and BIC penalize for model complexity. Entropy is a measure of classification certainty with values closer to 1 representing better classification (Celeux & Soromenho, 1996). The LMR-LRT is a measure of improvement in model fit which examines a k versus a $k-1$ class solution to determine the best fitting model

(Nylund, Asparouhov, & Muthen, 2007). A statistically significant p-value on the LMR-LRT suggests that a k -class solution provides a statistically significant improvement to model fit in comparison to a $k-1$ class solution. As noted by Nylund, Asparouhov, and Muthen (2007), the BLRT “uses bootstrap samples to estimate the distribution of the log likelihood difference test statistic. In other words, instead of assuming the difference distribution follows a known distribution (e.g. chi-square distribution) the BLRT empirically estimates the difference distribution” (p. 538). The BLRT is similar to the LMR-LRT in that BLRT assesses improvement in model fit between a k versus a $k-1$ class solution.

Based upon the information criteria, likelihood ratio tests, and the substantive interpretation of the classes, I selected the best fitting model for males and females separately (as per the guiding research questions). Next, I ran a multinomial logistic regression to examine whether the level of childhood stressors could distinguish class membership. As a final step, I examined mean level and proportional differences among the classes in the mental health and substance use outcomes in adolescence and adulthood.

Chapter 4: Results

Review of analysis

As described prior, latent class analysis (LCA) is a latent variable modeling approach which seeks to empirically identify subgroups within a population who share similar response patterns to a set of observed variables (Neely-Barnes, 2010; Lanza & Rhoades, 2011). To examine latent classes of child maltreatment, the four dichotomous maltreatment variables (i.e. physical abuse, emotional abuse, sexual abuse, neglect) were entered into a series of latent class models. Model estimation was done iteratively, starting with a one-class solution and continuing to estimate models with increasing numbers of classes until model estimation was not possible and a meaningful and parsimonious model was identified. Information criteria and likelihood ratio tests of each model were examined along with substantive interpretation of the class solution to identify the most meaningful and parsimonious model. LCA models were run separately for males and females to explore whether the patterns of overlap in child abuse and neglect differed across gender. Next, multinomial logistic regression was used to examine whether the level of childhood stressors differentiated the child maltreatment latent classes. Finally, mean level and proportional differences between the latent classes were examined on measures of mental health problems and substance use during adolescence and adulthood.

Findings

A series of chi-square tests of independence were estimated to examine the relationship between maltreatment types and gender (see Table 2). The chi-square test for the relationship

between gender and neglect was not statistically significant $X^2(1, n=414) = .458, p = .499$, suggesting that the proportion of men and women who experienced neglect does not differ by gender. Females reported statistically significantly higher rates of sexual abuse $X^2(1, n=418) = 30.104, p < .000$, while males reported statistically significantly higher rates of physical abuse $X^2(1, n=451) = 10.060, p < .01$, and emotional abuse $X^2(1, n=451) = 10.085, p < .01$.

Males- Latent classes.

The four dichotomous maltreatment variables (i.e. physical abuse, emotional abuse, sexual abuse, and neglect) were entered into a latent class model along with childhood stressors as a predictor of latent class membership. Estimation of the latent class models began with a one class solution and continued through a five class solution. The information criteria and likelihood ratio tests for a one through five class model can be seen in Table 3.

The VLRM, LMR-LRT, and the BLRT are all statistically significant for a 3-class model, suggesting that the addition of a third class provides a significant improvement to the model over 2-class solution. The AIC and SABIC are lowest for the 3-class model suggesting that a 3-class solution is the best fitting model. Class 1 (Physical abuse, sexual abuse, and neglect) is defined by a high probability for physical abuse (.84), sexual abuse (1.0), and neglect (.83) with a slightly lower than average probability of emotional abuse (.62). The sample size for the physical abuse, sexual abuse, and neglect class is 26 representing approximately 11% of the male sample. Class 2 (Low maltreatment) is defined by an average probability for physical abuse (.49) and a lower than average probability for emotional abuse (.20), sexual abuse (.13), and

neglect (.17). The sample size for the low maltreatment class is 126 representing approximately 52% of the male sample. Class 3 (Physical abuse and emotional abuse) is defined by a high probability of physical abuse (1.0) and emotional abuse (1.0) and lower than average probabilities for sexual abuse (.23) and neglect (.19). The sample size for the physical abuse and emotional abuse class is 92 representing approximately 37% of the male sample. Table 4 presents the conditional latent class probabilities for the 3-class solution for males.

Males: Relationship of childhood stressors to latent classes.

Childhood stressors, a count of the number of different types of stressors a child was exposed to, was included as a predictor of class membership in the estimation of the latent classes to understand whether the level of childhood stressors could differentiate between the latent classes. Those who experienced more childhood stressors were significantly more likely to be in the physical abuse, sexual abuse and neglect class and the physical abuse and emotional abuse class than the low maltreatment class (see Table 5). However, childhood stressors did not distinguish between the physical abuse, sexual abuse, and neglect class and the physical abuse and emotional abuse class.

Males: Mean-level and proportional differences in mental health and substance use outcomes.

As a final step, pair-wise comparisons between the three maltreatment classes were examined to understand class differences on both mental health and substance abuse outcomes in adolescence and adulthood. Table 6 provides descriptive statistics for substance use outcomes

broken-down by maltreatment class. Table 7 provides the pairwise comparisons between the maltreatment classes on substance use outcomes for males. Those in the physical abuse, sexual abuse, and neglect class (Class 1) reported significantly higher rates of having ever used alcohol during adolescence ($X^2_1= 9.44, p<.05$), higher rates of having ever used marijuana in adolescence ($X^2_1= 6.51, p<.05$), and marginally significantly higher frequency of past year marijuana use ($X^2_1= 3.01, p=.08$). Individuals in the physical abuse, sexual abuse, and neglect class (Class 1) had marginally significantly higher rates of having ever used alcohol during adolescence ($X^2_1= 2.79, p=.10$), marginally higher rates of having ever used marijuana ($X^2_1= 3.73, p=.05$), and marginally higher frequency of past year marijuana use ($X^2_1= 3.33, p=.07$) than those in the physical abuse and emotional abuse class (Class 3). No statistically significant differences were observed among any of the adolescent or adulthood substance use outcomes between the low maltreatment class (Class 2) and the physical abuse and emotional abuse class (Class 3). Interestingly, a higher proportion of those in the low maltreatment class (Class 2) reported past year binge drinking ($X^2_1= 3.90, p<.05$) in adulthood than those in the physical abuse, emotional abuse, and neglect class (Class 3).

Table 8 provides descriptive statistics for mental health outcomes for males while Table 9 provides the pairwise comparisons of mental health outcomes. Those in the physical abuse, sexual abuse, and neglect class (Class 1) reported significantly more depression symptoms in adolescence ($X^2_1= 7.28, p<.05$) and adulthood ($X^2_1= 4.38, p<.05$) and marginally higher rates of moderate to severe depression in adulthood ($X^2_1= 3.86, p=.05$) than those in the low

maltreatment class (Class 2). In adolescence, those in the physical abuse, sexual abuse, and neglect class (Class 1) reported significantly more depression symptoms than those in the physical abuse and emotional abuse class (Class 3) ($X^2_1= 4.27, p<.05$). Those in the physical abuse and emotional abuse class (Class 3) reported significantly more depression symptoms ($X^2_1= 5.60, p<.05$), anxiety symptoms ($X^2_1= 4.05, p<.05$), and higher rates of moderate to severe anxiety ($X^2_1= 5.12, p<.05$) than those in the low maltreatment class (Class 2) during adulthood.

Females: Latent classes.

The information criteria and likelihood ratio tests for a one through five class model can be seen in Table 10. Looking at the BIC, a 2-class model fits the data well although the BIC is the only information criteria supporting a 2-class model. The VLMR, LMR-LRT, and BLRT support a 3-class model over a 2-class model suggesting that the addition of a third class provides a significant improvement to the model over a 2-class model. Table 11 provides information regarding the conditional latent class probabilities for a 3-class solution for females. Class 1 (sexual abuse and neglect) is defined by a high probability for sexual abuse (.97) and neglect (.81) with a slightly higher than average probability of physical abuse (.54). The sample size for the sexual abuse and neglect class is 46 representing approximately 22% of the female sample. Class 2 (Low maltreatment) is characterized by average physical abuse (.44), lower than average emotional abuse (.18), sexual abuse (.38), and neglect (.12). The sample size for the low maltreatment class is 126 representing approximately 60% of the female sample. Finally, Class 3 (Physical abuse and emotional abuse) is characterized by physical abuse (1.0) and emotional abuse (1.0) with slightly lower than average rates of sexual abuse (.38) and neglect (.08).

A 4-class solution was also examined for model fit and substantive interpretation (see Table 12). The AIC and SABIC are lowest for the 4-class model although the change in the AIC and SABIC between a 3-class and 4-class model is relatively small. In addition, the entropy for the 4-class model is the highest suggesting better classification than the other models. Both the VLMR and the LMR-LRT are not statistically significant in the 4-class model suggesting that the addition of a fourth class does not improve the model from a 3-class model. On the other hand, the BLRT is statistically significant suggesting that a fourth class does improve the model over a 3-class model. Table 10 provides information regarding the conditional latent class probabilities for a 4-class solution for females. Examining the interpretation of the 4-class model, Class 1 (Low maltreatment) is characterized by a lower than average probability of physical abuse (.05), emotional abuse (.21), sexual abuse (.34), and neglect (.00). The sample size for the low maltreatment group is 50 representing approximately 24% of the female sample. Class 2 (Average maltreatment) is characterized by higher than average physical abuse (.57), lower than average emotional abuse (.13), and average sexual abuse (.45) and neglect (.24). The sample size for the low maltreatment group is 57 representing approximately 27% of the female sample. Class 3 (Physical abuse and emotional abuse) is characterized by high physical abuse (1.0), higher than average emotional abuse (.67), and lower than average sexual abuse (.39) and neglect (.08). The sample size for the physical abuse and emotional abuse group is 58 representing approximately 28% of the female sample. Class 4 (Sexual abuse and neglect) is characterized by higher than average physical abuse (.46), lower than average emotional abuse (.38), and high sexual abuse (.95) and neglect (.83).

As noted by Lanza, Bray, and Collins (2012), the optimal class solution in LCA is chosen based upon examination of information criteria (e.g. AIC, BIC), likelihood ratio tests (e.g. BLRT, LMR) and the theoretical and conceptual relevance of the class interpretations. “Because of the different penalties across the ICs [Information Criteria], when using them it is possible that each of the ICs points toward a different class solution as the best model” (Nylund, Asparouhov, & Muthen, 2007, p. 544). In a Monte Carlo simulation study by Nylund, Asparouhov, and Muthen (2007), the authors examined the performance of two common likelihood ratio tests (i.e. BLRT, LMR) and a number of common information criteria such as the AIC and the BIC. In conclusion, Nylund and colleagues found that the BLRT outperformed the LMR in identifying a correct class solution although the LMR was adequate in its ability to identify the correct class solution. Because the BLRT is computationally intensive, the authors suggest using the LMR as a first indicator of model fit and using the BLRT if/when other information criteria do not agree. In regards to the AIC and BIC, Nylund and colleagues note that the AIC tends to overestimate the true number of classes, while the BIC demonstrates good performance in identifying the correct class solution.

For females in the current study, the likelihood ratio tests and information criteria did not consistently indicate a particular class solution. Most criteria (excluding the BIC which supported a 2-class solution) favored a 3-class or 4-class solution. The AIC, SABIC, entropy, and BLRT support a 4-class model over a 3-class model, although the VLMR and LMR-LRT suggest that adding a 4th class does not improve the model over a 3-class solution. Looking at the substantive interpretation of the 3-class and 4-class models, both identified substantively

meaningful classes with adequate sample sizes. The 4-class model appeared to separate-out the “Low Maltreatment” class from the 3-class model into two separate classes: 1.) a low maltreatment group, and 2.) an average maltreatment group. Exploratory analyses compared the 3-class versus the 4-class model and found that the no maltreatment class and the average maltreatment class in the 4-class solution could not be distinguished on the basis of predictors or outcomes, providing evidence for the selection of the more parsimonious 3-class model.

Females: Relationship of childhood stressors to latent classes.

Childhood stressors, a count of the number of different types of stressors a child was exposed to, was included as a predictor of class membership in the estimation of the latent classes. Those who experienced more childhood stressors were significantly more likely to be part of the sexual abuse and neglect class and the physical abuse and emotional abuse class than those in the low maltreatment class (see Table 13). However, childhood stressors did not distinguish between the sexual abuse and neglect class and the physical abuse and emotional abuse class.

Females: Mean-level and proportional differences in mental health and substance use outcomes.

As a final step, pair-wise comparisons between the three maltreatment classes were examined to understand class differences on both mental health and substance abuse outcomes in adolescence and adulthood. Table 14 provides information regarding the descriptive statistics

for substance use outcomes broken-down by maltreatment class. Table 15 provides information on the pairwise comparisons between maltreatment classes and substance use outcomes for females. Those in the sexual abuse and neglect class reported marginally higher substance abuse symptoms in adulthood ($X^2_1= 2.91, p=.088$) and marginally higher rates of past year alcohol use in adolescence ($X^2_1= 3.20, p=.07$) than those in the low maltreatment group but statistically significantly higher rates of substance abuse symptoms in adulthood than those in the physical abuse and emotional abuse class ($X^2_1= 3.89, p<.05$). No statistically significant differences were observed among the low maltreatment class and the physical abuse and emotional abuse class across any of the adolescent or adulthood substance use outcomes.

Table 16 provides descriptive statistics for mental health outcomes for females while Table 17 includes pairwise comparisons of mental health outcomes. Those in the sexual abuse and neglect class reported significantly higher symptoms of depression in adolescence ($X^2_1= 4.21, p<.05$) and adulthood ($X^2_1= 5.59, p<.05$), higher rates of moderate to severe depression in adulthood ($X^2_1= 5.94, p<.05$), and higher rates of moderate to severe anxiety in adulthood ($X^2_1= 3.90, p<.05$) than those in the low maltreatment class. In addition, those in the sexual abuse and neglect class reported marginally higher rates of moderate to severe anxiety in adulthood compared to those in the physical abuse and emotional abuse class ($X^2_1= 2.76, p=.097$). There were no statistically significant differences among the low maltreatment and physical abuse and emotional abuse class across any of the adolescent or adulthood mental health outcomes.

Table 2. Chi-square differences between gender and type of maltreatment.

	Males	Females	Chi-square	P-value
Physical Abuse	69% (n=169)	54% (n=111)	10.06	p<.01
Psychological Abuse	50% (n=123)	35% (n=72)	10.09	p<.01
Sexual Abuse	26% (n=59)	53% (n=102)	31.1	p<.000
Neglect	25% (n=56)	30% (n=52)	0.46	p=.50

Table 3. Information criteria and likelihood ratio tests of latent class models, males (n=247).

	1 Class	2 Classes	3 Classes	4 Classes	5 Classes
Log	-1064.507	-545.926	-535.621	-531.845	-527.156
AIC	2141.014	1111.852	1103.621	1107.690	1110.312
BIC	2162.095	1146.946	1159.392	1184.897	1208.575
SABIC	2143.075	1115.246	1108.673	1115.157	1119.815
Entropy	--	.565	.745	.768	.866
VLMR	--	p<.05	p<.05	p=.3996	p=.0868
LMR-LRT	--	p<.05	p<.05	p=.4083	p=.0896
BLRT	--	p<.05	p<.05	p=.6667	p=1.0

Table 4. Conditional latent class probabilities for males, 3-class model.

Type of Abuse	Class 1: Physical Abuse, Sexual Abuse & Neglect 11% (n=26)		Class 2: Low Maltreatment 52% (n=129)		Class 3: Physical Abuse & Emotional Abuse 37% (n=92)		Full Male Sample N=247	
	No	Yes	No	Yes	No	Yes	No	Yes
Physical	.16	.84	.51	.49	0	1	.50	.50
Emotional	.38	.62	.80	.20	0	1	.31	.69
Sexual	0	1	.87	.13	.77	.23	.74	.26
Neglect	.17	.83	.83	.17	.81	.19	.75	.25

Table 5. Multinomial logistic regression results--Males

	Low Maltreatment vs. Physical, Sexual, & Neglect			Physical, Sexual, Neglect vs. Physical & Emotional			Physical & Emotional vs. Low Maltreatment		
	<i>B</i>	<i>SE B</i>	<i>OR</i>	<i>B</i>	<i>SE B</i>	<i>OR</i>	<i>B</i>	<i>SE B</i>	<i>OR</i>
Childhood Stressors	-0.52	0.26	0.59*	-0.04	0.27	0.96	0.48	0.12	1.62*

Note. *p<.05; OR= expB

Table 6. Descriptive statistics for substance use outcomes by maltreatment class—Males

	Class 1: Physical, Sexual & Neglect			Class 2: Low Maltreatment			Class 3: Physical & Emotional		
	%	Mean	SD	%	Mean	SD	%	Mean	SD
ADOLESCENT SUBSTANCE USE:									
Drink 7-9th grade ¹	76%			60%			59%		
Ever used alcohol ¹	100%			89%			93%		
Past year alcohol		95.93	26.62		54.31	8.36		51.55	10.56
Ever marijuana ¹	80%			52%			56%		
# times past year marijuana		88.87	31.84		30.21	8.48		25.31	11.21
ADULTHOOD SUBSTANCE USE:									
SSI-SA Moderate/Severe ¹	21%			17%			16%		
SSI-SA symptom count		2.08	0.71		1.58	0.24		1.78	0.4
# drinks per week		8.74	3.11		8.96	1.01		11.7	2.39
Past year binge ¹	40%			66%			56%		
# times past year binge		13.16	8.2		16.33	4.31		12.12	4.67
# times drink past month		4.24	1.91		5.66	0.72		4.08	1.12
# times binge drink past month		1.05	0.85		1.59	0.36		0.96	0.39
# times marijuana past year		37.78	23.03		15.39	6.8		36.64	14.03
# times marijuana past month		2.26	1.8		1.34	0.6		2.52	1.13
Past year marijuana ¹	24%			13%			25%		

¹Indicates a dichotomous variable.

Table 7. Pair-wise comparisons of substance use outcomes by maltreatment class—Males

	Physical, Sexual, & Neglect vs. Low Maltreatment		Physical, Sexual, & Neglect vs. Physical & Emotional		Low Maltreatment vs. Physical & Emotional	
	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>
ADOLESCENT SUBSTANCE USE:						
Drink 7-9th grade	1.77	0.18	1.77	0.18	0.02	0.9
Ever used alcohol	9.44	.00*	2.79	.10+	0.78	0.38
Past year alcohol	2.27	0.13	2.52	0.11	0.04	0.84
Ever marijuana	6.51	.01*	3.73	.05+	0.22	0.64
# times past year marijuana	3.01	.08+	3.33	.07+	0.12	0.73
ADULTHOOD SUBSTANCE USE:						
SSI-SA Moderate/Severe	0.11	0.74	0.21	0.65	0.06	0.8
SSI-SA symptom count	0.42	0.52	0.14	0.71	0.16	0.69
# drinks per week	0	0.95	0.55	0.46	1.04	0.31
Past year binge	3.9	.05+	1.09	0.3	1.23	0.27
# times past year binge	0.11	0.74	0.01	0.92	0.42	0.52
# times drink past month	0.46	0.5	0.01	0.94	1.26	0.26
# times binge drink past month	0.32	0.57	0.01	0.93	1.31	0.25
# times marijuana past year	0.86	0.35	0	0.97	1.73	0.19
# times marijuana past month	0.23	0.63	0.01	0.91	0.79	0.38
Past year marijuana	0.92	0.34	0.01	0.93	2.48	0.12

Note. +p<.10, *p<.05

Table 8. Descriptive statistics for mental health outcomes by maltreatment class—Males

	Class 1: Physical, Sexual & Neglect			Class 2: Low Maltreatment			Class 3: Physical & Emotional		
	%	Mean	SD	%	Mean	SD	%	Mean	SD
ADOLESCENT MENTAL HEALTH:									
BDI symptom count		14.83	1.86		9.4	0.66		10.34	0.97
ADULTHOOD MENTAL HEALTH:									
BDI Moderate/Severe ¹	30%			7%			18%		
BDI symptom count		12.73	2.49		7.21	0.72		11.74	1.71
GAD Moderate/Severe ¹	26%			10%			27%		
GAD symptom count		5.9	1.35		4.04	0.44		6.03	0.86

¹Indicates a dichotomous variable.

Table 9. Pair-wise comparisons of mental health outcomes by maltreatment class—Males

	Physical, Sexual, & Neglect vs. Low Maltreatment		Physical, Sexual, & Neglect vs. Physical & Emotional		Low Maltreatment vs. Physical & Emotional	
	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>
ADOLESCENT MENTAL HEALTH:						
BDI symptom count	7.28	.01*	4.27	.04*	0.61	0.44
ADULTHOOD MENTAL HEALTH:						
BDI Moderate/Severe	3.86	0.05+	0.92	0.34	2.48	0.12
BDI symptom count	4.38	0.04*	0.1	0.76	5.6	0.02*
GAD Moderate/Severe	1.88	0.17	0	0.95	5.12	.02*
GAD symptom count	1.64	0.2	0	0.94	4.05	.04*

Note. +p<.10, *p<.05

Table 10. Information criteria and likelihood ratio tests of latent class models females (n=209)

	1 Class	2 Classes	3 Classes	4 Classes	5 Classes
Log	-933.573	-503.654	-491.662	-484.338	-481.725
AIC	1879.145	1027.308	1015.323	1012.676	1019.450
BIC	1899.199	1060.732	1068.801	1086.208	1113.035
SABIC	1880.188	1029.047	1018.104	1016.500	1024.317
Entropy	--	.616	.666	.766	.751
VLMR	--	p<.05	p<.05	p=.0797	p=.1592
LMR-LRT	--	p<.05	p<.05	p=.0870	p=.1690
BLRT	--	p<.05	p<.05	p<.05	p<.05

Table 11. Conditional latent class probabilities for females, 3-class model

Type of Abuse	Class 1: Sexual Abuse & Neglect 22% (n=46)		Class 2: Low Maltreatment 60% (n=126)		Class 3: Physical Abuse & Emotional Abuse 18% (n=37)		Full Female Sample N=209	
	No	Yes	No	Yes	No	Yes	No	Yes
Physical	.46	.54	.57	.43	0	1	.65	.35
Emotional	.61	.39	.82	.18	0	1	.46	.54
Sexual	.03	.97	.62	.38	.62	.38	.47	.53
Neglect	.19	.81	.88	.12	.93	.07	.72	.28

Table 12. Conditional latent class probabilities for females, 4-class model

	Class 1: Low Maltreatment 24% (n=50)		Class 2: Average Maltreatment 27% (n=57)		Class 3: Physical Abuse & Emotional Abuse 28% (n=58)		Class 4: Sexual Abuse & Neglect 21% (n=44)		Full Female Sample N=209	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Physical	.95	.05	.43	.57	0	1	.54	.46	.65	.35
Emotional	.79	.21	.87	.13	.33	.67	.62	.38	.46	.54
Sexual	.66	.34	.55	.45	.61	.39	.05	.95	.47	.53
Neglect	1	0	.76	.24	.92	.08	.17	.83	.72	.28

Table 13. Multinomial logistic regression results--Females

	Low Maltreatment vs. Sexual & Neglect			Sexual & Neglect vs. Physical & Emotional			Physical & Emotional vs. Low Maltreatment		
	<i>B</i>	<i>SE B</i>	<i>OR</i>	<i>B</i>	<i>SE B</i>	<i>OR</i>	<i>B</i>	<i>SE B</i>	<i>OR</i>
Childhood Stressors	-0.43	0.18	.65*	0.1	0.16	1.11	0.53	0.16	1.7*

Note. *p<.05; OR= expB

**Table 14. Descriptive statistics for substance use outcomes by maltreatment class—
Females**

	Class 1: Sexual & Neglect			Class 2: Low Maltreatment			Class 3: Physical & Emotional		
	%	Mean	SD	%	Mean	SD	%	Mean	SD
ADOLESCENT SUBSTANCE USE:									
Drink 7-9th grade ¹	61%			56%			45%		
Ever used alcohol ¹	93%			88%			87%		
Past year alcohol		41.1	11.49		18.53	4.15		24.14	12.45
Ever marijuana ¹	58%			47%			41%		
# times past year marijuana		33.02	14.46		17.62	7.09		16.46	13.42
ADULTHOOD SUBSTANCE USE:									
SSI-SA Moderate/Severe ¹	18%			6%			5%		
SSI-SA symptom count		1.82	0.54		0.78	0.21		0.56	0.34
# drinks per week		8.56	3.43		5.56	1.4		4.09	1.97
Past year binge ¹	41%			35%			34%		
# times past year binge		20.08	12.05		6.12	4.29		2.99	4.46
# times drink past month		3.41	1.14		2.93	0.55		2.05	1.17
# times binge drink past month		0.93	0.66		0.47	0.33		0.27	0.22
# times marijuana past year		12.13	9.72		10.56	5.65		6.9	10.46
# times marijuana past month		0.85	0.83		0.92	0.5		0.97	0.13
Past year marijuana ¹	19%			13%			11%		

¹Indicates a dichotomous variable.

**Table 15. Pair-wise comparisons of substance use outcomes by maltreatment class—
Females**

	Sexual & Neglect vs. Low Maltreatment		Sexual & Neglect vs. Physical & Emotional		Low Maltreatment vs. Physical & Emotional	
	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>
ADOLESCENT SUBSTANCE USE:						
Drink 7-9th grade	0.18	0.67	1.39	0.24	0.09	0.34
Ever used alcohol	0.84	0.36	0.53	0.47	0.01	0.92
Past year alcohol	3.2	.07+	0.99	0.32	0.17	0.69
Ever marijuana	1.16	0.28	1.64	0.2	0.27	0.6
# times past year marijuana	0.81	0.37	0.71	0.4	0.01	0.94
ADULTHOOD SUBSTANCE USE:						
SSI-SA Moderate/Severe	2.52	0.11	2.17	0.14	0.02	0.88
SSI-SA symptom count	2.91	.09+	3.89	.05+	0.31	0.58
# drinks per week	0.56	0.45	1.16	0.28	0.36	0.55
Past year binge	0.3	0.58	0.22	0.64	0.01	0.94
# times past year binge	1.04	0.31	1.72	0.19	0.24	0.62
# times drink past month	0.13	0.72	0.67	0.41	0.41	0.52
# times binge drink past month	0.32	0.57	0.89	0.35	0.23	0.63
# times marijuana past year	0.02	0.89	0.11	0.74	0.09	0.76
# times marijuana past month	0	0.95	0.01	0.94	0	0.97
Past year marijuana	0.59	0.44	0.62	0.43	0.05	0.83

Note. +p<.10, *p<.05

**Table 16. Descriptive statistics for mental health outcomes by maltreatment class—
Females**

	Class 1: Sexual & Neglect			Class 2: Low Maltreatment			Class 3: Physical & Emotional		
	%	Mean	SD	%	Mean	SD	%	Mean	SD
ADOLESCENT MENTAL HEALTH:									
BDI symptom count		13.74	1.53		10.09	0.8		10.74	1.84
ADULTHOOD MENTAL HEALTH:									
BDI Moderate/Severe ¹	35%			12%			19%		
BDI symptom count		14	1.82		8.82	0.94		10.03	1.94
GAD Moderate/Severe ¹	29%			12%			11%		
GAD symptom count		6.75	1.04		4.4	0.51		4.57	1.08

¹Indicates a dichotomous variable.

**Table 17. Pair-wise comparisons of mental health outcomes by maltreatment class—
Females**

	Sexual & Neglect vs. Low Maltreatment		Sexual & Neglect vs. Physical & Emotional		Low Maltreatment vs. Physical & Emotional	
	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>	<i>Chi-Square</i>	<i>P-Value</i>
ADOLESCENT MENTAL HEALTH:						
BDI symptom count	4.21	.04*	1.48	0.23	0.1	0.75
ADULTHOOD MENTAL HEALTH:						
BDI Moderate/Severe	5.94	.02*	1.76	0.19	0.46	0.5
BDI symptom count	5.59	.02*	2.1	0.15	0.31	0.58
GAD Moderate/Severe	3.9	.05+	2.76	.10+	0.01	0.94
GAD symptom count	3.69	0.17	1.99	0.16	0.02	0.89

Note. +p<.10, *p<.05

Chapter 5: Discussion

Summary of study

The current study used latent class analysis to explore patterns of overlap of child abuse and neglect separately for males and females. Multinomial logistic regression was used to examine whether stressors during childhood helped distinguish between the identified latent classes of child maltreatment. As a final step, pair-wise differences in proportions (categorical variables) and mean-levels (continuous variables) were examined between the derived latent classes on mental health and substance use variables in adolescence and adulthood.

Findings: Research question #1a: Are there qualitatively different combinations of child abuse and neglect for the participants in the Lehigh Longitudinal Study.

Research question #1b: Are there differences in the combinations of child abuse and neglect for males and females in the Lehigh Longitudinal Study?

For males, a 3-class model was selected based upon fit indices and the substantive interpretation of the latent classes. Class 1 was defined by higher than average physical abuse, sexual abuse, and neglect with slightly lower than average emotional abuse. This class experienced the highest probability for the most forms of abuse. Class 2 was considered the low maltreatment class, with an average probability of physical abuse and a lower than average probability of emotional abuse, sexual abuse, and neglect. This class does not represent a “no maltreatment” comparison group because individuals in this class still appeared to have

experienced various forms of abuse and neglect. Class 3 was defined by high probabilities for physical abuse and emotional abuse and lower than average probabilities for sexual abuse and neglect.

For females, both a 3-class and a 4-class solution identified substantively meaningful classes, each with adequate sample size (over 10% of the sample in each class). The information criteria and likelihood ratio tests did not indicate a clear preference for a 3-class or 4-class model in this instance. Exploratory analyses were completed to examine whether identified classes could be distinguished based upon predictors and outcomes using both the 3-class and the 4-class models. Very few differences were identified between the latent classes on predictors or outcomes with the 4-class model. For this reason, the more parsimonious, 3-class model was retained for females and was used in all subsequent analyses. Class 1 was defined by high probabilities for sexual abuse and neglect and a slightly higher than average probability of physical abuse. This class had the highest probability for sexual abuse of all the classes for females. Class 2 was considered the low maltreatment class, with an average probability for physical abuse and lower than average probabilities for emotional abuse, sexual abuse, and neglect, similar to Class 2 for males. As was the case for males, this class does not represent a “no maltreatment” class because individuals within this class still had a probability for experiencing various forms of child abuse and neglect. Class 3 for females was defined by 100% probability for physical abuse and emotional abuse along with lower than average probabilities for sexual abuse and neglect, similar to Class 3 for males.

Looking at the patterns of latent classes across gender, the latent classes for males and females appear to differ in at least two important ways. First, an average probability of physical abuse was present for males across all the latent classes while a similar pattern was found for sexual abuse with the females in the sample; that is, for females, sexual abuse was present in all the derived classes. Prior research suggests that males experience higher rates of physical abuse compared to females and that females experience prevalence rates of sexual abuse compared to males (Ackerman, Newton, McPherson, Jones, & Dykman, 1998; Edwards, Holden, Felitti, & Anda, 2003). When considering the overlap in child abuse and neglect, higher prevalence rates of a particular type of maltreatment could result in at least two potential outcomes. First, there might be higher latent class probabilities (proportion of sample in each class) for males in classes defined by a high probability for physical abuse and for females in classes defined by a high probability of sexual abuse. In this way, one wouldn't necessarily expect many classes defined by physical abuse for males or sexual abuse for females but would instead expect a higher percentage of males in classes defined by physical abuse and higher percentage of females in classes defined by sexual abuse. A second explanation is that, as a result of higher prevalence rates of physical abuse for males and sexual abuse for females, physical abuse would be more distributed across latent classes for males, while sexual abuse would be more distributed across latent classes for females. The latter explanation appears to align with the findings of the current study. Males reported at least an average probability for physical abuse across all latent classes, while females reported an average probability for sexual abuse across all latent classes.

Currently, there are few theoretical or conceptual explanations for why males and females experience different rates of the various forms of abuse and neglect or why they may experience the overlap in different ways. Feminist perspectives focus on the how a patriarchal society reinforces power differentials between males and females (Purvis & Ward, 2006; Seymour, 1998). From this perspective, sexual abuse of females is more prevalent because males exert their power over females through the commission of sexual abuse. Theories of gender socialization suggest that males and female are rewarded for “sex-typed” behavior and punished when their behavior does not align with these pre-scripted roles (Ryle, 2011). It is possible that males experience higher rates of physical abuse because their behavior and vulnerability as young children does not fit the gender script of what a male is supposed to be (e.g. tough, non-emotional). Parents in turn may use physical discipline to correct males resulting in higher rates of physical abuse.

A second difference noted across gender was that the substantive interpretation of one of the latent classes differed slightly for males and females. As found in prior research (Armour, Elklit, & Christoffersen, 2013; Romano, Zoccolillo, & Paquette, 2006; Walsh, Senn, & Carey, 2012; Hazen et al., 2009), both males and females in the current study had a class defined by low probabilities for child maltreatment. In addition, both males and females had a class defined by high probabilities for physical abuse and emotional abuse, a finding supported by other studies utilizing latent class/latent profile analysis (Berzenski & Yates, 2011; Hazen et al., 2009). Males and females however, differed slightly on the third and final class. The third class for males was defined by all forms of maltreatment (high sexual abuse, neglect, physical abuse, and average

emotional abuse) whereas for females, the third class was defined by high probabilities for sexual abuse and neglect, but not physical or emotional abuse. Based upon the substantive interpretation of the third latent class, it appears that males and females differ on one of the identified latent classes. In addition to sexual abuse and neglect, males also experienced a high probability for physical abuse and an average probability for emotional abuse in the third identified latent class.

If males and females experience child abuse and neglect at different rates and in different combinations, there may be a need to develop gender-specific prevention and treatment programs. The current study was exploratory and ran LCA models separately for males and females to explore gender patterns in the overlap of child abuse and neglect but did not conduct formal tests of gender differences. Future research should explore whether males and females experience the overlap in child abuse and neglect in similar ways by using formal tests (e.g. multiple group LCA) to answer this question so recommendations can be made regarding the need for gender-specific prevention and treatment programs.

Findings: Research question #2: Does the level of adversity and stressors in childhood help distinguish between the latent classes of child abuse and neglect in the Lehigh Longitudinal Study?

A similar pattern emerged for males and females when examining childhood stressors as a predictor of class membership. Those who experienced more childhood stressors were significantly more likely to be in one of the identified maltreatment classes in comparison to the

low maltreatment class. This finding suggests that maltreated children (regardless of the combination of abuse and neglect) live in social contexts marked by high levels of stressors/adversities compared to children with minimal levels of maltreatment. Future research may benefit from understanding which risk factors increase the likelihood for particular combinations of abuse and neglect. If certain risk factors, or constellations of risk factors, increase the likelihood of some combinations of maltreatment but not others, targeted prevention efforts can be developed to target the specific combinations of maltreatment. For example, it is possible that the combination of being unemployed (creating parental stress) and abusing substances (diminishing impulse control) may increase the likelihood that a parent will physically and emotionally abuse their child(ren). On the other hand, being employed and having to rely upon informal or transient childcare (inadequate supervision) in combination of living in a community marked by violence (exposure to perpetrators of violence), may increase the likelihood that a child will experience the combination of neglect and sexual abuse. Knowing if/which factors increase the likelihood for a particular combination of maltreatment help point to potential targets for prevention programs (Whittaker, Shelley, & Lutzker, 2005).

Findings: Research question #3: Are particular classes of child abuse and neglect related to higher rates/levels of adolescent and adulthood substance use problems in comparison to other classes of child abuse and neglect for individuals in the Lehigh Longitudinal Study?

Male: Mental health outcomes.

Males in the physical abuse, sexual abuse, and neglect class reported higher numbers of

depression symptoms in adolescence and adulthood and moderately higher percentage of those reporting moderate to severe depression in adulthood compared to those in the low maltreatment class. In addition, males in the physical abuse, sexual abuse, and neglect class reported a higher number of depression symptoms in adolescence than those in the physical abuse and emotional abuse group yet no other statistically significant differences in mental health outcomes were observed between these two classes. Together, these findings suggest that the impacts of the combination of physical abuse, sexual abuse, and neglect for males may result in early (adolescence) impairments in the form of increased depression symptoms even when compared to those who experience the combination of physical abuse and emotional abuse. Males who experience the combination of physical abuse, sexual abuse, and neglect may require intervention to address early (adolescent) mental health concerns.

Differences between those in the physical abuse and emotional abuse class and those in the low maltreatment class did not emerge until adulthood. Specifically, those in the physical abuse and emotional abuse class reported significantly higher number of depression symptoms, higher number of anxiety symptoms, and more anxiety in adulthood compared to those in the low maltreatment class.

In summary, a few differences were noted for males between the two maltreatment classes and the low maltreatment class on indicators of mental health problems in adolescence and adulthood, although only one statistically significant difference was noted between the two maltreatment classes on these outcomes. Together, these findings suggest that maltreatment in

any combination generally lead to worse outcomes than experiencing low levels of maltreatment. Different combinations of abuse and neglect lead to similar levels and proportions of males experiencing mental health problems in adolescence and adulthood. It appears that knowing the particular combination of maltreatment an individual experiences does not provide any advantage over simply knowing that an individual experienced multiple, overlapping forms of maltreatment.

Female: Mental health outcomes.

Pairwise comparisons of mental health outcomes for females revealed a couple of key differences. Females in the sexual abuse and neglect class reported a significantly higher number of depression symptoms in adolescence and a higher proportion of individuals with moderate to severe depression, a significantly higher number of depression symptoms, and a marginally higher proportion of individuals experiencing moderate to severe anxiety in adulthood than those in the low maltreatment class. Those in the sexual abuse and neglect class also reported a marginally higher proportion of individuals with moderate to severe anxiety during adulthood compared to those in the physical abuse and emotional abuse class.

No differences were observed for females on any of the mental health outcomes between those in the physical abuse and emotional abuse class and those in the low maltreatment class. It is possible that the lack of differences between these two classes could be attributed to high rates of mental health problems in female populations in general. Data from the United States National Comorbidity Study suggest that females experience higher rates of anxiety and mood

disorders than males in the general population (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). The lack of mean and proportional differences among females in the physical abuse and emotional abuse class and the low maltreatment class could be a result of high rates of mood and anxiety disorders in female populations masking any differences in mental health outcomes.

In summary, for females, the combination of sexual abuse and neglect resulted in higher rates of mental health problems in adolescence and adulthood, yet no significant differences were observed between the two identified maltreatment classes (i.e. sexual abuse & neglect class; physical abuse & emotional abuse class). Further, those females who experienced the combination of physical abuse and emotional abuse reported similar levels and proportions of mental health problems as those in the low maltreatment group in both adolescence and adulthood.

Comparing patterns in male and female mental health outcomes.

For both males and females, the classes defined by a high probability of sexual abuse were associated with higher rates of mental health problems in both adolescence and adulthood when compared to those in the low maltreatment group. Prior research suggests that child sexual abuse is a robust predictor of mental health problems. For example, Fergusson et al. (2008) examined diagnostic criteria of a number of mental health problems (including depression and anxiety) in a birth cohort of 1,265 children in New Zealand. The authors found that, after accounting for a number of confounding factors including child physical abuse, child sexual

abuse remained a strong predictor of mental health problems such as depression and anxiety. In the current study, a higher number of depression symptoms were observed for those in the class defined by sexual abuse (for both males and females), suggesting that child sexual abuse results in early (adolescent) mental health problems. Children who experience sexual abuse in combination with other forms of maltreatment should be targeted with early interventions to prevent the early onset of adolescent depression symptoms.

Findings: Research question #4: Are particular classes of child abuse and neglect related to higher rates/levels of adolescent and adulthood substance use problems in comparison to other classes of child abuse and neglect for individuals in the Lehigh Longitudinal Study.

Male: Substance abuse outcomes.

Pairwise comparisons of the substance abuse outcomes for males revealed two statistically significant differences among the identified latent classes and a couple marginally significant differences. Those in the physical abuse, sexual abuse, and neglect class reported significantly higher percentages of those who, in adolescence, had ever used alcohol or marijuana in addition to marginally higher rates of the number of times having ever smoked marijuana compared to those in the low maltreatment class. Individuals in the physical abuse, sexual abuse, and neglect group reported marginally higher proportions of those who, in adolescence, had ever used alcohol or marijuana as well as marginally higher number of times having ever smoked marijuana compared to those in the physical abuse and emotional abuse class.

Of note, no differences were observed in substance use outcomes in adolescence between the physical abuse and emotional abuse class and the low maltreatment class. However, it is important to note that experimenting with alcohol and marijuana is prevalent even for those who do not experience early abuse or neglect (Hovdestad, Tonmyr, Wekerle, & Thornton, 2011; Danielson, Amstadter, Dangelmaier, Resnick, Saunders, & Kilpatrick, 2009). The fact that adolescence is a time when many individuals experiment with substances may account for the reasons why differences were not observed between those in the physical abuse and emotional abuse class and those in the low maltreatment class.

Finally, out of all the pairwise comparisons in substance use outcomes across classes for males in adulthood, only one marginally significant difference emerged. Those in the low maltreatment class reported a marginally higher proportion of individuals who binge drank in the past year compared to those in the physical abuse, sexual abuse, and neglect group. This finding is somewhat counterintuitive and perplexing. One explanation for this finding lies in a hypothesis advanced by Hovdestad, Tonmyr, Wekerle, and Thornton (2011). Children who experience more severe maltreatment may be at an increased likelihood to receive early intervention in the form of child welfare services. In turn, these maltreated individuals may be linked with appropriate resources to address the symptoms associated with early maltreatment and therefore may be less likely to abuse substances later in life. This explanation could account for the reason why those in the low maltreatment class were reporting marginally higher rates of binge drinking than those in the physical abuse, sexual abuse, and neglect class.

Overall, very few differences were observed between the identified latent classes for males on indicators of adolescent and adulthood substance use outcomes. Similar to the trend in mental health outcomes for males, those in the physical abuse, sexual abuse, and neglect class reported earlier (adolescent) substance use (alcohol and marijuana) in comparison to other combinations of maltreatment. Males who experienced the combination of physical abuse and emotional abuse reported similar rates of substance use outcomes as those in the low maltreatment class.

Female: Substance use outcomes.

In regards to comparisons of substance use outcomes for females only a few marginally significant differences ($p < .10$) were noted. Compared to those in the low maltreatment class, those in the sexual abuse and neglect class reported marginally higher proportions of individuals who used alcohol in the past year during the adolescent years. Further, those in the sexual abuse and neglect class reported marginally higher numbers of substance use symptoms in adulthood than those in the physical abuse and emotional abuse class. While none of the differences observed were statistically significant, these findings do suggest that those females who were members of the sexual abuse and neglect class trended in the direction of more past year alcohol use during adolescence and more symptoms of substance abuse during adulthood. The overall lack of class differences on adolescent and adulthood substance use outcomes for females suggests that maltreated and non-maltreated females used substances at similar rates across time.

Comparing patterns in male and female substance use outcomes.

There are a few observed patterns across genders in substance use outcomes that are noteworthy. First, although some differences were observed during the adolescent years for males in the study in regards to substance use for those in the physical abuse, sexual abuse, and neglect class, there is a general lack of class differences in substance abuse outcomes for both males and females. This finding suggests that levels of substance use and the proportion of individuals engaging in substance use behavior were similar among all of the identified latent classes for both males and females. Experiencing different combinations of abuse and neglect appears not to result in higher rates of substance use, raising the question about the link between child maltreatment and later substance use outcomes. As noted by Kristman-Valente and Wells (2013), there is a general lack of research documenting the maltreatment-substance use link, therefore, more research is needed. Specifically, more evidence is needed to understand if/how different combinations of abuse and neglect increase the likelihood of substance use across the life-course.

Second, as was the case for mental health outcomes for both males and females, there was a general trend whereby those individuals in the class defined by sexual abuse reported higher levels of substance use in adolescence than those in the low maltreatment class. This general trend suggests that sexual abuse, for males and females, leads to early substance use problems for both males and females when compared to those with low levels of child abuse and

neglect. Sexually abused children may require early intervention to prevent the early onset of substance use problems in adolescence.

Summary of key findings

In summary, the current study examined the overlap in experiences of child abuse and neglect using latent class analysis. Patterns of overlap in child abuse and neglect as well as the predictors and outcomes associated with these patterns of overlap were explored separately for males and females. Latent class analysis identified patterns of overlap in child abuse and neglect for males and females. Across genders, these patterns appeared very similar with a difference observed in one of the three identified latent classes. For both males and females, higher levels of childhood stressors increased the risk of being in one of the identified maltreatment classes compared to those in the low maltreatment class. The level of childhood stressors did not differentiate those in the identified maltreatment classes for either males or females. In regards to mental health outcomes, males and females in classes defined by high probabilities of child sexual abuse reported higher levels of adolescent mental health problems than those experiencing low levels of child maltreatment, suggesting an early onset of mental health problems for those who experience sexual abuse. Similarly, there was a general trend whereby males and females in classes defined by a high probability for child sexual abuse reported higher rates of substance abuse in adolescence compared to those individuals reporting low levels of maltreatment. Both males and females had a class defined by high probabilities for physical abuse and emotional abuse, although differences between this class and the low maltreatment class revealed only a few differences for males in adult mental health outcomes but no other differences for males or

females in any of the other outcomes examined. Finally, very few differences were observed for males or females in outcomes between the identified maltreatment classes. This finding suggests that particular combinations of abuse and neglect do not lead to increased substance use or mental health problems in comparison to other combinations of abuse and neglect.

Limitations

The results of the current analysis should be reviewed with the following limitations in mind. The first limitation deals with the measurement of key maltreatment constructs. The measures of physical and emotional abuse were prospectively reported by the caregiver (often the mother) during the preschool wave of data collection while the sexual abuse and neglect variables were measured retrospectively by self-report in adolescence and adulthood³. There are at least a couple limitations of this approach. First, the reporter of the maltreatment differed between the various forms of abuse and neglect. It is possible that parents (most the mother) significantly under-reported physical and emotional abuse during preschool for reasons of social desirability. On the other hand, adolescents may have significantly over-reported neglect and sexual abuse. As a result of different reports for the various forms of abuse and neglect and the potential for under or over-estimation of the occurrence of these types of maltreatment based upon the reporter, one cannot be sure that the observed associations (or lack thereof) between the

³ The sexual abuse variable relied on retrospective reporting in adolescence and adulthood while the child neglect variable used retrospective reports from the adolescent wave of the study.

maltreatment types are due to true relationships and not some other factors such as the difference in reporter. Since LCA is a method which models latent associations among a set of variables, any factors (e.g. reporters) that influence potential relationships among variables should be noted.

Second, information on the different forms of maltreatment was collected in different ways (i.e. prospective & retrospective) and at different points in time (i.e. childhood, adolescence, & adulthood). The prospectively measured physical and emotional abuse variables only captured the three months prior to the preschool survey and may significantly underestimate the number of children who experienced these forms of maltreatment. The neglect and sexual abuse variables were retrospectively measured and capture a wider developmental range than the physical and emotional abuse variables.

In addition to the measurement issues noted prior, the current study conceptualized child abuse and neglect as dichotomous experiences (yes/no) without consideration of other important characteristics associated with the maltreatment. Research demonstrates that understanding the characteristics of the maltreatment experience (e.g. age of onset, frequency, severity) may be important for understanding the adverse outcomes associated with abuse and neglect (Kinard, 2004). For example, in their prospective study of maltreated children, Kaplow and Widom (2007) found that age at which abuse occurred was related to both anxiety and depression symptoms. Compared to those reporting maltreatment between the ages of 6-11 years, those reporting maltreatment between 0-5 years of age reported higher symptom levels of both

depression and anxiety. Higgins (2004) found that the frequency and severity of the maltreatment experience was more predictive of adult psychological problems than the particular combination of maltreatment one experienced. Future research should, in addition to understanding the overlap in experiences of abuse and neglect, investigate how different characteristics of the maltreatment experience (e.g. age of onset, frequency, severity) contribute to or exacerbate the effects of multi-type maltreatment.

Research demonstrates that a family history of mental health and substance use problems are strong predictors of off-spring mental health and substance use problems (Chassin, Ritter, Trim, & King, 2003; Chassin, Pitts, & Prost, 2002; Costello, Erkanli, Federman, & Angold, 1999; Sullivan, Neale, & Kendler, 2000). In trying to disentangle the mental health and substance use effects of multi-type maltreatment, it is critical to examine the influence of family history on these associations. For example, Widom, White, Czaja, and Marmorstein (2007) found that, after accounting for parental substance abuse problems, the relationship between early maltreatment and later substance abuse was no longer significant, suggesting the critical role of family history in the etiology of substance abuse in maltreated samples. The current study did not account for family history of mental health or substance use problems when examining the relationship between the classes of maltreatment and later outcomes. Failing to account for the contributions of family history when examining the mental health and substance use effects associated with early maltreatment has the potential of over-inflating these relationships. Future studies should account for family history of mental health and substance

use problems when attempting to understand the relationship between multi-type maltreatment and mental health and substance use outcomes.

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- Watts-English, T., Fortson, B. L., Gibler, N., Hooper, S. R., & De Bellis, M. D. (2006). The psychobiology of maltreatment in childhood. *Journal of Social Issues, 62*, 717-736.
- Whitaker, D. J., Lutzker, J. R., & Shelley, G. A. (2005). Child maltreatment prevention priorities at the Centers for Disease Control and Prevention. *Child Maltreatment, 10*, 245-259.
- Widom, C. S. (1989). Child abuse, neglect, and adult behavior: Research design and findings on criminality, violence, and child abuse. *American Journal of Orthopsychiatry, 59*, 355-367.
- Widom, C. S. (1998). Childhood victimization: Early adversity and subsequent psychopathology. In B. P. Dohrenwend (Ed.), *Adversity, stress, and psychopathology* (pp. 81-95). London: Oxford University Press.
- Widom, C. S., DuMont, K., & Czaja, S. (2007). A prospective investigation of major depressive disorder and comorbidity in abused and neglected children grown up. *Archives of General Psychiatry, 64*, 49-56.
- Widom, C. S., Marmorstein, N. R., & White, H. R. (2006). Childhood victimization and illicit drug use in middle adulthood. *Psychology of Addictive Behaviors, 20*, 394-403.

Wilderman, C., Emanuel, N., Leventhal, J. M., Putnam-Horstein, E., Waldfogel, J., & Lee, H. (2014). The prevalence of confirmed maltreatment among US children, 2004-2011. *JAMA Pediatrics*, 401, E1-E8.

Curriculum Vitae

J. Bart Klika, MSW, PhD

University of Washington
School of Social Work
4101 15th Ave NE
Seattle, WA 98125

EDUCATION

Doctor of Philosophy of Social Work

July 2014

University of Washington, School of Social Work

Dissertation: The context of child maltreatment and well-being in adulthood: Developmental patterns over a 30-year period.

Master's of Social Work

June 2008

University of Chicago, School of Social Service Administration

Concentration: Clinical

Program of Study: Violence Prevention, Family Support

Bachelor of Arts, Psychology

May 2002

University of Montana, Department of Psychology

Major: Psychology

FELLOWSHIPS & AWARDS

Doris Duke Fellowship for the Promotion of Child Well-Being: *Washington.* Nationally selected interdisciplinary fellowship awarded to a cohort of doctoral students demonstrating potential as future leaders in the field of child maltreatment prevention (August 2011-August 2013).

University of Washington Excellence in Teaching Award: *Washington.*

University-wide teaching award recognizing creativity, innovation, and engagement of students in the classroom (Academic year 2011-12).

BASW Students' Choice Teaching Award: *Washington*

Student choice award recognizing faculty commitment to student learning in the BASW program at the University of Washington (Academic year 2011-2012).

Beatrice Cummings Mayer Fellowship in Violence Prevention: *Chicago.*

Merit-based program of study, providing specialized training and coursework in the prevention of interpersonal violence (September 2007-June 2008).

Family Support Fellowship: *Chicago.*

Merit-based program of study, providing specialized training and coursework in community-oriented services with vulnerable families (September 2007-June 2008).

RESEARCH INTERESTS

- Child maltreatment prevention
- Etiology and consequences of child maltreatment
- Resilience
- Quantitative research methods

PEER-REVIEWED PUBLICATIONS

Herrenkohl, T.I., Jung, H., **Klika, J.B.**, Mason, W.A., Brown, E.C., Leeb, R.J., & Herrenkohl, R.C. (under review). Adverse effects of child maltreatment and the mitigating role of safe, stable, nurturing relationships and environments in the prediction of adult physical health and mental health problems. *Developmental Psychology*.

Lee, O., Herrenkohl, Jung, H., & **Klika, J.B.** (under review). Gender differences in pathways from child abuse to antisocial behavior across the life-course. A test of contemporaneous effects of partners and peers. *Development & Psychopathology*.

Jung, H., Herrenkohl, T.I., **Klika, J.B.**, Lee, O., & Brown, E.C. (in press). Does child maltreatment predict adult crime? Re-examining the question in a prospective study of gender differences, education, and marital status. *Journal of Interpersonal Violence*.

Caringi, J.C., **Klika, J.B.**, Zimmerman, M., Trautman, A., & van den Pol, R. (2013). Promoting youth voice in Indian Country. *Child & Youth Services Review*, 35(8), 1206-1211.

Herrenkohl, T.I., **Klika, J.B.**, Brown, E., & Herrenkohl, R.C. (2013). Tests of the mitigating effects of caring and supportive relationships in the study of abusive disciplining over two generation. *Journal of Adolescent Health*, 53, S18-S24.

Klika, J.B., & Herrenkohl, T.I. (2013). A review of developmental research on resilience in maltreated children. *Trauma, Violence, & Abuse*, 14(3), 222-234.

Klika, J.B., Herrenkohl, T.I., & Lee, O. (2013). School factors as moderators of the relationship between physical child abuse and pathways of antisocial behavior. *Journal of Interpersonal Violence*, 28(4), 852-867.

Herrenkohl, T.I., Hong, S. **Klika, J.B.**, Herrenkohl, R.C., & Russo, M.J. (2013). Developmental impacts of child abuse and neglect related to adult mental health, substance use, and physical health. *Journal of Family Violence*, 28, 191-199.

Herrenkohl, T.I., **Klika, J.B.**, Herrenkohl, R.C., & Russo, M.J. (2012). A prospective investigation of the relationship between child maltreatment and indicators of adult psychological well-being. *Violence and Victims*, 27(5), 764-776.

Sousa, C., Herrenkohl, T.I., Moylan, C.A., Tajima, E.A., **Klika, J.B.**, Herrenkohl, R. C., Russo, M.J. (2011). Longitudinal study on the effects of child abuse and children's exposure to domestic violence, parent-child attachments, and antisocial behavior in adolescence. *Journal of Interpersonal Violence*, 26(1), 111-136.

RESEARCH EXPERIENCE

Montana Workforce Development Study, Montana

- **Research Consultant**

Tasks: Coordinate with Child and Family Services to administer surveys; supervise the data entry specialists; clean and organize survey data; analyze survey data; assist in writing a legislative report of critical findings (August 2012-January 2014).

Centers for Disease Control and Prevention, Atlanta

- **Research Consultant**

Tasks: Investigate the role of safe, stable, and nurturing relationships in breaking intergenerational patterns of child maltreatment; collaborate with program officers at the CDC in addition to national and international child abuse expert researchers; attend and present research findings at the yearly study panel held at the CDC headquarters in Atlanta; provide verbal feedback and peer review for partnering research sites; participate in monthly conference calls with CDC collaborators (June 2010-January 2014).

Lehigh Longitudinal Study, Washington

- **Research Assistant**

Tasks: Conduct quantitative and qualitative analysis with a prospective longitudinal dataset investigating the consequences of family violence on social, emotional, and cognitive functioning across the life-course; preparation of a literature review looking at the longitudinal study of resilience in maltreated individuals; assist colleagues in the preparation of manuscripts for peer-review; supervise undergraduate and graduate research assistants; presentation of research at national and international conferences (June 2008-Present).

Seattle Social Development Project, Washington

- **Research Assistant**

Tasks: Utilized structural equation modeling to study the general and unique prediction of experiences of child maltreatment (i.e. physical abuse, sexual abuse, emotional abuse, neglect) on adult functioning (i.e. mental health, substance use, crime); assisted with the development of a parent-child interaction coding system to assess quality of parent-child relationships; presented work at a national conference (June 2009-March 2010).

Infant & Child Development Project, Chicago

- **Research Assistant**

Tasks: Coded video-taped mother-child interactions; transcription; developed and organized a research project code-book; maintained inter-rater reliability on coding task (June 2007- June 2008).

Study of Risk Taking Behavior, Montana

- **Research Assistant**

Tasks: Scheduled undergraduate research participation; supervised the computer research laboratory; de-briefed research participants (September 2000- May 2002).

TEACHING EXPERIENCE

Undergraduate Level Instruction:

Social Work Research [SW 400], Montana

- **Adjunct Faculty**

Tasks: Taught introductory research methods to a cohort of 22 undergraduate students; designed course assignments, in-class activities, and take-home skills demonstrations; graded student projects and provided detailed written feedback; met individually with students to answer questions and further facilitate integration of readings and course material (Fall 2012; Spring 2013; Fall 2013)

Social Welfare Practice I [SOC WF 310], Washington

- **Instructor**

Tasks: Taught introductory social work interviewing, assessment, and goal setting skills to a cohort of 23 undergraduate students; organized weekly class lectures and in-class activities; collaborated with instructor of the other section of SOC WF 310 to ensure continuity in content; reviewed video-taped student interviews; graded course papers (Fall 2011)

Social Welfare Practice II [SOC WF 311], Washington

- **Instructor**

Tasks: Provided students with an overview to generalist social work practice with individuals, families, and groups; conducted weekly class lectures/discussions; developed midterm and final assignments; graded course papers; assigned course grades (Winter 2011)

Social Welfare Practice II [SOC WF 311], Washington

- **Teaching Assistant**

Tasks: Independently prepared and delivered 4 full-class lectures with accompanying activities; facilitated in-class weekly role-play and feedback with students; created and administered weekly electronic course feedback surveys; graded course papers and bi-weekly quizzes (Fall 2010)

Research in Social Welfare [SOC WF 490], Washington

- **Independent Study Instructor**

Tasks: Provided one-on-one methodological (quantitative and qualitative) training and mentorship to undergraduate students; assisted students in the preparation and presentation of research at a University research symposium; assigned independent study grades (Winter 2010; Spring 2010; Fall 2010; Winter 2011; Spring 2011)

Introduction to Psychology [PSYC 100S], Montana

▪ **Teaching Assistant**

Tasks: Facilitated bi-weekly break-out discussions with students; assisted in the development and administration of weekly quizzes; attended weekly class sessions (Spring 2001)

Graduate Level Instruction:

Intellectual/Historical Foundations of Social Work Practice [SOC W 500], Washington

▪ **Teaching Practicum**

Tasks: Met weekly with lead instructor to plan class lectures and in-class activities; facilitated in-class small group discussions (Fall 2011)

Managing the Professional Relationship in Social Work Practice [SOC W 535], Washington

▪ **Teaching Practicum**

Tasks: Co-facilitated classroom discussions and student video review; provided one-on-one reflective supervision for students in regards to video-taped interviews (Spring 2011)

Clinical Social Work with Individuals II: Theory and Practice [SOC W 545], Washington

▪ **Teaching Assistant**

Tasks: Facilitated reflective group supervision for student case consultations; Evaluated final student presentations (Winter 2011)

Clinical Social Work with Individuals I: Theory and Practice [SOC W 544], Washington

▪ **Teaching Assistant**

Tasks: Provided instruction the last hour-and-a-half of each class to introduce students to a model of peer-consultation and reflective supervision using video feedback; facilitated course instruction and discussion in the absence of the lead instructor (Fall 2010)

Statistics in Social Work [SOC W 596], Washington

▪ **Statistics Tutor**

Tasks: Organized and facilitated weekly review sessions for students; developed and facilitated a training to familiarize students with statistical analyses using EXCEL and SPSS; graded weekly course assignments and final examination; administered final examination (Fall 2010)

Special Topics in Interpersonal/Direct Practice [SOC W 535C], Washington

▪ **Teaching Practicum**

Tasks: Taught students the core concepts of reflective supervision and facilitated a class environment for peer consultation; modeled reflective supervision using live student role-plays and video recorded student therapy sessions (Spring 2010)

Practice I: Introduction to Social Work Practice [SOC W 510], Washington

▪ **Teaching Assistant**

Tasks: Co-taught a full-day clinical skills workshop; reviewed video recorded student interviews (individually) to provide critical feedback on students' clinical skills (Spring 2010)

SOCIAL WORK PRACTICE

Sound Mental Health, Seattle

A community mental health network, Sound Mental Health provides an array of outpatient counseling and case management services to individuals and families in the greater Seattle area.

- ***Volunteer Mental Health Therapist***

Tasks: Conducted intake and initial assessments; Provided individual counseling and case management services for children and youth; coordinated and facilitated a series of trainings for agency interns; received weekly supervision from a licensed clinical social worker (September 2011-July 2012)— Post-master's degree

Uhlich Children's Advantage Network, Chicago

The clinical and counseling services division of Uhlich Children's Advantage Network provides therapeutic counseling services for children and families who experience trauma.

- ***Clinical Intern***

Tasks: Provided individual and/or family counseling with a caseload of 6-8 clients; co-facilitated a therapeutic group for male juvenile sex-offenders; engaged in weekly peer-consultation; participated in weekly staff meetings and monthly strategic planning sessions (September 2007- June 2008)

Youth Outreach Services, Chicago

Youth Outreach Services offers counseling services for adolescents struggling with substance use and/or abuse. Counseling services are provided at the agency, in school settings, and in-home.

- ***Clinical Intern***

Task: Conducted substance abuse assessments with high-risk teenagers in high school settings; provided cognitive-behavioral therapy for teenagers struggling with substance abuse; maintained a caseload of 6-8 clients; co-facilitated weekly drop-in life skills sessions for area teens; facilitated life-skills groups for high-risk teens in local high schools (September 2006- June 2007)

The Partnership for Children, Montana

The Partnership for Children provides relationship-based group home and in-home treatment for children diagnosed with reactive attachment disorder. The Partnership for Children works with children and families to create safe, nurturing, predictable environments by attending to the dynamics of the parent-child relationship.

- ***Group Therapist***

Tasks: Co-facilitated parent support groups for foster, adoptive, and birth parents; worked with agency staff to plan and implement group therapy sessions (September 2012-October 2012)— 6-week parenting group

- ***In-Home Community Treatment Coordinator***
Tasks: Coordinated mental health, medical, and educational services for children in foster/kinship care; provided direct intervention and on-call services for treatment families; facilitated relationship building between families and children; participated in planning and running of agency training for treatment families; participated in weekly peer consultation (June 2004-August 2006)
- ***Therapeutic Group Home Counselor, I & II***
Tasks: Developed safe, caring, and predictable relationships with children diagnosed with reactive attachment disorder; co-facilitated weekly social skills groups; attended individual therapy with group home children when necessary; supervised and facilitated parent-child visitation at the group home and in the community; organized and coordinated treatment team meetings for group home children (January 2002-June 2004)
- ***Therapeutic Aide***
Tasks: One-on-one therapeutic mentorship with children diagnosed with reactive attachment disorder; provided treatment families with respite care; coordinated communication between school personnel and treatment families (September 2003-June 2004)
- ***Group Home House Manager***
Tasks: Developed and maintained a working budget for a 4-bed therapeutic group home; supervised compliance with state licensing requirements; provided direct care with group home children; planned logistics for the running of the group home (i.e. meals, appointments, shopping)(September 2000- January 2002)

REFERED PRESENTATIONS

Klika, J.B., & Lanier, P. (2014, June). *Prevention 101: Definitions, current research, and practical strategies*. American Professional Society on the Abuse of Children Conference, New Orleans, LA.

Klika, J.B., Lanier, P., & Daro, D. (2013, June). *Innovations in mentorship: Fostering the professional development of early career child abuse and neglect researchers*. American Professional Society on the Abuse of Children Conference, Las Vegas, Nevada.

Klika, J.B., & Herrenkohl, T.I. (2013, June). *Intergenerational continuity in child abuse and intimate partner violence*. The American Professional Society on the Abuse of Children Conference, Las Vegas, Nevada.

Hubel, G., Maguire-Jack, K., **Klika, J.B.**, Lanier, P., Mullins-Geiger, J., Neugut, T., & Ocasio, K. (2013, January). *Making the stakes and stakeholders in child maltreatment visible: A Discussion of innovative approaches to prevention research design and methodology*. Roundtable at the Society for Social Work and Research, San Diego, California.

- Klika, J.B.,** & Herrenkohl, T.I. (2012, July). *Adulthood health and mental health outcomes in a maltreated sample*. International Family Violence and Child Victimization Research Conference, Portsmouth, New Hampshire.
- Klika, J.B.,** & Herrenkohl, T.I. (2012, June). *Life-course resilience processes for maltreated children*. American Professional Society on the Abuse of Children Conference, Chicago, Illinois.
- Huang, L.A., **Klika, J.B.,** Maguire-Jack, K., & Raissian, K. (2012, April). *Nurturing a new generation of leaders: Fellowships to prevent child abuse and neglect*. Workshop at the 18th National Conference on Child Abuse and Neglect, Washington, D.C.
- Klika, J.B.,** & Herrenkohl, T.I. (2011, April). *Family functioning and child maltreatment: A prospective analysis of intervening processes and outcomes of adult mental health*. Society for Research in Child Development, Montreal, Quebec, Canada.
- Klika, J.B.,** Herrenkohl, T.I., Tajima, E.A., & Sousa, C. (2011, January). *Social-emotional functioning and child maltreatment: A person-focused analysis of childhood*. Society for Research and Social Work, Tampa, Florida.
- Klika, J.B.,** Herrenkohl, T.I., Tajima, E.A., & Sousa, C. (2010, November). *Developmental patterns of resilience, transitions, and positive adult functioning following childhood exposure to family violence*. American Society of Criminology, San Francisco, California.
- Bernstein, V.J., **Klika, J.B.,** Edwards, R., & Hans, S. (2010, October). *Video scrapbooking: A tool for enhancing student's work with families and children*. Council on Social Work Education, Portland, Oregon.
- Klika, J.B.,** LeBuffe, P., & Shapiro, V. (2010, June). *Assessing within-child protective factors from 1 month to 14 years of age*. Pathways to Resilience Conference, Dalhousie University, Halifax, Nova Scotia.
- Klika, J.B.** (2010, June). *Qualitative contributions to the conceptualization and study of resilience*. Pathways to Resilience Conference, Dalhousie University, Halifax, Nova Scotia.
- Klika, J.B.,** Herrenkohl, T.I., Sousa, C., Tajima, E.A., Kristman-Valente, A., & Hong, S. (2010, March). *Studying continuity and change in resilience for maltreated children: A multiple domain, life-course approach*. Society for Research on Adolescents, Philadelphia, Pennsylvania.
- Klika, J.B.,** Hill, K.G., & Hawkins, J.D. (2010, January). *The consequences of unique and overlapping forms of child maltreatment on adult outcomes*. Society for Social Work and Research, San Francisco, California.
- Klika, J.B.,** Herrenkohl, T.I., Tajima, E.A., Sousa, C., & Derr, A. (2009, April). *Developmental pathways of resilience in maltreated children: Findings of an extended longitudinal study*.

Society for Research in Child Development, Denver, Colorado.

NON-REFERED PRESENTATIONS

- Klika, J.B.** (2014, June). *Resilient kids, resilient families, resilient communities: Creating the conditions and contexts for healthy development*. Invited presentation at the Great Beginnings, Great Families Conference, Helena, Montana.
- Klika, J.B.** (2014, April). *Moving upstream to prevent adverse childhood experiences*. Invited keynote presentation at the Prevent Child Abuse Virginia Conference, Richmond, Virginia.
- Klika, J.B.** (2014, April). *The Essentials for Childhood framework: A strategy to reduce Adverse Childhood Experiences*. Invited workshop at the Prevent Child Abuse Virginia Conference, Richmond, Virginia.
- Klika, J.B.** (2014, April). *Adverse Childhood Experiences Study*. Invited presentation at the Missoula Exchange Club, Missoula, Montana.
- Klika, J.B.** (2014, March). *From ACEs to action: Strategies to promote safe, stable, nurturing relationships and environments*. Invited workshop at the Idaho Strengthening Families Training Institute, Boise, Idaho.
- Klika, J.B.** (2014, February). *Adverse Childhood Experiences Study*. Invited presentation at the Big Brothers Big Sisters meeting, Missoula, Montana.
- Klika, J.B.** (2013, December). *Adverse Childhood Experiences Study*. Invited presentation at the Missoula Underage Substance Abuse Prevention meeting, Missoula, Montana.
- Klika, J.B.** (2013, October). *Essentials for Childhood: Preventing ACEs and promoting SSNRs*. Invited presentation at the Prevent Child Abuse America Executive Directors meeting, Denver, Colorado.
- Klika, J.B.** (2013, September). *Safe, stable, nurturing relationships and environments: A strategic framework for the prevention of ACEs*. Invited presentation for the Montana Children's Trust Fund.
- Klika, J.B.** (2013, August). *Essentials for Childhood: Promoting safe, stable, and nurturing relationships and environments*. Invited presentation at the Great Beginnings, Great Families Conference, Helena, Montana.
- Klika, J.B., & Siegrist, K.** (2013, August). *Prevention: Building the framework*. Invited presentation for the Missoula Family Violence Council, Missoula, Montana.
- Klika, J.B.** (2013, May). *From fences to ambulances: Preventing child abuse and neglect*. Invited presentation for the Montana Chapter of the American Academy of Pediatrics, Helena, Montana.
- Klika, J.B.** (2013, April). *Applying prevention science to the problem of child abuse and neglect*.

Invited keynote address at the Montana Prevent Child Abuse and Neglect Conference, Helena, Montana.

Herrenkohl, T.I., **Klika, J.B.**, & Brown, E.C. (2011, December). *Mitigating effects of caring and supportive relationships in the study of abusive disciplining*. Centers for Disease Control expert panel on child maltreatment, Atlanta, Georgia.

Herrenkohl, T.I., & **Klika, J.B.** (2011, February). *Abuse, adolescent risk, and adult outcomes of depression, anger, and harsh discipline*. Centers for Disease Control expert panel on child maltreatment, Atlanta, Georgia.

SERVICE

UM hiring committee	Academic year 2013-2014
UM MSW admissions committee	Academic year 2013-2014
UW advisory review committee on the Dean	Academic year 2011-12
UW doctoral program awards committee	Academic year 2011-12
UW BASW admissions committee	Academic year 2011-12
Peer reviewer: Violence & Victims	Summer 2011- Present
Peer reviewer: Journal of Interpersonal Violence	Fall 2011- Present
Peer reviewer: Child Abuse & Neglect	Winter 2012-Present
Peer reviewer: Trauma Violence & Abuse	Spring 2012-Present
Peer reviewer: Journal of Adolescence	Summer 2013-Present
UW doctoral program peer mentor	Academic year 2010-11
UW Magnuson scholarship committee	Spring 2011
UW staff recognition awards committee	Spring 2010
Board of Directors: Prevent Child Abuse Montana	Summer 2013-Present
Advisory Council: The Forum for Children and Youth	Fall 2013-Present
APSAC Prevention Committee Co-Chair	Fall 2013-Present