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Cumulative Childhood Adversity and Disparities in Adult Psychological Distress and Educational Attainment

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Graduate Program in Sociology
A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy
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Abstract

Exposure to childhood adversity often does not occur as an isolated experience; rather, adverse childhood circumstances tend to co-occur, resulting in a climate of disadvantage that has detrimental consequences, and contributes to disparities in adult outcomes. Although the enduring impacts of cumulative childhood adversity on adult mental health and attainment outcomes are well documented in the literature, studies have not accounted for the long-term impact of cumulative childhood adversity on trajectories of adult psychological distress. Furthermore, measures of adversity used to predict selection into higher education consistently focus on childhood economic hardship as the sole indicator of adversity and overlook the co-occurrence of adversities during childhood.

Limitations in previous measures of cumulative childhood adversity further hinder an overall understanding of processes of cumulative adversity that contribute to disparities in adult mental health and educational attainment. Previous studies consider a limited number of adversities, overlook the potential heterogeneity across experiences of adversity, and vary in the conceptualization and measurement of cumulative childhood adversity. These discrepancies in measures have led to inconsistent conclusions regarding the overall impact of multiple adverse childhood experiences on adult outcomes.

Drawing from the life course perspective and the stress process model, the current dissertation uses data from the Panel Study of Income Dynamics' Childhood Retrospective Circumstances Study in order to identify a more comprehensive measure of cumulative childhood adversity that takes into account the heterogeneity and co-occurrence of adversities during childhood. Cumulative histories of exposure to co-occurring adversities are identified using latent class analysis, and used in subsequent papers to predict trajectories of psychological distress and selection into higher education. Overall, results indicate that adversities have a high probability of co-occurring, and that variations in patterns of exposure to childhood adversity have important implications for psychological distress and educational attainment.

Keywords

cumulative childhood adversity, mental health, educational attainment, stress process, life course, cumulative inequality, latent class analysis, latent growth curve, PSID, CRCS, quantitative methods

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Chapter 1

1 Introduction

An abundance of evidence links experiences of cumulative childhood adversity to disparities in various adult outcomes, including mental health (e.g., Chapman et al., 2004; Schilling, Aseltine & Gore, 2007; Nurius, Green, Logan-Greene & Borja, 2015), physical health (e.g., Schafer & Ferraro, 2013; Friedman, Montez, Sheehan, Guenewald & Seeman, 2015), educational attainment (e.g., Montez & Hayward, 2013), labour market outcomes (e.g., Johnson & Schoeni, 2011), and an array of major leading causes of adult death (e.g., Felitti et al., 1998). Childhood is a salient period of the life course, whereby initial experiences of adversity and hardship set in motion trajectories of disadvantage that can have lifelong detrimental consequences (Ferraro & Shippee, 2009). While the majority of children will experience at least one adversity during childhood (Green et al., 2010; Friedman et al., 2015), exposure to childhood stressors is not an isolated or independent experience, but rather a product of the interplay between various social, familial, and economic circumstances of children's everyday lives (Felitti et al., 1998; Chapman et al., 2004; Schilling et al., 2007; Nurius, Logan-Greene & Green, 2012). Adverse childhood experiences have a high probability of co-occurring with other adverse circumstances during childhood (Björkenstam et al., 2015). It is the cumulative experience of multiple adversities that creates a context of disadvantage that is significant for development, and increases the risk of exposure to additional adverse experiences. Furthermore, exposure to cumulative childhood adversity is socially patterned, whereby underlying structural and institutional factors impact the distribution of adversity and resources (Pearlin, 1989; Avison, 2010), and dictate the overall socioeconomic position of children.

The accumulation of adverse childhood experiences has become a central focus of ongoing literature on the childhood origins of adult disparities (Felitti et al., 1998; Chapman et al., 2004; Schilling et al., 2007; Nurius, Logan-Greene & Green, 2012). Growing research on the impact of cumulative childhood adversity on mental health and attainment during adulthood aims to understand mechanisms of cumulative adversity that have a long reach in shaping future opportunities and disadvantage across the life course and contributes to a better understanding of the long-term implications of childhood disadvantage for health and success in adulthood. Experiences of cumulative childhood adversity are associated with higher levels of psychological distress during adulthood. For adolescents, exposure to adverse childhood circumstances set in motion trajectories of poor mental health that worsen through the transition into adulthood (Wickrama, Noh & Elder, 2009; Wickrama, Conger, Lorenz & Jung, 2008; Walsemann, Bell & Goosby, 2011). Experiences of cumulative childhood adversity, more specifically indicators of childhood poverty, further influence educational attainment and socioeconomic status during adulthood. Exposure to economic adversity during childhood is associated with lower levels of high school and college completion, lower wages, and less overall work satisfaction (for a review, see Duncan & Brooks-Gunn, 1997).

While the adverse impacts of disadvantaged childhoods on mental health and adult attainment are well documented in the literature, measures of cumulative childhood adversity are over simplistic and inconsistent and may provide an inaccurate account of the total experience of childhood adversity. Methodological limitations have not allowed for a complete understanding of how processes of adversity accumulate and impact adult disparities and may result in an overestimation or underestimation of the overall influence of childhood disadvantage on adult mental health and attainment outcomes. Variations in the

accumulation and experience of adversity may have important implications for disparities in adult outcomes but are largely unaccounted for in ongoing literature. More recently, a handful of researchers has attempted to move away from traditional sum score measures of cumulative adversity, and instead focus attention on the co-occurrence of adversity and the heterogeneity in the accumulation and experience of adversity (Schilling, Aseltine & Gore, 2008; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015) proposing measures that account for differences in cumulative adversities by type (Schafer & Ferraro, 2013; Friedman et al., 2015), severity (Schilling et al., 2008), and experience (Björkenstam et al., 2015).

Overall, results assert that there is heterogeneity among adverse experiences during childhood; however, discrepancies in the conceptualization of cumulative adversity, and variations in the number and type of adversities included from study to study, have resulted in inconsistent findings across disciplines. Furthermore, few studies have examined the impact of a comprehensive measure of cumulative childhood adversity that includes multiple adversities across different childhood domains on mental health and educational attainment. While experiences of acute and traumatic circumstances, especially economic and familial adversities, are consistently included in cumulative measures of childhood adversity (Friedman et al., 2015), other adverse experiences, such as school and neighborhood conditions, have received less attention in previous literature.

It is important to accurately account for the total exposure to childhood adversity in order to fully understand processes of childhood disadvantage that have a cumulative impact on mental health and attainment during adulthood. Ongoing research may overestimate or underestimate the impact of

measured adversities resulting in an inaccurate account of the complete childhood context of disadvantage and the interrelated adverse experiences that occur across multiple domains. Furthermore, assessing the heterogeneity in the accumulation and experience of adverse childhood conditions would provide greater insight into variations in the exposure to adversity and the manner in which adverse circumstances cluster together to differentially impact mental health and attainment.

The present dissertation relies on longitudinal data from the Panel Study of Income Dynamics' Childhood Retrospective Circumstances Study (PSID-CRCS; Panel Study of Income Dynamics, 2016) to assess how patterns of exposure to cumulative childhood adversity influence processes of mental health across the adult life course, and educational attainment during young adulthood. The measure of cumulative childhood adversity developed here challenges traditional approaches by considering a more comprehensive account of the total experience of childhood stress across multiple domains of disadvantage including, family, neighborhood, and school contexts, and utilizes a person-centered approach to account for the heterogeneity in the co-occurrence and overall experience of adverse circumstances during childhood. Analyses assess how variations in the accumulation of adversity may have a differential impact on mental health and educational attainment. More specifically, different patterns of co-occurring adversities may matter more for mental health outcomes across the life course, or may have a stronger influence on selection into higher education during early adulthood. Results provide a more complete understanding of the overall impact of experiences of cumulative childhood adversity on mental health and educational attainment during adulthood.

1.1 Overview of Dissertation

This dissertation uses an integrated article approach to assess the impact of experiences of cumulative childhood adversity on disparities in adult mental health and educational attainment.

Chapter 2 advances existing research by developing a promising measure of cumulative childhood adversity that broadens the scope of indicators of adversity included in previous measures and considers the heterogeneity in the experience and co-occurrence of cumulative adversity. This measure is used across subsequent papers in the current dissertation. Four measures of cumulative childhood adversity are considered with results compared across measures. First, in accordance with previous literature, a typical sum score of total adversities experienced during childhood is examined. Three other approaches examined depart from the typical sum measure and take into account the heterogeneity in the severity, type, and experience of cumulative childhood adversity respectively. Analyses assess how the conceptualization and modeling of cumulative childhood adversity impacts estimates of adult psychological distress and the overall interpretation of results.

Taken together, results indicate that while the experience of childhood adversities across all four measures is associated with increases in psychological distress, estimates of the association between cumulative childhood adversity and adult psychological distress differ by the conceptualization and measurement of cumulative childhood adversity. Results further reveal that there is heterogeneity in the experience of childhood adversity that a simple sum score is unable to capture.

Of the four measures examined, one measure of cumulative childhood adversity emerged as the most promising approach for measuring the overall

experience of adverse childhood circumstances. The measure, a person-centered approach, identifies similar patterns of exposure to co-occurring cumulative adversities across multiple domains. This approach accounts for the heterogeneity in the experience of adversity and captures the cumulative impact of adversities that have a high probability of clustering together, ensuring a better understanding of underlying adverse childhood experiences that have a pervasive impact on adult disparities.

Chapter 3 assesses the impact of co-occurring cumulative childhood adversities on trajectories of psychological distress in adulthood. The optimal measure of cumulative childhood adversity outlined in Chapter 2 is used to predict baseline levels of adult psychological distress and changes in psychological distress over time. Results demonstrate that all patterns of co-occurring cumulative adverse experiences during childhood are associated with higher initial levels of psychological distress. However, variations in patterns of exposure to childhood adversities have a differential strength of association with mental health during adulthood, affirming the heterogeneity in the co-occurrence and experience of cumulative childhood adversity.

Furthermore, only the most disadvantaged group with a high probability of experiencing multiple childhood adversities across different domains exhibit increases in psychological distress over time. While psychological distress did not worsen over time for other groups experiencing adversities, there is no evidence that trajectories of psychological distress decreased over time, suggesting that adults who experience various patterns of adverse childhood experiences not only report higher initial levels of psychological distress, but that initial disadvantages are maintained over time.

Chapter 4 uses the same measure of cumulative childhood adversity identified in Chapter 2 to assess the association between exposure to cumulative childhood adversity and educational attainment in early adulthood. Educational attainment is measured by the successful completion of high school and college. Rather than rely on indicators of childhood poverty as the sole predictors of adult attainment, the present chapter departs from typical studies and considers a more comprehensive measure of the total climate of childhood disadvantage.

Taken together, results reveal the importance of considering multiple adversities across different domains when predicting adult educational attainment instead of solely focusing on experiences of childhood economic hardship as the primary indicator of childhood adversity. Furthermore, differences in the patterns of exposure to childhood adversity resulted in variations in high school and college completion rates. Results assert the importance of identifying various patterns of exposure to similar adverse experiences as a primary measure of cumulative childhood adversity.

1.2 Theoretical Framework

The key theoretical frameworks underlying each paper are discussed here. This dissertation applies both the stress process model and a life course perspective for understanding the cumulative impact of childhood experiences of adversity on adult mental health and educational attainment.

1.2.1 The Stress Process Model

Developed by Leonard I. Pearlin and colleagues (1981), the stress process model is the dominant framework used to assess the impact of multiple stressors on mental and physical health outcomes. The stress process is promising in its ability to explain social patterns in the distribution of stressors that contribute to disparities

in health outcomes. There are three principle assumptions that underlie the stress process model. First, the process is dynamic in nature, whereby the different facets of the model – stressors, mediators, and outcomes – are interconnected. Second, the experience of stress is not unusual, but rather a typical part of ordinary life. And third, stress originates in the social world, and arises out of the social structures and contexts in which people are situated (Pearlin, 1989).

Stress is conceptualized as an ongoing process composed of three fundamental domains: sources of stress, mediating resources, and manifestations of stress. Manifestations of stress are the multitude of possible health outcomes linked to experiences of stressors. Stress process literature has typically focused on mental health and symptoms of psychological distress as the primary outcomes. Mediating resources are the varying factors that function as the pathway linking sources of stress to manifestations of stress. Social systems determine the allocation and acquisition of resources and contribute to the unequal distribution of opportunity. Psychosocial resources, social and personal resources such as social support and coping capabilities, shape the response to stressors. These resources can be mobilized to attenuate the impact of stressors.

Sources of stress, or stressors, are circumstances that threaten the ordinary operating capacity of an individual. Exposure to stressors is determined by structural arrangements, resulting in a differential distribution of stressors and a disproportionate burden on disadvantaged persons. Initial experiences of stressors can influence additional exposure to stressors, exacerbating strain and resulting in a cumulative impact of disadvantage that exerts a powerful and lasting influence. Wheaton (1994) provided an important extension to the stress process model, advocating for a more sophisticated and comprehensive measure of the inventory of

total potential stressors. Wheaton (1994) proposed a multidimensional stress universe that accounts for the multitude of different sources of stress that co-occur to produce a context of disadvantage that has a cumulative impact on health disparities. The stress universe encompasses a broad spectrum of stressful experiences such as traumas, major life events, and contextual ongoing strain. There are many different sources of stress, or stressors, and it is important to consider the multilevel occurrence of stressors. Not considering the entire realm of exposure to stressors may result in misleading findings and outcomes that may be wrongfully attributed to measured stressors.

Numerous studies have extended the stress universe for adults to include an array of different adult stressors. Research reveals that considering a more comprehensive account of adult exposure to stressors results in an overall better explanation for disparities in psychological distress (Turner & Lloyd, 1995; Turner, Wheaton & Lloyd, 1995; Turner & Lloyd, 1999; Turner & Avison, 2003). However, measures of cumulative childhood adversity have not undergone the same methodological rigor in order to identify a more comprehensive account of childhood stressors and construct a stress universe for children.

Dimensions of stressors, or adversities, for children may differ from those of adults (Avison, 2010). Children spend a large quantity of time in the family, school, and neighborhood environments; these domains may give rise to important adversities and further contribute to disparities in adult outcomes. The focus of the subsequent analyses is on the role of stressors, or adversities, within the stress process model as they indicate the overall climate of childhood disadvantage. The analyses do not include an examination of mediating resources that link sources of stress to manifestations of stress. This is due both to the lack of appropriate

measures in the data utilized, but also because of the analytical priority the thesis places on improving our understanding of the many childhood adversities across various domains that contribute to cumulative childhood adversity and its long-term implications.

1.2.2 The Life Course Perspective

The life course perspective is a framework that focuses on the interplay between individual lives and the social contexts in which people are situated. The origins of the life course perspective were shaped by 20th century advancements in research that gave rise to the availability of longitudinal data and the acknowledgement that early events can influence later life decisions and outcomes (Elder, Kirkpatrick Johnson & Crosnoe, 2003). The life course perspective offers a longitudinal and intergenerational approach to the study of people's lives within historical contexts and through social change (Elder, 1974).

The life course perspective emphasizes aging as a lifelong cumulative process that can only be adequately understood over time using research that considers the entire life span from childhood to adulthood (Settersten, 2003). The life span is composed of multiple trajectories, dynamic patterns characterized by periods of stability and change. Trajectories are pathways that continuously develop over time and are socially defined (George 1993). Personal biography and historical context are important considerations of the life course that further shape social roles and events; these events and transitions give trajectories meaning, and can significantly redirect life pathways.

Childhood is recognized as a sensitive period during the life course, whereby early insults or exposure to adverse experiences initiate trajectories of disadvantage

that accumulate over time and increase the risk for additional stressors. Cumulative disadvantage theory maintains that initial experiences of inequality and disadvantage grow over time across the life course (Dannefer, 2003). Building on prior research on how success begets success, cumulative disadvantage theory suggests that experiences of childhood adversity increases the risk for subsequent exposure and has a pervasive and compounding negative impact on adult disparities. The early onset of disadvantage initiates a chain of disadvantage, and can redirect trajectories on a path of adversity that increases the risk of adverse adult outcomes.

1.2.3 Synergism of the Stress Process Model and the Life Course Perspective

Both the stress process model and the life course perspective share an interest in continuity and dynamics of change over time (Pearlin & Skaff, 1996; Pearlin, Schieman, Fazio & Meersman, 2005; Pearlin, 2010). However, the stress process is more focused on health inequalities, while the life course perspective is more generally applied to a wide variety of outcomes. Both paradigms are beneficial for the study of long-term processes of childhood adversity on adult health and attainment outcomes, and are capable of informing one another to further extend ongoing literature.

Life course principles of timing and age can inform stress process research. Childhood is an important life stage whereby important development is occurring; therefore, timing and age of exposure are particularly important in research pertaining to childhood adversity. The differential exposure to adverse experiences and the allocation of resources during this critical period of development may shape transitions across the life course and have life-long consequences for disparities in

mental and physical health. While adverse experiences continue into adulthood, it is the adversities that occur during early life that set in motion trajectories of disadvantage that are pervasive and enduring.

The attention of the stress process to roles and statuses can also inform life course research. Position in the economic and social hierarchy, and the roles and statuses occupied, shape exposure to stressors and can further inform trajectories of stability and change. Differences in social and economic placement influence long-term temporal patterns that may be characterized by a high accumulation of stressful circumstances, or pathways that are protected from stressful events. Location within structural and institutional arrangements further determines the allocation of resources and shapes access to important opportunities that contribute to successful achievement and positive health.

More recently, Ferraro and Shippee (2009) proposed a cumulative inequality theory, which combines facets from cumulative disadvantage theory (e.g., Dannefer, 2003), the stress process model (Pearlin, 1981; Pearlin, 1989), and the life course perspective (Elder, 1974; Elder et al., 2003). The theory maintains the saliency of childhood and considers the impact of early experiences on adult outcomes, but provides a more complex approach than cumulative disadvantage theory. Cumulative inequality theory focuses on the differential exposure to risk and variations in social system position that contributes to social disparities during childhood. These initial levels of inequality are structurally generated and maintained throughout the life course, indicating the importance of social and economic antecedents for exposure to adverse childhood experiences. Processes of disadvantage are initiated in childhood, with exposure to adverse experiences

launching trajectories of inequality that undermine health and attainment across the life course.

1.3 Data

This dissertation uses data from the Panel Study of Income Dynamics (PSID), the longest running longitudinal study of families and households (PSID Main Interview User Manual, 2017). Data collection began in 1968, with subsequent data collected annually until 1997, and biennially thereafter. Data spans almost 50 years and provides a nationally representative sample of the non-immigrant American population. The PSID includes detailed family level and individual level variables pertaining to important economic, social, and health factors. The intergenerational component of the PSID continues to follow adult children when they split off from their family unit and form new households of their own. This process has resulted in data for up to four generations of participants. The low attrition rates coupled with the high response rates to the main PSID survey with each consecutive wave has ensured that in general, weighted PSID maintains its representativeness.

The Childhood Retrospective Circumstances Study (CRCS) is a supplement to the main PSID data. Collected during 2014, eligible participants included in the CRCS were older than 19, completed the 2013 main PSID data survey, and identified as a household head or spouse/partner of a family unit during the main 2013 data collection (McGonagle & Freedman, 2015). For the first time in PSID data collection history, the CRCS utilized the Internet as the primary mode of data collection and issued 20-minute self-administered surveys to eligible study participants. Overall, the weighted response rate was 67%. The CRCS collected extensive data on retrospective childhood circumstances, spanning various different domains of childhood experience including, health conditions, socioeconomic status, neighborhood quality, school experiences, involvement with the criminal justice system, and family context. The PSID-CRCS is advantageous for studying the dynamic process of exposure to early adverse experiences, and provides a unique

opportunity for analyzing the influence of childhood conditions on adult health and attainment outcomes.

1.4 A Note on the Integrated Article Format

Although empirical chapters contained in this dissertation are unique, due to the nature of the integrated article format there is by necessity some repetition across chapters.

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Chapter 2

2 The Childhood Roots of Adult Psychological Distress: Interdisciplinary Perspectives Towards a Better Understanding of Exposure to Cumulative Childhood Adversity

2.1 Introduction

Researchers consistently conclude that the experience of early childhood adversity is associated with poor mental health, physical health, and socioeconomic outcomes during adulthood (e.g., Kessler, Gillis-Light, Magee, Kendler & Eaves, 1997; Green et al., 2010; Johnson & Schoeni, 2011; Björkenstam et al., 2015). Exposure to adverse childhood experiences is not uncommon, with the majority of children experiencing at least one adversity during childhood (Green et al., 2010; Friedman, Montez, Sheehan, Guenewald & Seeman, 2015). However, it is the experience of multiple adversities that produces a context of disadvantage and increases the risk of various negative outcomes in adulthood (Felitti et al., 1998; Chapman et al., 2004; Schilling, Aseltine & Gore, 2007; Nurius, Logan-Greene & Green, 2012). While the persisting impacts of cumulative childhood adversity have been well-documented, previous measures of cumulative adversity consider a limited number of childhood stressors, overlook potential differences across experiences of adversity, and vary in the conceptualization and measurement of cumulative adversity. These discrepancies in measures of cumulative childhood adversity have led to inconsistent conclusions regarding estimates of the overall impact of multiple adverse childhood experiences on an array of adult outcomes, such as mental health.

Recent studies have attempted to broaden the range of childhood risk variables included in measures of cumulative childhood adversity in an effort to capture the multitude of potentially threatening childhood experiences (Schilling,

Aseltine & Gore, 2008; Greeson, Briggs & Layne, 2014). However, while recent studies consider a larger and more inclusive list of adversities (Green et al., 2010), measures of cumulative childhood adversity have generally focused on acute adverse events and traumatic experiences within the familial domain while frequently overlooking the potential importance of chronic adverse childhood contexts that act as ongoing strains across various domains, and further provide an environment for additional childhood stressors to occur (Friedman et al., 2015).

Furthermore, studies often do not consider the heterogeneity in the exposure and experience of multiple adverse childhood circumstances. With few exceptions (Schilling et al., 2008; Schafer & Ferraro, 2013; Björkenstam et al., 2015), cumulative childhood adversity is typically measured in a checklist manner; a sum score of total adversities experienced. This measure assumes that each adverse experience has an equal impact and may underestimate or overestimate the influence of certain types of adversities, preventing an overall understanding of processes of disadvantage that accumulate during childhood and impact adult outcomes.

Utilizing data from the Panel Study of Income Dynamics' Childhood Retrospective Circumstances Study (PSID-CRCS), the goal of this study is to assess how the operationalization and modeling of exposure to cumulative childhood adversity impacts estimates of the association between cumulative childhood adversity and psychological distress in adulthood. A further contribution to the literature is the inclusion of childhood chronic contextual adversities and stressors across various childhood domains in measures of cumulative childhood adversity, broadening the range of childhood stressors typically included in conventional cumulative measures. Framed by principles from the stress process model and the life course perspective multiple non-additive measures of cumulative childhood

adversity that consider the heterogeneity in severity, type, and experience of childhood stressors will be used to predict adult psychological distress. Results across models will be compared to determine how variations in measurement of cumulative childhood adversity influence estimates of adult psychological distress, and the overall interpretation of findings.

A more comprehensive account of childhood adversity considers sources of childhood stress across various childhood domains of experience and results in a more complete measure of the total climate of childhood disadvantage. Analysis of the operationalization of cumulative childhood adversity is necessary in order to understand the heterogeneity in *severity*, *type*, and *experience* of childhood stressors and the implications that variation in the measurement of cumulative childhood adversity have on findings related to the long term effects on well-being in adulthood. A better understanding of how childhood adverse experiences and their operationalization influence estimates of adult psychological distress would provide further insight into the lasting imprint of early disadvantage, and reveal critical opportunities for early life intervention that can reduce disparities in mental health across the life course.

2.2 Childhood Adversity and Adult Outcomes

The deleterious and enduring social, economic and health impacts associated with exposure to early childhood adversity have long been established (Felitti et al., 1998; Chapman et al., 2004; Green et al., 2010; Johnson & Schoeni, 2011). Childhood is an influential period of the life course in which cognitive, physical and emotional development is occurring (Schafer et al., 2011; Monnat & Chandler, 2015). Experiences of adversity and stressors during this time can have a detrimental influence on a wide range of adult outcomes. Early studies of childhood adversity

focused on the deleterious impact of single childhood adverse experiences such as parental divorce (Amato, 2000), parental mental health (Avison & Gotlib, 1990), or childhood poverty (Sobolewski & Amato, 2005).

More recent literature demonstrates that adverse experiences do not occur in isolation. Rather, childhood adversities tend to cluster together while also increasing the risk of exposure to additional adverse childhood conditions (Seery, Holman & Cohen Silver, 2010; Friedman et al., 2015). For children exposed to adversities, the experience of a single adversity during childhood is generally an exception (Scott-Storey, 2011; Friedman et al., 2015; Nurius, Green, Logan-Greene & Borja, 2015). Therefore, focusing on the impact of a single adverse experience may result in an overestimation of the distinct contribution of a single measured adversity on the outcome of interest (Felitti et al., 1998; Nurius et al., 2012). Considering a cumulative measure of childhood adversity helps avoid wrongfully attributing the cumulative effects of childhood adversities to the experience of a single adversity (Green et al., 2010).

2.3 Cumulative Measures of Childhood Adversity

Studies utilizing cumulative measures of childhood adversity provide evidence for the importance of examining co-occurring experiences of childhood stressors (Scott-Storey, 2011; Nurius et al., 2015). The inclusion of multiple childhood adversities in a cumulative measure resulted in a stronger association with mental health outcomes; whereby, the number of childhood adversities experienced was highly correlated with increases in adult psychological distress (Anda, Butchart, Felitti & Brown, 2010; Scott-Storey, 2011).

However, discrepancies in the conceptualization and terms utilized to define cumulative childhood adversity across disciplines and researchers have persisted, contributing to the confusion and complexity of research on cumulative adversity and hindering the progression of the field (Scott-Storey, 2011; Schafer & Ferraro, 2013). Researchers use terms such as cumulative childhood adversity (Turner & Butler, 2003; Schilling et al., 2008), childhood adversity (Green et al., 2010; Ford, Clark & Stansfeld, 2011; Friedman et al., 2015), adverse childhood experiences (Felitti et al., 1998; Chapman et al., 2004; Schilling et al., 2007; Anda et al., 2010; Nurius et al., 2012; Monnat & Chandler, 2015; Nurius et al., 2015) and childhood misfortune (Schafer et al., 2011; Schafer & Ferraro, 2013) in an attempt to investigate the experience of exposure to multiple childhood stressors.

However, further analysis reveals that these terms appear to encompass the same phenomenon, whereby early experiences of childhood adversity tend to co-occur with other adverse experiences, and have a larger cumulative impact on adult outcomes than do single measures of adversity. Instead, these measures differ primarily in the number and type of childhood adversities included and may reflect disciplinary criterion or survey limitations that dictate the number and type of childhood stressful experiences considered from study to study (Friedman et al., 2015). Developing a consistent theoretically coherent and comprehensive measure of cumulative childhood adversity would contribute to the overall knowledge of childhood adverse experiences and improve the comparability of results across studies and disciplines.

2.4 Broadening the Range of Childhood Social Stress

The stress process model is the dominant theoretical framework utilized when considering disparities in various mental health outcomes (Pearlin, Menaghan,

Lieberman & Mullan, 1981; Pearlin, 1989; Turner & Lloyd, 1999). Initially proposed by Pearlin and colleagues (1981), the stress process model provides a conceptual framework that contextualizes how sources of stress impact disparities in mental health. Wheaton (1994) further expanded the model and outlined the importance of considering a stress universe, the complete spectrum of potentially harmful adult stressors. The main premise of the stress universe is the assertion that there are different types of stressors that occur across various domains of life that encompass the multiple dimensions of stress and impact mental health (Wheaton, 1994; Avison, 2010; Aneshensel, 2015). Studies on the experience of adulthood stressors find that the inclusion of various dimensions of stress reveals differences in exposure to risk, accounts for variations in mental health outcomes (Turner & Lloyd, 1995; Turner, Wheaton & Lloyd, 1995), and further reveals important racial and social class differences in psychological distress (Turner and Avison, 2013). Turner and Avison (2003) conclude that a more comprehensive measure of cumulative stressors in adulthood provides a more accurate estimate of overall stress exposure than a simple sum score of recent stressful life events. However, the full range of stressors experienced by children has not been explored in ongoing studies on cumulative childhood adversity.

Research on cumulative childhood adversity has mostly focused on the detrimental impact of childhood occurrences of acute stressful events or traumatic experiences (Friedman et al., 2015), while overlooking the chronic stressors of broader adverse childhood contexts (Anda et al., 2010). The majority of cumulative childhood adversity measures pay little attention to the unique contextual experiences of childhood stressors that can have an enduring impact on later life outcomes. Chronic stressors are stressors that emerge from constant and enduring disadvantageous environmental conditions in which children are situated (Kessler

et al., 1997; Avison, 2010). A considerable amount of research provides evidence for the association between single measures of chronic childhood stress and detrimental mental health outcomes in adulthood (Wheaton & Clarke, 2003; Bond et al., 2007; Hammen et al., 2009). Studies link adult psychological distress to the chronic environments of children, such as neighborhood circumstances (Wheaton & Clarke, 2003), childhood school experiences (Shochet, Dadds, Ham & Montague, 2006; Bond et al., 2007; Arseneault, Bowes & Shakoor, 2010), economic hardship (Sobolewski & Amato, 2005; Hsu & Wickrama, 2015), and ongoing exposure to parental mental health problems (Goosby, 2013). Despite these findings, chronic and ongoing childhood adversities, with a few exceptions, have been largely excluded from most measures of cumulative childhood adversity.

Cumulative measures of adversity that do include chronic stressors primarily focus on the impact of family dysfunction (Felitti et al., 1998; Nurius et al., 2015) and childhood poverty (Turner & Butler, 2003; Schilling et al., 2007). These studies consistently conclude that chronic stressors add to the overall cumulative experience of childhood adversity. However, solely considering family dysfunction or childhood poverty in cumulative measures is not a sufficient indicator of the full potential environmental strain experienced by children.

Childhood adversities occur in the context of much broader social and economic circumstances that can further increase the risk of exposure to additional adversity and contribute to detrimental mental health outcomes (Avison, 2010). Social stress includes an array of dimensions. Unobserved adversities may account for the differential impact of childhood adversities on adult disparities. Expanding the range of adversities included in studies is beneficial for future research in order to acquire a fuller understanding of the impact of cumulative childhood adversity on

variations in adult mental health outcomes (Anda et al., 2010). Researchers should consider the importance of constructing a stress universe for children, and include a wider range of childhood stressors when creating measures of cumulative childhood adversity (Avison, 2010).

2.5 Methodological Advances in the Study of Cumulative Childhood Adversity

Methodological advances in measures of cumulative childhood adversity suggest that there may be heterogeneity in the exposure and experience of various childhood adversities that cannot be captured using a typical sum score (Schilling et al., 2008; Green et al., 2010; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015). These findings suggest that differences across adversities may result in variations in the impact of cumulative adversity on adult psychological distress, and have refocused researcher's attention to the conceptualization and operationalization of cumulative childhood adversity (Schilling et al., 2008). In order to construct a more accurate and comprehensive measure of the experience of multiple childhood stressors, and assess the impact on adult mental health disparities, it is necessary to reconsider the measurement and operationalization of cumulative childhood adversity, and to move away from an over-reliance on additive measures of adversity to a more complex approach. Recent research has begun to consider non-additive measures of cumulative childhood adversity (Schilling et al., 2008; Green et al., 2010; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015). These studies each offer a unique approach for capturing the heterogeneity across adversities, suggesting different methods for grouping and conceptualizing the experience of various childhood adversities.

Although useful, differences in data and the inconsistency in the number and type of adversities considered from study to study hinder the comparison of measures of cumulative childhood adversity across studies. Variations in statistical models used to measure the heterogeneity in cumulative childhood adversity, and the lack of generalizability of study samples, limit the inferences that can be drawn from results. Furthermore, the interpretation of research estimates depends heavily on statistical models used and adversities included. For example, Schilling et al. (2008) utilized a regression-based weighting technique to roughly categorize childhood adversities by their severity, or impact factor, on mental health. Results indicated that the severity of adversities experienced, rather than the total number of adversities experienced, had more important implications for adult mental health outcomes.

Björkenstam et al. (2015) applied a person-centered approach, a class analysis, to determine response patterns among participants in their study. Individuals were grouped into homogenous classes based on similarities in exposure to childhood stressors accounting for the potential clustering, or co-occurrence, of adversities. Participants with a high probability of experiencing teenage parenthood, household public assistance, and single parent households reported the highest levels of self-reported depression. Green et al. (2010) relied on a variable centered approach, factor analysis, to group adversities based on intercorrelations among childhood stressors. Analyses determined that adversities grouped in the maladaptive family functioning factor were the strongest predictor of first onset of clinical mental health disorders.

Other studies have attempted to meaningfully group childhood adversities by type of stressor (Schafer & Ferraro, 2013; Friedman et al., 2015); however, again,

there are inconsistencies in the types of adversities considered, which further determine the identified groups of adversity type. Schafer and Ferraro (2013) found that adversity types pertaining to abuse had a more detrimental impact on initial levels of somatic and psychosocial symptoms than adversity types pertaining to family structure and financial strain. Friedman and colleagues (2015) found that adversity types pertaining to academic interruptions and sexual and physical abuse were the most consequential for cardio metabolic health. Taken together, results across studies reveal the variability in overall study conclusions and implications.

In order to compare results across various conceptual models, it is important for research that utilizes the same data to analyze different methodological approaches for measuring the cumulative impact of childhood stressors. Since each measure captures a different dimension of cumulative childhood adversity, it is important to discern whether estimates remain consistent across measures when utilizing the same representative data or whether some measures mask or amplify the impact of certain adversities over others. This approach would contribute to a better understanding of the overall impact of cumulative childhood adversity on adult psychological distress.

Despite varying approaches and inconsistent results, previous studies demonstrate the benefits of non-additive approaches for measuring cumulative childhood adversity as a predictor of adult outcomes, primarily psychological distress. A clear finding across several of these studies is that the experience of abuse and traumatic adversities had the most pervasive and enduring impact for disparities in health (Schilling et al., 2008; Green et al., 2010; Schafer & Ferraro, 2013; Friedman et al., 2015). Results further suggest that there is heterogeneity among stressors in childhood that must be considered, and that the association

between cumulative childhood adversity and adult outcomes is not equal across experiences of adversity. More specifically, certain adversities or experiences may be associated with higher levels of psychological distress. However, due to the inconsistency in adversities included from study to study, results cannot be adequately compared across measures of cumulative childhood adversity. It remains unclear how variations in measurement influence estimates of psychological distress and the overall interpretation of results.

The following research focuses on the measurement of cumulative childhood adversity, considering the heterogeneity of various adverse childhood experiences, and the manner in which different conceptualizations of cumulative childhood adversity impacts estimates of adult psychological distress and inferences that can be drawn from results. The PSID-CRCS includes a large number of items measuring childhood stressors, some of which have not been available in data used in previous research, which broadens the scope of childhood adversity indicators and result in a more comprehensive measure of cumulative childhood adversity. Cumulative measures of childhood adversity in the present study include contextual childhood adverse circumstances arising from domains such as the school and neighborhood environments. The analyses compare estimates of psychological distress across four different measures of cumulative childhood adversity, including the commonly used sum score of total adversity experienced. The other three cumulative measures of adversity focus on different dimensions of childhood stressors: severity, type, and experience. Grouping adversities by severity and by type each employs a variable centered approach whereby the cumulative impact of one group of adversities is net of the effects of other groups. The last approach is person-centered and categorizes individuals into latent classes based on similarities in experiences of adversity. Utilizing latent class analysis (LCA) allows for the identification of similar patterns

of exposure to co-occurring adversities in childhood. Results are compared across measures of cumulative childhood adversity to determine how differences in the conceptualization of cumulative childhood adversity impact estimates of adult psychological distress and the overall interpretation of results.

2.6 Methodology

2.6.1 The Data and Sample

The present study uses data from the Panel Study of Income Dynamics (PSID), a nationally representative sample of households in the United States (Panel Study of Income Dynamics, 2016). The first wave of data was collected in 1968 and was comprised of over 5,000 American families. These families were interviewed annually until 1997, after which, interviews were conducted biennially (PSID Main Interview User Manual, 2017). To date, the PSID contains detailed intergenerational information that spans over 48 years. The Childhood Retrospective Circumstances Study (CRCS) is a supplement of the PSID main data file. Collected in 2014, the CRCS consists of a representative subsample of 2013 PSID household heads and/or spouses/partners of household heads (McGonagle & Freedman, 2015). The supplement contains data from 8,072 individuals who were 19 years of age or older at the time of the 2013 PSID main interview data collection. Selected respondents were asked to retrospectively answer questions pertaining to circumstances and experiences occurring during their childhood, prior to the age of 17 (McGonagle & Freedman, 2015). The weighted response rate was 67%.

Data from the CRCS is linked to respondents' data from the main PSID interview, which includes a measure of psychological distress. Unlike the CRCS in which any adult family member may be a respondent, the format of the main PSID interview relies on one member of the family unit, usually the Head or the

Wife/"Wife," to report on the entire household. In other words, the respondent serves as a proxy, answering questions pertaining to other members of the family. Because it is problematic for anyone, other than the individual, to comment on his or her own mental health, the PSID only collected data on the mental health of the respondent. For the present analysis, the sample was limited to participants who were the respondent during the main PSID interview (N=5451).

The sample was further limited to respondents who were 25 years or older to allow sufficient time for students to graduate from a four-year university (N=5142). Lastly, the sample was limited to respondents without missing data on covariates (sex, race, age, education, and parental education) and on measures of adversity included in the present study. Approximately 1 percent of participants were missing on sex, race, age, or education variables (N=5095). Approximately 17 percent of the sample was excluded due to missing data on indicators of childhood adversity. See Appendix A: Table A1 for the distribution of missing on adversity indicators.

A missing data analysis was further conducted to determine whether missing data were correlated with any of the covariates used in the present study. Diagnostics revealed that the majority of excluded participants were missing on a single adversity. Non-whites were approximately two times more likely to be missing. Older participants were more likely to be missing, as were participants with lower levels of education. The final data sample contains a total of 4,219 participants.

Data from the PSID and the supplement CRCS provide a unique opportunity to link retrospective experiences of cumulative childhood adversity to adult mental health outcomes. Although retrospective data on childhood adversity may be

influenced by recall failure, resulting in upwardly biased results, studies have found that retrospective recounts of childhood adverse circumstances remain a valid and reliable measure of early life exposure (Hardt & Rutter, 2004; Surtees & Wainwright, 2007). Furthermore, the CRCS is specific to childhood experiences, while adulthood psychological distress was measured a year prior during the PSID main interview. Staggering the collection of childhood retrospective data and adult data may further improve the accuracy of retrospective childhood circumstances reports.

2.7 Measures

2.7.1 Independent Variable

Adverse Childhood Experiences (ACEs): Respondents were asked to retrospectively consider the experience of an array of childhood adversities that ever occurred during their lives before the age of 17. Adversities included in the present study were chosen based on previous literature (e.g., Turner & Lloyd, 1995; Schafer & Ferraro, 2013); however, the PSID-CRCS also includes additional indicators that have not been considered in prior studies.

The following childhood adversities were dichotomized to indicate whether respondents did (coded=1) or did not (coded=0) experience each adversity before the age of 17: (1) *parental divorce*; (2) *poor childhood health*; (3) *missed a month of school or more due to health*; (4) *perceived poor financial comparison to average family*; (5) *repeated a grade*; (6) *victim of a crime*; (7) *arrested or taken into custody by police*; (8) *convicted of a crime*; (9) *sentenced to probation*; (10) *paternal unemployment*; (11) *maternal unemployment*; (12) *financial struggle*; (13) *received welfare for 3 or more months*; (14) *lonely for friends*; (15) *bullied in school*; (16) *bullied outside of school*; (17) *unhappy at school*; and (18) *felt unsafe at school*.

(19) *Poor childhood mental health* was measured by asking respondents whether they had drug or alcohol problems, depression, anxiety, panic attacks, attention deficit disorder, or any other emotional or psychological problems before the age of 17. The experience of any indicator of poor childhood mental health indicated the respondent had experienced the adversity (coded=1)

(20) *Poor parental mental health* was assessed utilizing questions about each parent. Consistent with data collection from the National Comorbidity Study, questions considered some of the most prevalent adult mental health conditions (McGonagle & Freedman, 2015). Respondents were asked if their mother or father ever had trouble keeping a job, often got into physical fights, ever had anxiety attacks, ever had periods of depression, or ever had a problem with substance abuse. Experience of this adversity (coded=1) was determined by reports of a parent with any indicator of poor mental health.

In order to assess the frequency of conflict experienced by the respondent, particularly parental abuse, sibling abuse, and family disorder (conflict between parents), the CRCS utilized questions modeled by the well-established Conflict Tactics Scale (McGonagle & Freedman, 2015). Although these questions measure a level of frequency, consistent with previous literature, any instance of abuse indicated that the respondent had experienced that particular adversity (coded=1) (Schafer & Ferraro, 2013). (21) *Parental abuse* was comprised of questions based on the frequency that a parent pushed grabbed or shoved, threw things, slapped or hit, or physically harmed the respondent in any way before they were the age of 17. (22) *Sibling abuse* was measured utilizing questions about how often respondent's siblings pushed grabbed or shoved, threw things, slapped or hit, or physically harmed the respondent during their childhood. (23) *Family disorder* assessed the

relationship between the respondent's parents. The respondent was asked how often their parents pushed grabbed or shoved, threw things, slapped or hit, or physically harmed each other before the respondent was 17.

Two scales captured the unique and important ambient experience of childhood neighborhood conditions. Consistent with previous literature, the experience of neighborhood circumstances were grouped into two categories that together gave an overall impression of the neighborhood in which the child spent most of their time (Ross & Mirowsky, 2001; Root & Humphrey, 2014).

(24) *Neighborhood disorder* consisted of the physical attributes of the neighborhood. Was the neighborhood safe at night, was the neighborhood safe during the day, was the neighborhood safe for kids, was the neighborhood clean and attractive, and did neighbors take care of homes and property. (25) *Neighborhood cohesion*, on the other hand, captured the experience of networks and relationships among neighbors, which can be linked to accountability and trustworthiness. Two questions captured neighborhood cohesion: did neighbors help each other, and were neighbors close knit. Responses were recorded on a four point Likert scale where 1=very true and 4=not true at all. These variables were further dichotomized 1=not very true/not true at all (perceptions of more disorder/less cohesion) and 0=very true/somewhat true (perceptions of less disorder/more cohesion).

Lastly, a multicollinearity test was conducted to ensure childhood adversities included in present measures of cumulative childhood adversity were not highly correlated. Results from the variable inflation factors (VIF) analysis revealed a final mean close to the value of 1, indicating no strong correlation among childhood adversity variables included in the study.

2.7.2 Dependent Variable

Psychological Distress: The focal outcome of the current study was a measure of psychological distress based on the K6 Nonspecific Psychological Distress Scale (Kessler, Andrews, Colpe & Hiripi, 2002; Kessler, Baker & Colpe, 2003). The scale measured the experience of symptoms of psychological distress over the past 30 days. Previous studies assert the accuracy, reliability and validity of the K6 scale for predicting serious mental health. Although only a six-item scale, researchers find that the K6 produces a more accurate measure of psychological distress than other scales that contain more items and are more time consuming and burdensome for respondents (Cairney et al., 2007).

Respondents were asked how often they felt: (1) so sad nothing could cheer you up; (2) nervous; (3) restless or fidgety; (4) hopeless; (5) that everything was an effort; and (6) worthless. Responses to K6 psychological distress indicators were recoded so that higher values indicated higher levels of distress with a baseline of 0 for no distress. Responses ranged from 0=none of the time to 4=all of the time. Individual responses were then summed, producing a scale ranging from 0-24. Previous literature considers individuals with scores greater than 13 to have serious psychological distress that reaches the threshold for clinical diagnosis. However, dichotomizing psychological distress into a binary variable does not capture the overall distribution of distress, or differences in the level of distress experienced across respondents. Epidemiological studies suggest that only participants with the most extreme and persistent distress would reach clinical levels. However, the stress process maintains that the experience of stress is not unusual, but rather, an ordinary part of life. Therefore, in accordance with the stress process model, psychological distress was measured as a continuous variable.

2.7.3 Control Variables

Other Covariates: The following demographic characteristics were included as covariates. Sex was measured as a dichotomous variable (male=0, female=1). Race was dichotomized into two categories (white=0, non-white=1). Respondents were categorized based on the race with which he or she most strongly identified. Age was a continuous variable. Respondent's education was measured as less than high school degree, high school degree but less than college degree, and college degree or higher. Lastly, parent's education was measured similar to respondents', but also included a "don't know" category.

2.8 Overview of Statistical Analysis

To determine whether a more comprehensive measure that considers the contextual circumstances and heterogeneity across adversities provides a more adequate measure of the impact of cumulative childhood adversity on mental health outcomes, a basis of comparison was necessary. First, consistent with previous studies, cumulative childhood adversity was measured utilizing a sum score of total adversities experienced, a summation index whereby each adversity is equally weighted, and each additional adversity is assumed to exert an equal impact on the outcome of interest.

However, the association of cumulative childhood adversity on psychological distress may not be uniform across adverse experiences. The other three techniques for measuring cumulative childhood adversity considered distinct aspects of adverse experiences to determine whether certain differences across adversities were more critical for psychological distress and how the operationalization of cumulative childhood adversity influences the interpretation of results. Following Schilling et al. (2008), the second approach focused on the severity, or impact factor, of each adversity. The impact factor provides an estimate of the relative impact of

each adversity on the outcome of interest. In other words, the impact factor of each adversity is a mean measure of the specific impact on mental health relative to other adversities. Using Ordinary Least Square regressions, psychological distress was regressed on each adversity, controlling for gender, race, age, education, and parental education. Regression coefficients were standardized and ranged from 0.06-0.26. Adversities were grouped into 3 categories based on the magnitude of the standardized coefficients, a measure of severity: low=0.06-0.08, medium=0.09-0.11, high=0.12+. Adversities within each category were summed creating three variables that measure the cumulative experience of adversities at each level of severity.

The third approach built on previous life event research in the sociology of stress and mental health literature that emphasizes the importance of considering the stress universe, whereby different stressors can be distinguished by type (Turner & Lloyd, 1995; Turner & Avison, 2003; Friedman et al., 2015). Adversities were grouped into six meaningful and distinct categories depending on the nature of adversity experienced. The categories considered were: the family context, school circumstances, neighborhood environment, economic hardship, health status, and involvement in crime. Variables within each category were summed to produce cumulative measures of the experience of childhood stressors within each category. Categories were not mutually exclusive; respondents who experienced adversities across multiple categories were represented in each category. Appendix A: Table A2 shows the distribution of adversities across type, and the number of respondents that experienced at least one adversity within each type.

The last approach used LCA, which is a finite-mixture model that identifies groups of individuals who share similar patterns of responses on observed variables, in this case experiences of adverse childhood circumstances, and sorts

respondents into mutually-exclusive and exhaustive groups based on identified patterns (Collins & Lanza, 2010). The experience of childhood adversity does not occur in a vacuum; rather, childhood stressors tend to co-occur, or cluster together. Using LCA allowed for the identification of classes of individuals who shared similar latent experiences of exposure to adverse childhood circumstances, and further identified adversities that had a high probability of co-occurring among participants in identified classes. The LCA Stata plugin was used to estimate LCA models (Lanza et al., 2011).

A series of models were estimated fitting 2-10 classes. Model diagnostics determined the appropriate number of classes for the data (Collins & Lanza, 2010). The Schwarz Bayesian information criterion (BIC; Schwarz, 1978) and the Akaike information criterion (AIC; Akaike, 1987) were compared across model estimates and were relied upon to choose the most suitable number of classes. Smaller values of both AIC and BIC indicate a better model fit. With each increase in latent classes estimated, the BIC and AIC consistently declined before increasing with the estimation of 9 classes, indicating that 8 latent classes was the best fit for the data. Classes were mutually exclusive so that respondents only belonged to one class. All analyses were conducted using Stata 15 (StataCorp, 2017).

2.9 Results

Table 2.1 presents the weighted distribution of all variables. Less than 10 percent of the sample reported experiencing no childhood adversities. This is consistent with recent literature that finds that the majority of people will experience at least one adversity during their childhood (Chapman et al., 2004; Surtees & Wainwright, 2007; Friedman et al., 2015). Approximately 40 percent of the sample stated that they experienced five or more adversities during their childhood. Although this

percentage is higher than findings from previous literature, it is not surprising given the more inclusive list of adverse childhood experiences included in the present study.

The majority of respondents in the sample were white and a larger proportion of the sample was female. Financial struggle was the most commonly experienced childhood hardship with just under half of the sample stating that their families struggled financially at some point during their childhood. Parental mental health problems during childhood were also a common adversity, with approximately 36 percent of the sample having a mother or a father who struggled with a mental health issue. Childhood mental health problems were not a prominent occurrence in the sample. Approximately 21 percent of the sample reported struggles with mental health prior to the age of 17. Research concludes that mental health problems are most likely to develop during early adolescence and carry on into adulthood, indicating that early experiences of mental health problems are a strong predictor of adult mental health status (for a review, see Wickrama, Conger, Lorenz & Jung, 2008). Involvement in the criminal justice system was not very common; however, it is important to note that approximately 13 percent of the sample was arrested before the age of 26, but only about a third of those participants (approximately five percent of the total sample) were convicted of a crime during the same time period.

Table 1: Weighted Sociodemographic Characteristics of Participants and the Distribution of Adversities (N=4,219)

	n	%
Sex		
Male (0)	1,753	41.55
Female (1)	2,466	58.45
Race		
White (0)	3,634	86.13
Other (1)	585	14.87
Age (mean)		
25-97	4,219	50.19
Education		
Less than High School	274	6.50
High School	1,995	47.30
College Degree or Higher	1,949	46.21
Parental Education		
Less than High School	543	12.88
High School	2127	50.42
College Degree or Higher	1,256	29.76
Missing	293	6.94
Childhood Adversity Indicators		
Parental Divorce	439	10.41
Poor Childhood Health	197	4.67
Missed Month+ of School for Health Reason	394	9.35
Poor Childhood Mental Health	888	21.05
Dad Unemployment	785	18.61
Mom Unemployment	960	22.75
Financial Struggle	1,957	46.40
Welfare 3+ Months	567	13.44
Poor Financial Comparison to Average Family	839	19.89
Neighborhood Disorder	468	11.10
Poor Neighborhood Cohesion	712	16.89
Repeated a Grade	399	9.45
Lonely for Friends	1,380	32.70
Bullied at School	1,281	30.37
Bullied Outside of School	692	16.40
Unhappy at School	598	14.16
School Unsafe	467	11.07
Crime Victim before Age 17	367	8.70
Arrested before Age 26	554	13.12
Convicted before Age 26	208	4.93
Probation before Age 26	200	4.73
Parental Mental Health Problems	1,524	36.12
Parental Abuse	991	23.49
Family Disorder	356	8.43
Sibling Abuse	1,412	33.47

Cumulative Number of Adversities		
0	407	9.65
1	589	13.95
2	554	13.12
3	509	12.07
4	440	10.42
5 +	1720	40.78
Mean Number of Adversities		
Number of adversities ^a (mean)	4219	4.42
Number of adversities ^b (mean)	3841	4.89
Psychological Distress		
0	1,396	33.09
1	449	10.65
2	717	16.99
3	279	6.60
4	423	10.03
5	137	3.25
6	229	5.42
7	130	3.08
8	103	2.44
9	60	1.42
10	79	1.87
11	44	1.04
12	37	0.88
13	36	0.86
14	22	0.53
15+	77	1.82

^aMean number of adversities for total sample (N=4219)
^bMean number of adversities for sample experiencing 1 adversity or more (N=3841)

Table 2.2 displays standardized coefficients from regression analyses of psychological distress on each adversity. Model 1 presents the bivariate association, while model 2 controls for demographic characteristics race, sex and age, as well as respondent and parental education. Associations with psychological distress are significant (at $p < 0.001$) for all adversities, and remain significant after the controls are introduced. Standardized coefficients are all positive ranging from 0.06 – 0.26, signifying that all of the childhood adversities are associated with increased psychological distress in adulthood. However, there is variability in the impact of each childhood stressor on the outcome.

As described above, standardized coefficients were used to group adversities into three categories based on their relative impact (Low, Medium, High) on psychological distress. The final column of Table 2.2 includes the estimated relative impact of each adversity on psychological distress. Adversities characterized as childhood traumas in previous literature, such as parental abuse and childhood mental health, have a high impact factor. So do adversities pertaining to the school environment, such as experiences of bullying and perceptions of unsafe schools. Low impact adversities include parental divorce and paternal or maternal unemployment. Financial struggle and neighborhood disadvantage adversities are characterized as medium impact adversities. Adversities within each impact category were added to create three cumulative adversity variables – low, medium, and high – that capture the additive impact of adversities within each severity category.

Table 2: Standardized Individual Effects of Childhood Adversity on Psychological Distress Controlling for Demographics (N=4,219)

Adversity	Model 1 Psychological Distress		Model 2 Psychological Distress + Controls		Relative Impact Factor
	b.	S.E.	b.	S.E.	
Parental Divorce	.071***	.172	.056***	.170	Low
Poor Childhood Health	.118***	.282	.110***	.278	Medium
Missed Month+ of School for Health Reason	.082***	.208	.077***	.204	Low
Poor Childhood Mental Health	.259***	.139	.262***	.138	High
Dad Unemployment	.069***	.145	.063***	.143	Low
Mom Unemployment	.089***	.129	.071***	.128	Low
Financial Struggle	.114***	.113	.099***	.112	Medium
Welfare 3+ Months	.139***	.140	.105***	.147	Medium
Poor Financial Comparison to Average Family	.079***	.141	.069***	.140	Low
Neighborhood Disorder	.124***	.157	.104***	.159	Medium
Poor Neighborhood Cohesion	.103***	.146	.099***	.144	Medium
Repeated a Grade	.118***	.179	.084***	.183	Low
Lonely for Friends	.181***	.122	.189***	.121	High
Bullied at School	.157***	.123	.159***	.121	High
Bullied Outside of School	.154***	.152	.152***	.149	High
Unhappy at School	.172***	.158	.151***	.157	High
School Unsafe	.154***	.171	.140***	.169	High
Crime Victim before Age 17	.097***	.198	.102***	.194	Medium
Arrested before Age 26	.082***	.159	.078***	.162	Low
Convicted before Age 26	.082***	.240	.074***	.239	Low
Probation before Age 26	.072***	.240	.064***	.239	Low
Parental Mental Health Problems	.165***	.117	.157***	.115	High
Parental Abuse	.129***	.131	.118***	.129	High
Family Disorder	.106***	.191	.088***	.189	Medium
Sibling Abuse	.118***	.119	.115***	.117	High

*p<.05; **p<.01; ***p<.001

Model 1: crude

Model 2: adjusted for race, sex, age, education, and parental education

Table 2.3 displays the standardized coefficients of the effect of three distinct measures of cumulative childhood adversity on adult psychological distress: the sum score measure, the measure based on relative impact, and the measure determined by type of adversity. Model 1 illustrates the bivariate association, while results presented in Model 2 are adjusted for sex, race, age, education, and parental education of the respondent. The first measure of cumulative childhood adversity considered (Measure 1, Table 2.3) is the typical sum score approach in which all adversities are summed. Results indicate an increase in psychological distress ($\beta =$

.310) with the experience of each additional adversity. After controlling for demographic and educational attainment variables, the effect of this measure of cumulative childhood adversity on psychological distress slightly weakens ($\beta = .273$), but remains statistically significant (at $p < 0.001$).

The second measure of cumulative childhood adversity examines potential differences in the effect of childhood adversities of varying severity. Results (Measure 2, Table 2.3) indicate that the effect on psychological distress differs across cumulative impact categories of childhood stressors. As the categories increase in severity, the standardized coefficients also increase indicating a rise in psychological distress. For example, in Model 1, with each additional low impact adversity experienced, psychological distress increases by .05, and each additional high impact adversity experienced leads to an increase in psychological distress by .26. Although the crude effects of all three impact categories are associated with a statistically significant increase in adult psychological distress, after the controls are included, only the high impact category remains statistically significant.

The third measure of cumulative childhood adversity groups stressors into categories based on the type of stressor experienced (Measure 3, Table 2.3). Six meaningful categories of adversity are considered in an attempt to capture the impact of different types of stressful childhood experiences: family context, school circumstances, neighborhood environment, economic hardship, health status, and involvement in crime. After controlling for race, gender, age, education, and parental education, three out of the six categories, family context, school circumstances, and health status, are associated with statistically significant (at $p < 0.001$) increases in psychological distress. Childhood adversities relating to health status have the largest effect on psychological distress ($\beta = .161$). Notably, effect sizes of stressors

associated with school circumstances are also large ($\beta = .153$) indicating the importance of the school environment for the occurrence of childhood adversities. Family context adversities have a smaller standardized effect on psychological distress than health and school environments ($\beta = .082$). Adverse experiences pertaining to the neighborhood environment, economic hardship, or involvement in crime do not reach statistical significance.

Table 3: Ordinary Least Squares Regressions of Measures of Cumulative Childhood Adversity and Psychological Distress (N=4,219)

	Model 1 β (SE)	Model 2 β (SE)
Measure 1: Cumulative Childhood Adversity Sum Score		
CCA Sum Score	.310*** (.015)	.273*** (.015)
Measure 2: Cumulative Childhood Adversity by Severity		
CCA Low Impact Adversities	.050* (.046)	.024 (.046)
CCA Medium Impact Adversities	.075*** (.050)	.042 (.051)
CCA High Impact Adversities	.259*** (.031)	.261*** (.031)
Measure 3: Cumulative Childhood Adversity by Type		
CCA Family Context	.089*** (.051)	.082*** (.051)
CCA School Circumstances	.163*** (.044)	.153*** (.044)
CCA Neighborhood Environment	.041 (.091)	.024 (.091)
CCA Economic Hardship	.031 (.044)	.002 (.044)
CCA Health Status	.156*** (.99)	.161*** (.098)
CCA Involvement in Crime	.038 (.070)	.027 (.071)

*p<.05; **p<.01; ***p<.001
 Model 1: crude
 Model 2: adjusted for sex, race, age, respondent education and parental education

The fourth measure of cumulative childhood adversity utilizes LCA to group respondents into eight classes based on similar patterns of adverse experiences, indicating that certain adversities tend to cluster or co-occur. Model fit statistics are presented in Table 2.4. Item-response probabilities, the probability of experiencing each adversity conditional on class membership, were used to interpret latent classes. Table 2.5 shows the weighted distribution of participants across latent classes. Conditional probabilities over 60 percent indicate that an adversity had a

high probability of occurring; conditional probabilities between 50 and 60 percent indicate that an adversity had an elevated risk of occurring.

Table 4: Model Fit Statistics for Latent Class Analysis

Model	Degrees of freedom	G ²	AIC	BIC	Adjusted BIC
1	33554406	34348.701	34398.701	34557.385	34477.946
2	33554380	28141.513	28243.513	28567.228	28405.171
3	33554354	27082.498	27236.498	27725.244	27480.570
4	33554328	25456.020	25662.020	26315.797	25988.507
5	33554302	24659.646	24917.646	25736.455	25865.455
6	33554276	24175.021	24485.021	25468.021	24976.336
7	33554250	23861.125	24223.125	25371.996	24796.854
8	33554224	23567.765	23981.765	25295.667	24637.908
9	33554198	23451.267	23917.267	25396.200	24655.824
10	33554172	23231.716	23749.716	25393.681	24570.687

The No to Low Adversity class (reference, Class 1), approximately 40 percent of the sample, was composed of individuals with a low probability of experiencing any adversity during their childhood. The Involvement in Criminal Activity class (Class 2) included participants with a high probability of having been arrested, convicted of a crime, or on probation during childhood. Individuals in Class 3, Bullied and Alone, had a high probability of experiencing bullying and feelings of loneliness during childhood. Class 4, Economic Hardship, Poor Parental Mental Health, and an elevated risk of Neighborhood Disadvantage, participants were characterized by the experience of hardship associated with financial strain, parental mental health problems, and an elevated risk of neighborhood disorder and lack of cohesion. Respondents in Class 5, Adversities across Different Domains, endured a multitude of adversities across different domains. Adversities included experiences with mental health struggles, financial hardship, criminal activity, parental mental health problems, and experiences of parental abuse. While this class

was composed of a small percentage of the total sample, approximately three percent, the high probability of experiencing a multitude of different adversities suggests that this class contained some of the most disadvantaged respondents.

Individuals in Class 6, Financial Struggle, Negative School Environment, and elevated risk of Familial Abuse and Poor Childhood Mental Health, had a high probability of having experienced economic hardship, bullying, and feelings of loneliness, as well as an elevated risk of exposure to parental and sibling abuse, and poor childhood mental health. Participants in Class 7, Financial Struggle, primarily experienced economic hardship during childhood. Class 8, Poor Parental Mental Health, represented respondents with a high probability of having an unpredictable parent, or parents, with poor mental health.

Table 5: Weighted Probability of Experiencing Adversities by Class (N=4219)

LCA Classes of Cumulative Childhood Adversity	Adversities with a Conditional Probability over 60% and Elevated Risk over 50%	n	%
Class 1: "No to Low Adversity"	(Reference)	1,675	39.71
Class 2: "Involvement in Criminal Activity"	Arrested, Convicted, Probation	194	4.60
Class 3: "Bullied and Alone"	Bullied school, elevated risk of bullied outside school and childhood loneliness	486	11.52
Class 4: "Economic Hardship, Poor Parental Mental Health, and Elevated risk of Neighborhood Disadvantage"	Mom unemployed, Financial struggle, Childhood welfare, Financial comparison, Parental mental health, elevated risk of experiencing neighborhood disorder and neighborhood cohesion	315	7.46
Class 5: "Adversities across Different Domains"	Child mental health, Financial struggle, Childhood welfare, Bullied in school, Arrested, Convicted, Probation, Parental mental health, Parental abuse, Sibling abuse, elevated risk of experiencing Financial comparison, Bullied outside of school, and Childhood loneliness	111	2.63
Class 6: "Financial Struggle, Negative School Environment and Elevated risk of Familial Abuse and Poor Childhood Mental Health"	Financial struggle, Bullied in school, bullied outside school, childhood loneliness, elevated risk of Child mental health, Mom unemployment, Financial Comparison, School safety, Parental abuse, and Sibling abuse	329	7.80
Class 7: "Financial Struggle"	Financial Struggle	674	15.97
Class 8: "Poor Parental Mental Health"	Parental mental health	435	10.32

Table 2.6 displays the standardized coefficients of the effect of latent classes of cumulative childhood adversity on adult psychological distress. All classes, when

compared to the reference class of No to Low Adversity, are associated with statistically significant (at $p < 0.001$) increases in psychological distress. All classes, except for Class 7, Financial Struggle, remained highly significant (at $p < 0.001$) after adjusting for covariates. Class 7 was still significant (at $p < 0.05$) but had the weakest impact on psychological distress. Membership in Class 6, Financial Struggle, Negative School Environment and elevated risk of Familial Abuse and Poor Childhood Mental Health, was the strongest predictor of psychological distress ($\beta = .218$). Class 5, Adversities across Different Domains, had the second strongest impact on psychological distress ($\beta = .181$).

Table 6: Ordinary Least Squares Regressions of Latent Classes of Cumulative Childhood Adversity and Psychological Distress (N=4,219)

LCA Classes of Cumulative Childhood Adversity (ref. Class 1: "No to Low Adversity")	Model 1 β (SE)	Model 2 β (SE)
Class 1: "No to Low Adversity"	1 (REF)	1 (REF)
Class 2: "Involvement in Criminal Activity"	.077*** (.246)	.059*** (.248)
Class 3: "Bullied and Alone"	.117*** (.192)	.116*** (.189)
Class 4: "Economic Hardship, Poor Parental Mental Health, and Elevated risk of Neighborhood Disadvantage"	.150*** (.198)	.117*** (.197)
Class 5: "Adversities across Different Domains"	.181*** (.322)	.153*** (.323)
Class 6: "Financial Struggle, Negative School Environment and Elevated risk of Familial Abuse and Poor Childhood Mental Health"	.218*** (.218)	.196*** (.215)
Class 7: "Financial Struggle"	.060*** (.161)	.047* (.159)
Class 8: "Poor Parental Mental Health"	.127*** (.200)	.121*** (.192)

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

Model 1: crude

Model 2: adjusted for sex, race, age, respondent education and parental education

2.10 Summary and Comparison of Results Across Measures of Cumulative Childhood Adversity

Results across measures (Tables 2.3 and 2.6) indicated the statistically significant impact of measures of cumulative childhood adversity on adult psychological distress. Overall, the results indicated that the sum score of cumulative childhood adversity (Measure 1, Table 2.3) overestimated the impact of adversity compared to results from alternative approaches (Measure 2 and 3, Table 2.3; Table 2.6). Higher associations with psychological distress may be a function of the heterogeneity of adversities not accounted for in the typical sum score. The alternative approaches for conceptualizing cumulative childhood adversity focused on distinct aspects of adversities, the heterogeneity in the severity, type, and experience of adversity, to determine how variations in measurement impacted estimates of the association with psychological distress.

Grouping childhood adversities into cumulative measures based on their severity, or impact factor, revealed that differences in the level of severity contribute to variations in adult psychological distress (Measure 2, Table 2.3). After adding controls, the effects of low and medium impact adversities were no longer significant; only the association of high impact adversities remained statistically significant. Results indicated the detrimental impact of adversities identified as high severity. The increase in the standardized coefficient (from .259 to .261) following the inclusion of controls further suggested that the impact of more severe adversities on psychological distress persisted net of differences by race, gender, age, education, and parental education.

Results from Measure 3, Table 2.3, a cumulative measure of adversity based on type, revealed that certain types of adversities had a more consequential impact

on adult psychological distress. Experiences of cumulative childhood adversity belonging to the family context, school circumstances, or health status categories were associated with a statistically significant increase in adult psychological distress. Adverse experiences pertaining to the neighborhood environment, economic hardship, or crime categories were not associated with statistically significant increases in psychological distress. However, results using the LCA approach (Table 2.6) reported that the co-occurrence, or clustering, of adversities across various types had statistically significant impacts on adult psychological distress.

For example, Class 2, Involvement in Criminal Activity, was associated with psychological distress when grouped by similar latent patterns of exposure rather than type (Table 2.6 vs. Measure 3, Table 2.3). Each additional experience of an adversity related to crime was not associated with increases in psychological distress; however, the co-occurrence of adversities related to involvement in criminal activity (Class 2) was associated with a statistically significant increase in psychological distress ($\beta = .077$).

Cumulative measures of neighborhood environment and economic hardship were not statistically significant when measured by type (Measure 3, Table 2.3); however, the co-occurrence of adversities using the LCA approach (Table 2.6) revealed that the probability of experiencing Economic Hardship, Poor Parental Mental Health, and an Elevated risk of Neighborhood disadvantage (Class 4), was associated with statistically significant increases in psychological distress compared to the reference category ($\beta = .150$). Furthermore, after adding covariates, there was a large decrease in the coefficient, suggesting that differences in race, sex, age, education, and parental education accounted for a large proportion of this

association. The probability of experiencing Financial Struggle (Class 7) was also associated with increases in psychological distress ($\beta = .127$).

Lastly, a cumulative measure of type of adversities occurring in the family context (Measure 3, Table 2.3) had a strong association with psychological distress ($\beta = .089$); however, results using the LCA approach (Table 2.6) suggested that it may be the experience of poor parental mental health included in the family context adversity type that may be the most impactful for outcomes of adult psychological distress. Respondents with a high probability of experiencing Poor Parental Mental Health (Class 8) had a strong association with psychological distress ($\beta = .127$). The measure of types of adversities occurring in the family context potentially underestimated the impact of parental mental health problems, while overestimating the impact of other adversities within the same category. Overall, while cumulative measures of adversities categorized by severity and type capture unique dimensions of adverse experiences, measures focused on the accumulation of adversities specific to one aspect within each dimension, either level of severity or type. Therefore, respondents who experienced multiple adversities across severity and type were included in multiple categories. These approaches overlooked the interplay among various adversities across different dimensions of severity and type, and may not provide an accurate account of the cumulative impact of childhood adversity.

2.11 Discussion

The association between early childhood stressors and detrimental later life outcomes has long been established across various disciplines (Kessler et al., 1997; Felitti et al., 1998; Green et al., 2010; Johnson & Schoeni, 2011). Empirical studies further assert that multiple co-occurring childhood adversities have a stronger and

more enduring impact than measures of single adversities on adult mental health (Dong, Anda, Dube, Giles & Felitti, 2003; Björkenstam et al., 2015). However, the majority of studies conceptualize cumulative childhood adversity as a sum score of total childhood stressors experienced, assuming a uniform impact across adversities and overlooking the heterogeneity in type, severity, and experience of adversities. A handful of studies have proposed innovative methods for measuring cumulative childhood adversity (Schilling et al., 2008; Green et al., 2010; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015); however, inconsistencies in the type and number of adversities included and the diversity of data used does not allow for comparison across studies. Previous researchers have paid relatively little attention to how differences in the operationalization of cumulative childhood adversity can lead to differential estimates of the impact on mental health outcomes. In addition, previous studies overlook the importance of childhood chronic and contextual adversities in cumulative measures of childhood stressors, such as perceptions of neighborhood disorder or school safety, and instead focus primarily on the impact of acute and traumatic adversities.

To address these limitations, the present study utilized data from the PSID-CRCS to construct multiple measures of cumulative childhood adversity that considered the heterogeneity among childhood stressors. These measures were compared to the typical sum score to discern whether a single measure could adequately capture the unique experience of cumulative childhood adversity. Differences in the estimated effects on adult psychological distress across measures and models were also considered, focusing on how different measures yield variations in estimates that impact the interpretation of results. In addition, this study included a broader range of adversities, addressing an important limitation in previous literature by providing a more comprehensive measure of cumulative

childhood adversity and advancing the understanding of the overall impact of early life stressors.

Taken together, results indicated that all measures of cumulative childhood adversity were associated with increases in adult psychological distress; however, variations in the measurement of cumulative childhood adversity resulted in differential estimates of the impact on adult psychological distress. Four key findings contribute to the understanding of cumulative childhood adversity and outcomes of mental health. First, there is heterogeneity among childhood stressors that contribute to disparities in psychological distress. While the accumulation of childhood adversities was an important predictor of psychological distress, cumulative childhood adversity is a complex process, which cannot be adequately captured using a simple sum score. A sum score of adversities had the largest effect across measures, suggesting that a simple additive measure overestimates the overall impact of cumulative childhood adversity. This measure estimated the impact of each additional adversity on psychological distress; however, it did not provide detail on the differences across adverse experiences and the underlying process of accumulation.

After grouping childhood stressors into more homogenous categories based on severity, type, or experience, it was clear that the impact of adversities on estimates of adult psychological distress was not uniform across adversities. In other words, grouping adversities into meaningful categories that accounted for the heterogeneity among adversities resulted in differing effects on estimates of psychological distress. Cumulative measures of adversity categorized by severity or type both provided additional insight into processes of accumulation not only across groups of adversity but also within categories of adversity. Furthermore, using LCA

to group participants into classes based on similar experiences of adversity considered the heterogeneity in the co-occurrence of adversities, furthering the understanding of underlying patterns of experiences of cumulative childhood adversity and the differential impact of co-occurring adversities on psychological distress.

Secondly, it is clear from the results that estimates of the impact of childhood stressors on psychological distress depend on the measure and conceptualization of cumulative childhood adversity. The three alternative measures of cumulative childhood adversity provided additional information on the heterogeneity and complexity of cumulative childhood adversity. Estimates of the magnitude of association with psychological distress differed across measures of cumulative childhood adversity. Grouping adversities by severity highlighted the importance of the accumulation of high impact adversities, which had a strong association with increases in adult psychological distress net of controls.

Grouping adversities by type revealed the distinct effects of the accumulation of adversities within each category. Overall, cumulative experiences of adversity within the family context, school circumstances, and health status domains were associated with statistically significant increases in psychological distress, even after the addition of controls.

High impact adversities had a larger coefficient than any of the adversity categories grouped by type. Grouping adversities by severity factor allowed the cumulative impact to vary by each level of severity; results reflected the impact of each additional adversity experienced within the different levels of severity. Since the focus was on the experience of adversities *within* each impact factor and not across them, results did not simultaneously capture the experience of adversities

across different levels of severity. In a similar manner, grouping adversities by type captured the accumulation of adversities within each domain of adversity but not across them.

Both of these methods for grouping adversities relied on variable centered approaches. Overall, results indicated the importance of considering differences in the severity and type of adversities in cumulative measures of childhood stressors. Each measure captured a different underlying aspect, or feature, of adversity and variations in these characteristics could have varying implications for estimates of adult psychological distress. However, a limitation of grouping adversities by severity or type was that these approaches were unable to capture experiences of adversities across categories, and therefore overlooked the important co-occurrences of adversities across severity and type.

In contrast, grouping respondents based on latent similarities in experiences of adversity using LCA provided further insights into the heterogeneity of cumulative childhood adversity, and following the stress process model, was the most promising approach for conceptualizing cumulative childhood adversity for two reasons. First, because LCA uses a person-centered approach, respondents were grouped by similarities in the experience of adversities; therefore, the latent classes that were produced captured the co-occurrence of adversities across severity and type. In accordance with previous literature, certain adversities had a higher probability of co-occurring together (Björkenstam et al., 2015). LCA was able to identify respondents that had a higher likelihood of experiencing certain adversities over others, and grouped respondents based on similar patterns of co-occurring adverse experiences. The increased probability of co-occurring adversities had important implications for adult psychological distress and offers further insight

into a different aspect of cumulative childhood adversity. Specifically, it was the co-occurrence of adversities in childhood across various domains within the stress universe that had a detrimental impact.

Secondly, grouping adversities by severity or type assumes that adversities accumulate solely within the parameters of the category in which they belong. The cumulative measure of high impact adversities may overestimate the cumulative impact of adversities since it only considered the accumulation of the most impactful, or severe, adversities. For the same reason, grouping adversities by type may underestimate the impact of certain adversities because it assumed that the accumulation of adversities occurred only within the specific domain, or type, and not across them. Adversities accumulate across various domains and differing severity; hence, the actual experience of co-occurring adversities is important to consider.

Third, it is important to consider the co-occurrence of adverse childhood experiences across different childhood domains and to expand the stress universe for children to include measures of chronic and contextual stressors to ensure that the overall cumulative effect of childhood adversity is captured. A single measure, or domain, of adversity was not sufficient for understanding the full impact of childhood experiences. Results indicated that when grouping adversities by type, the cumulative impact of economic hardship did not have a significant association with adult psychological distress. Similarly, the latent class characterized by participants with a high probability of experiencing Financial Struggle (Class 7) had only a modest association with adult psychological distress. These results are consistent with previous research that finds an overall weak association between childhood financial strain adversities and adult health (Schafer & Ferraro, 2013).

However, the latent class characterized primarily by participants that experienced indicators of economic hardship, coupled with parental mental health and perceptions of neighborhood disadvantage (Class 4) had a stronger significant association with adult psychological distress. This finding demonstrates that the co-occurrence of adversities have important implication for psychological distress. It may be the detrimental and ongoing parental mental health struggles that exacerbate the experiences of childhood financial strain. Furthermore, the contexts in which childhood stressors occur, such as disadvantaged neighborhoods, are important chronic stressors to include in cumulative measures of childhood adversity. These adversities had a high probability of co-occurring for participants in this class, and may work in tandem to cumulatively impact psychological distress. For example, parental mental health status may impede the acquisition of a stable job, which can lead to financial struggles; financial struggles in turn may contribute to the type of neighborhood one can afford. While the present study did not focus on the sequence of adverse exposure, these potential processes suggest an important avenue for future research.

Lastly, the results indicate that the school environment is an important childhood context to consider when evaluating the impact of childhood adversities on adult outcomes. In accordance with previous literature (Ozer & Weinstein, 2004; Smokowski & Kopasz, 2005; Takizawa, Maughan & Arseneault, 2014), exposure to bullying, feelings of loneliness for friends, and perceptions of unsafe schools emerged as strong predictors of adult psychological distress across the three non-additive measures of cumulative adversity. Both the experience of school adversities alone and the high probability of co-occurrences of school adversities with other childhood adversities, such as detrimental childhood mental health, were important determinants of later adult psychological distress. However, researchers that focus

on the impact of cumulative adverse childhood experiences have not included these important school related risk factors and stressors in measures of cumulative childhood adversity.

It is imperative to expand the stress universe for children to include the unique childhood experiences that occur within the school context and the potential chronic stressors that arise from this environment. Children spend a majority of their time in school, which is an important environment where children are developing and interacting with each other on a day-to-day basis. It serves to reason that the quality of the school environment could have direct implications for adult outcomes. Furthermore, feelings of fear, humiliation, and abuse experienced in the school environment are consistent with the experience of acute and traumatic adversities that are situated in the home environment (Smokowski & Kopasz, 2005).

2.12 Limitations and Future Directions

While this study provides important insights into the experience of cumulative childhood adversity and its impact on adult psychological distress, it is not without limitations. First, the present study relies on retrospective measures of adverse childhood circumstances. Reliance on retrospective measures is consistent with previous literature due to the deficit in prospective longitudinal data that addresses childhood adverse experiences. While some researchers have called into question the validity and reliability of retrospective recounts of childhood experiences, recent analyses conclude that retrospective measures maintain a methodological integrity despite potential biases in systematic reporting, whereby benefits of this approach outweigh potential flaws (Hardt & Rutter, 2004). Fully addressing this limitation in ongoing research requires the application of prospective data.

Another limitation of the current study is that important life course principles of sequencing and duration of adversities are not considered. There is growing evidence that these principles have implications for future adult mental and physical health (Friedman et al., 2015). It is likely that one adversity occurred prior to another and had cascading effects. Furthermore, the duration of childhood stressors would provide additional information on the variations in exposure to childhood adversities. Research finds that differences in timing and duration of exposure to poverty during childhood contributes to differences in health and overall life chances (Kuh & Ben-Shlomo, 2002). LCA groups respondents based on similar experiences, and while it does not account for the temporal ordering of adversities, it is able to account for patterns in the accumulation of adverse circumstances experienced during childhood. While sequencing and duration of adversities are important mechanisms that can have implications for differences in adult psychological distress, the focus of this study was to determine if participants ever experienced each adversity. Future studies would benefit from considering these various life course dimensions of adversity.

Third, while the present study has broadened the range of childhood stressors and provided a more comprehensive measure of cumulative adversity than previously used, it does not claim to have captured the exhaustive realm of adverse childhood experiences within the childhood stress universe. Future researchers are encouraged to continually expand measures of cumulative childhood adversity in order to avoid potential biases due to unmeasured adverse childhood circumstances.

Lastly, the present study does not focus on racial and gender differences, and psychological distress is measured at a single point in time. Future research would

further benefit from considering the differences in exposure to childhood adversity due to differences in race and gender. These initial differences in exposure can commence a process of cumulative disadvantage that compounds across the life course. Measures of psychological distress over time would further provide additional information on the dynamic process of mental health and the manner in which childhood adversities contribute to trajectories of psychological distress across the life course.

Despite these limitations, the present study advocates for considering a wide array of childhood stressors in measures of cumulative childhood adversity, and provides evidence that the heterogeneity across adversities and the measurement of cumulative childhood stressors impact estimates of adult psychological distress. The PSID-CRCS offers a unique opportunity to study an array of childhood adversities across a broad spectrum of domains, encompassing a larger proportion of the childhood stress universe. In accordance with the stress process model and the life course perspective it is clear that early life circumstances of childhood adversity have a long reach into outcomes of adult psychological distress. Further evidence suggests that the co-occurrence of adversities during childhood, irrespective of sequence, have important implications for adult psychological distress.

It is important to consider a comprehensive measure of cumulative childhood adversity that adequately measures the climate of disadvantage during childhood before research can continue to develop. The measure of cumulative childhood adversity that focuses on patterns of co-occurring adverse experiences is a promising approach that adequately captures exposure to adversity across various facets of disadvantage. From a policy perspective, it is clear that childhood is a salient period of the life course whereby initial insults contribute to later life

outcomes. Public health strategies would benefit from policies that aim to reduce exposure to childhood stressors or provide effective strategies to mediate the impact of adverse childhood experiences.

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Chapter 3

3 The Lasting Imprint of Childhood Disadvantage: Cumulative Histories of Co-Occurring Childhood Adversities and Trajectories of Psychological Distress in Adulthood

3.1 Introduction

Childhood experiences of adversity are consistently linked to detrimental mental health outcomes during adulthood (Horwitz, Spatz Widom, McLaughlin & Raskin White, 2001; Schilling, Aseltine & Gore, 2007; Schilling, Aseltine & Gore, 2008). Most children experience at least one adversity (Green et al., 2010; Friedman, Montez, Sheehan, Guenewald & Seeman, 2015), but it is the experience of multiple adversities, exposure to numerous childhood stressors, that have an enduring impact on disparities in adult outcomes across the life course (Felitti et al., 1998; Chapman et al., 2004; Schilling et al., 2007; Nurius, Logan-Greene & Green, 2012). An abundance of studies present significant evidence of the impact of cumulative childhood adversity on adult mental health (Turner & Lloyd, 1995; Dong et al., 2003; Björkenstam et al., 2015; Friedman et al., 2015). However, most research relies on two-wave prospective designs that are useful for estimating the prevalence of mental health problems but are unable to estimate trajectories of psychological distress as they unfold over time, providing only a glimpse into processes of change in psychological distress (Adkins, Wang, Dupre, van den Oord & Elder, 2009; Schafer & Ferraro, 2013). Furthermore, the bulk of previous studies rely on measures of cumulative childhood adversity that overlook the potential heterogeneity and co-occurrence in the experience of adversity during childhood and pay little attention to the full range of adverse childhood experiences that occur across different domains.

Previous research has demonstrated the enduring impact of adverse childhood experiences on both socioeconomic and physical health trajectories in adulthood (Haas, 2008; Schafer, Ferraro & Mustillo, 2011; Shuey & Willson, 2014; Turner, Thomas & Brown, 2016); however, few studies have considered the impact

on trajectories of adult mental health over time. Dimensions of physical and mental health are often related, suggesting that the impact of cumulative childhood disadvantage and hardship on trajectories of mental health may parallel the long-term disparities in physical health trajectories across the life course. However, it is important to consider differences in the experiential and social factors underlying the etiology of various ailments to ensure an overall understanding of processes of health inequalities in adulthood (Pearlin, Schieman, Fazio & Meersman, 2005).

Noteworthy exceptions that consider the impact of childhood adversities on long-term trajectories of mental health have focused on a short span of time, such as the transition from adolescence into early adulthood (Wickrama, Conger, Lorenz & Jung, 2008; Walsemann, Gee & Geronimus, 2009; Wickrama, Thulitha & Wickrama, 2010; Williams & Merten, 2014). While this research provides valuable insight into the change in mental health during the transition to adulthood, experiences of adverse childhood circumstances may continue to impact psychological distress throughout adulthood into old age.

Furthermore, measures of childhood adversity rely on a typical sum score that masks important differences across experiences of adversity. Methodological advances in the measurement of cumulative childhood adversity reveal that there is heterogeneity in the experience and impact of childhood adversities (Schilling et al., 2008; Schafer & Ferraro, 2013; Björkenstam et al., 2015). Childhood stressors do not occur as unique isolated incidents; rather, adverse childhood experiences tend to co-occur, clustering together to produce an accumulation of risk that has detrimental consequences and leads to disparities in adulthood. Early experiences of childhood adversity may result in exposure to additional childhood risks and stressors that, together with the lack of available resources, create an environment of disadvantage and hardship that can influence long-term processes of psychological distress (Ferraro & Shippee, 2009). Compositional variations in the accumulation of adverse childhood experiences reflect heterogeneous histories of exposure to childhood disadvantage and can have important implications for trajectories of psychological distress in adulthood. However, the majority of researchers have not considered how childhood adversities cluster to produce

different configurations of co-occurring adversities and whether certain patterns of adverse histories may be differentially associated with initial levels of psychological distress and changes in psychological distress over time.

In addition, most research examining cumulative childhood adversity has focused on a limited number of familial level adverse childhood experiences rather than considering multiple indicators of stressors across a broad realm of childhood domains. While adversities in childhood school and neighborhood domains have been independently linked to detrimental adult outcomes (e.g., Wheaton & Clarke, 2003; Pearlin et al., 2005; Shochet, Dadds, Ham & Montague, 2006; Bond et al., 2007; Arseneault, Bowes & Shakoor, 2010), these important contextual adversities are often absent from measures of cumulative childhood adversity. The exclusion of these childhood adversities from most previous cumulative measures is largely due to data availability, which dictates the number and type of adversities included from study to study. Considering a more comprehensive measure of cumulative childhood adversity that includes a wide range of childhood stressful experiences across multiple contexts of disadvantage would allow researchers to account for the multitude of childhood specific circumstances that contribute to disparities in adult mental health, and avoid wrongfully attributing the impact of multiple adversities to observed childhood stressors within a single domain (Schafer & Ferraro, 2013; Ferraro, Schafer & Wilkinson, 2016).

The present study utilizes longitudinal data from the Panel Study of Income Dynamics' Childhood Retrospective Circumstances Study (PSID-CRCS) to examine the impact of cumulative histories of co-occurring childhood adversities on trajectories of adult psychological distress. The analysis relies on a mixture model approach. First, latent classes representing varied histories of exposure to cumulative childhood adversity are identified and used to specify a more comprehensive measure of cumulative childhood adversity that considers the heterogeneity and clustering across experiences of childhood stressors. Second, these classes are used to predict trajectories of psychological distress spanning 14 years of adult data. Analyses assess how variations in the co-occurrence and accumulation of adverse childhood experiences impact levels of psychological

distress during adulthood and whether different clusters of childhood adverse experiences exert a stronger influence on changes in psychological distress across the life course.

3.2 Cumulative Childhood Adversity and Adult Health Trajectories

Previous literature on the long-term effects of cumulative childhood adversity has focused on trajectories of physical health (Haas, 2008; Schafer et al., 2011; Shuey & Willson, 2014; Turner et al., 2016), while only a handful of longitudinal studies have examined the impact of cumulative childhood adversity on trajectories of mental health (Wickrama et al., 2008; Walsemann et al., 2009; Wickrama et al., 2010; Williams & Merten, 2014). Physical health and mental health outcomes are largely related and encompass different dimensions of symptoms of well-being that have a high probability of co-occurring (Schafer & Ferraro, 2013). Experiences of childhood adversity are distressing in nature and are significant for disparities in mental health, and may have long-term implications for trajectories of mental health, like physical health, across the life course.

Cumulative inequality theory, proposed by Ferraro & Shippee (2009), is a key framework used in sociological studies to explain the impact of childhood conditions on health disparities in adulthood. Combining aspects of the stress process (Pearlin, 1981; Pearlin, 1989), the life course perspective (Elder, 1974; Elder, Kirkpatrick Johnson & Crosnoe, 2003), and processes of cumulative disadvantage (e.g., Dannefer, 2003), the theory posits that initial exposure to adversity during childhood has detrimental consequences for physical health that are both immediate and shape outcomes over time (Ferraro & Shippee, 2009; Ferraro et al., 2016). Childhood is further identified as a critical period of development; disadvantaged conditions during this critical period have more detrimental consequences for adult health (Hayward & Gorman, 2004; Walsemann, Bell & Goosby, 2011; Montez & Hayward, 2014).

Critical economic and social childhood conditions, typically coupled with origin family circumstances, contribute to the 'long arm of childhood' (Hayward & Gorman, 2004; Haas, 2007; Haas, 2008), whereby long-term processes of health inequality reflect broader patterns of childhood disadvantage. This cumulative exposure to adverse experiences during childhood may impact the acquisition of resources, resulting in a heightened reactivity to additional strain (Shonkoff et al., 2009). Early experiences of adverse circumstances, coupled with access to resources, initiate long-term patterns of disadvantage, whereby unfavorable conditions accumulate over time and magnify the impact of early disparities (Kuh & Ben Shlomo, 2002; DiPrete & Eirich, 2006; Wickrama, Mancini, Kwag & Kwon, 2013). In other words, the lack of protective resources to effectively attenuate exposure to adversity, or manage impacts following exposure, results in a higher risk of developing poor health later in life.

Overall, researchers assert that exposure to cumulative childhood adversity is detrimental for multiple domains of well-being during adulthood, including both mental and physical health outcomes (Schafer & Ferraro, 2013). Different dimensions of well-being are highly interrelated and often co-occur, suggesting that disparities in mental health trajectories due to adverse childhood circumstances may further parallel physical health trajectories. However, while the deleterious impact of adverse childhood experiences on long-term processes of psychological distress are expected, important etiological differences between mental and physical health exist. For example, physical health conditions typically manifest later in the life course, whereas onset of mental health problems typically occurs during adolescence and persists across adulthood (Kim & Durden, 2007). Kim and Durden (2007) present further evidence that while socioeconomic status predicted enduring disparities in overall health, the effects of different dimensions of socioeconomic status differed for mental health and physical health. Modeling trajectories of mental health is important for understanding the dynamic process of overall adult health and well-being, and to identify distinct mechanisms that may underlie the development and continuation of psychological distress.

Existing studies on the long-term effects of childhood adversity on trajectories of depressive symptoms reveal that variations in both the starting point and rate of change in depressive symptoms were due to the cumulative experience of earlier childhood stressors, including family of origin adversities and childhood socioeconomic circumstances (Wickrama, Noh, & Elder, 2009; Wickrama et al., 2010; Walsemann et al., 2011). Furthermore, life events characterized as major disruptive transitions occurring during adolescence, such as moving in with a romantic partner or early parenthood, were associated with an increased risk in depressive symptoms during early adulthood (Wickrama et al., 2008). Through a process of stress proliferation, initial disadvantages in one childhood domain increased exposure to accumulating stressors across multiple domains (Pearlin et al., 2005). Overall, results indicate that trajectories of mental health reflect continuity and change, and are shaped by transitions and experiences that occur during early life (Pearlin, 2010; Wickrama et al., 2010; Walsemann et al., 2011).

While these studies have provided valuable insight into processes of change in depressive symptoms, a complete understanding of the long-term effects of cumulative childhood adversity is hindered by the limited span of the life course captured by these studies. The majority of studies predicting trajectories of mental health have focused on a short span of time, primarily the transition from adolescence into early adulthood (Wickrama et al., 2008; Wickrama et al., 2010). While results provide important insight into adolescence, a tumultuous period of the life course often characterized by major changes, instability, and higher levels of psychological distress (Needham, 2012), exposure to childhood adversity may further impact adults and have a pervasive effect that persists across the life course. Overall, these studies demonstrate the detrimental mental health effects of childhood adversity on the transition to adulthood; however, research has yet to explore the enduring impact of exposure to early childhood adversities on trajectories of adult psychological distress into later adulthood.

3.3 The Childhood Climate of Disadvantage

Childhood adversities, like adult stressors and strains, are socially patterned and arise from the various structural arrangements that dictate the ordinary facets of children's everyday lives (Avison, 2010). Exposure to childhood adversity is not uncommon, with most children experiencing at least one adversity before the age of 17 (Friedman et al., 2015). Childhood is a sensitive period of the life course whereby experiences of disruptive or stressful childhood conditions can have a lasting impact on adulthood by initiating a chain of risk that increases the probability of exposure to additional stressors (Ferraro & Shippee, 2009; Umberson, Williams, Thomas, Liu & Thomeer, 2014). For example, children living in low socioeconomic settings are at an increased risk for additional exposure to other adverse childhood circumstances such as poor parental mental health, parental addiction, parental abuse, access to quality schools and neighborhoods, and stressful family dynamics (Wheaton & Clarke, 2003; Davis-Kean, 2005; Wickrama, Noh & Elder, 2009; Santiago, DeCarlo, Wadsworth & Stump, 2011; Goosby, 2013; Georg, 2016).

Research focusing on the variations in exposure to adult stress asserts the importance of formulating an effective measure of social stress that includes various forms of adult stressors, such as contextual stressors (Turner & Lloyd, 1995; Turner, Wheaton & Lloyd, 1995). Results from a study by Turner and Avison (2003) indicate that considering the differential exposure to stressors, and the various forms of stressors that occur across the stress universe, resulted in a more accurate and comprehensive measure of total social stress exposure during adulthood. Adequately measuring adult stress exposure contributed to an overall better understanding of underlying differences in stress exposure and the impact on adult mental health outcomes. However, ongoing research on cumulative childhood adversity has paid little attention to the total exposure to adversities during childhood. Measures of childhood adversity do not consider the full realm of potentially threatening childhood experiences and overall have not addressed a stress universe encompassing the full experience of childhood social stress (Avison, 2010).

The co-occurrence, or accumulation, of childhood adversities across a broad spectrum of childhood domains creates an environment of disadvantage that has detrimental consequences for mental health in adulthood (Heidinger, 2018). However, childhood adverse contexts are not typically included in measures of cumulative childhood adversity; instead measures of the accumulation of adversities centers on traumatic and acute childhood events, overlooking the important contribution of childhood environments that act as contextual stressors, stressors arising out of the everyday environments in which children are situated (Pearlin et al., 2005; Avison, 2010). Adversities emerging from poor neighborhood conditions, unsafe school environments, and unstable familial households are important sources of stress for children that provide an unfavorable context for the accumulation of detrimental adversities (Wheaton & Clarke, 2003; Shochet et al., 2006; Bond et al., 2007; Arseneault et al., 2010). Substantial variations in contextual circumstances may expose children to unique stressors and function as ambient, ongoing strains. These interactions between a child and their environment can further shape the dynamic processes of psychological distress (Avison, 2010).

It is necessary to consider a wider range of childhood stressors and formulate a stress universe for children that encompasses multiple childhood adversities across various domains, such as contextual stressors, in order to adequately assess the cumulative burden of childhood adversities. Like adults, children may be exposed to an array of varying adversities and stressors that span different dimensions of experience, including acute stressors, ambient strains, and traumatic experiences (Avison, 2010). Previous literature asserts that the exposure to cumulative adversity, or co-occurring stressors, during childhood has a more detrimental impact than a single measure or experience of adversity (Felitti et al., 1998; Schilling et al., 2007; Nurius et al., 2012). Broadening the range of cumulative childhood adversity to include experiences across multiple childhood domains would take into account the cumulative risk of co-occurring adversities that typically transcend a single domain of disadvantage. Failure to account for the broad array of childhood adversities could result in the overestimation of the impact of measured adversities (Ferraro et al., 2016). A more comprehensive measure of

cumulative childhood adversity would provide a better understanding of the impact of childhood stressors on changes in psychological distress, and an enhanced explanation for disparities in trajectories of psychological distress as they unfold over time.

In sum, childhood adversities have a high probability of co-occurring, and exposures to stressors during childhood are not independent of other simultaneous or sequential experiences of strain, which may function as a “matrix of disadvantage” to impact mental health (Wheaton, Roszell & Hall, 1997; Pearlin et al., 2005). It is important that researchers consider the total experience of childhood adversities across the stress universe of children in order to adequately account for the full experience of childhood strain and hardship. However, data limitations have typically dictated the number and type of childhood stressors included in cumulative measures of adversity and has led to inconsistencies in measures of cumulative childhood adversity across studies.

3.4 Measuring Cumulative Childhood Adversity

Childhood adversities exert a differential impact on adult mental health with some adversities having a stronger association than others (Kessler et al., 1994; Schilling et al., 2008; Friedman et al., 2015). Recent literature suggests that there is heterogeneity in the experience of cumulative childhood adversity that cannot be adequately captured using a simple sum score of total adversities experienced. However, only a handful of researchers have accounted for the heterogeneity across experiences of adverse childhood circumstances (Schilling et al., 2008; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015). The majority of measures of cumulative childhood adversity that consider the heterogeneity across adverse experiences rely on variable centered approaches to categorize childhood stressors into homogenous groups (Schilling et al., 2008; Schafer & Ferraro, 2013; Friedman et al., 2015). While informative, variable centered approaches are unable to fully account for the complex interplay and accumulation among co-occurring childhood adversities (Heidinger, 2018). In contrast, a person-centered latent

variable approach for measuring cumulative childhood adversity, such as latent class analysis (LCA), considers both the heterogeneity in the cumulative experience of childhood stressors and the co-occurrence of adversities across various childhood domains (Björkenstam et al., 2015). LCA groups respondents into classes based on similar patterns of clustering adverse experiences during childhood. These complex patterns represent histories of exposure to childhood adversity, with differing configurations of adverse experiences reflecting distinct risk profiles.

3.5 Research Questions

Childhood adversity is differentially distributed across the population. Co-occurring childhood risk factors interact to produce multiple patterns of adverse experiences. However, recent literature has yet to explore patterns of co-occurrence and the manner in which a more comprehensive account of cumulative childhood adversity impact trajectories of adult mental health. Little is known about compositional variations in the accumulation of childhood adversity, and how varying combinations of co-occurring childhood adversity may initiate distinct processes of disadvantage and differentially shape trajectories of psychological distress across the life course. Framed by cumulative inequality theory, which maintains the importance of experiences during the sensitive period of childhood in shaping adult outcomes, results are expected to indicate how early exposure to cumulative adversity contribute to long-term disparities in adult psychological distress.

The aim of the current study is to assess the impact of a person-centered measure of cumulative childhood adversity on trajectories of adult psychological distress. Using LCA to measure cumulative childhood adversity addresses the heterogeneity in co-occurring childhood stressors across various domains of childhood. First, LCA is used to estimate classes representing similar histories of co-occurring adversities. Latent classes of adversity are then used to predict trajectories of psychological distress in adulthood. Initial differences and change over time in psychological distress are estimated to determine the long-term impact of varying patterns of clustering adverse childhood experiences.

3.6 Methodology

3.6.1 The Data

The present study draws on longitudinal data from the 2001 to 2015 waves of the Panel Study of Income Dynamics (PSID) and the Childhood Retrospective Circumstances Study (CRCS), a representative subsample of PSID participants (Panel Study of Income Dynamics, 2016). The PSID is a nationally representative longitudinal family and household study (PSID Main Interview User Manual, 2017). Data collection began in 1968, making the PSID the world's longest running survey on families over time. Families were interviewed annually until 1997, and biennially thereafter. The long span of data collection allows researchers to follow individuals and their families across the life course.

The CRCS survey data was collected in 2014 from 8,072 participants and focuses on retrospective experiences of childhood adversity that occurred before the age of 17 (McGonagle & Freedman, 2015). For this analysis, seven waves of the main PSID interview data (2001-2015), the years in which detailed information on adult psychological distress were collected, were linked to respondents' CRCS data.

The PSID provides a unique opportunity to observe the effects of cumulative childhood adversity on trajectories of psychological distress across the life course. The extensive number of childhood stressors included in the CRCS broadens the range of previous measures of cumulative childhood adversity resulting in a more comprehensive measure of cumulative childhood adversity than has been previously considered.

3.6.2 The Analytic Sample

The sample was constrained in a few key ways for the present analysis. First, the sample was limited to participants in the CRCS supplement who were also the family survey respondent in the main PSID interview. Information on adult psychological distress was only available for the primary survey respondent of each family unit; therefore, all other respondents, who were not identified as the family

respondent and did not provide data on psychological distress, were dropped from the sample. (N=6,006).

In order to avoid potential problems with estimation, the data were constrained depending on the availability of psychological distress data across waves. A benefit of latent growth curve modeling, used in this analysis, is the ability to use unbalanced panels with a minimum of three data points to estimate patterns of change over time. Therefore, respondents were not required to have mental health data for all waves of analysis, but were required to have measures of psychological distress for a minimum of three waves of data. Participants who did not meet this criterion were dropped from the sample (N=5,151).

The sample was further restricted to participants who were at least 25 years of age or older in 2001, limiting the sample to adults who had the opportunity to complete a four year college education (N=3,391). LCA does not require complete data on indicators of childhood adversity; however, missing data analysis revealed that data were sparse for CRCS participants over 80 years of age at 2015, with fewer than 10 complete cases at each age, suggesting poor data quality for the oldest participants. Therefore, participants over the age of 80 were dropped from the analysis (N=3228). Listwise deletion was used for cases missing on covariates sex, race, age, education, and parental education (N=3206).

Missing data analysis further revealed that approximately 19 percent of the sample was missing on at least one adversity indicator. However, the majority of participants missing on indicators of adversity, approximately 85 percent (16% of the total sample), were missing on three indicators or less. Only 3 percent of the total sample had missing values on more than three adversities. Non-whites were approximately 2.5 times more likely to be missing on adversity indicators. Older participants and participants with lower levels of education were also more likely to have missing values. No participants were missing on all adversity indicators; however, one participant was missing on 24 of 25 indicators. This participant was subsequently dropped from the study. The final analytical sample consists of 3205 participants.

3.7 Measures

3.7.1 Dependent Variable

Psychological Distress (K6): The K6 Nonspecific Psychological Distress Scale, a continuous measure utilized to capture levels of depression and anxiety, was used to measure psychological distress (Kessler et al., 2002; Kessler et al., 2003). Respondents were asked to reflect on the previous 30 days and record how often they felt sad, nervous, restless, hopeless, worthless, and that everything was an effort. Responses were summed to produce a scale with scores ranging from 0-24 and higher values indicating higher levels of psychological distress. Psychological distress was measured biennially in the PSID from 2001 to 2015, except for 2005. Studies find that K6 measures of psychological distress provide an accurate account of serious mental health problems in study participants (Kessler et al., 2002; Kessler et al., 2003). Despite the limited number of indicators in the 6-item scale, research concludes that the K6 performs better than measures of psychological distress that contain more indicators and are more burdensome to both researchers and study participants (Cairney et al., 2007).

3.7.2 Independent Variable

Cumulative Childhood Adversity: The focal independent variable was a measure of cumulative childhood adversity. The included adversities are consistent with those used in previous literature (e.g., Turner & Lloyd, 1995; Schafer & Ferraro, 2013); however, the PSID-CRCS provides the opportunity to incorporate indicators of adversity that have not been available for inclusion in previous measures of cumulative childhood adversity but have been independently linked to poor adult outcomes. The CRCS asked respondents to retrospectively answer questions pertaining to adverse circumstances experienced before the age of 17. The adversities considered fall into 7 broad categories: *family context* (parental divorce, poor parental mental health, parental abuse, sibling abuse, family disorder); *school circumstances* (bullied in school, bullied outside of school, perceptions of unsafe school, childhood loneliness, repeated a grade); *health status* (poor childhood

health, poor childhood mental health, missed school due to poor health); *neighborhood environment* (neighborhood disorder, neighborhood cohesion); *economic hardship* (perceived poor financial comparison, paternal unemployment, maternal unemployment, struggled financially, received welfare); and *involvement in crime* (victim of a crime, arrested, convicted of a crime, sentenced to probation).

A multicollinearity analysis was conducted to ensure that childhood stressors included in the measure of cumulative childhood adversity were not highly correlated. Variable inflation factors (VIF) were estimated; results revealed no strong correlation among variables, with VIFs lower than 10 across adversities and a final mean VIF close to the value of 1.

3.7.3 Control Variables

Other Covariates: Given their association with mental health outcomes, the following variables were included as controls. Race was coded as white (0) and non-white (1); sex was coded male (0) and female (1). Age was a continuous variable. Respondents' age ranged from 25-66 in 2001 data and 39-80 in 2015 data. Respondent education was based on respondent's highest educational achievement coded as less than high school degree, high school degree, and college degree or higher. Parental education was coded in the same manner with an additional category for 'don't know'.

3.8 Overview of Statistical Analysis

The first step of the analysis was the construction of a measure of cumulative childhood adversity that accounts for the variation in exposure to childhood disadvantage, and provides a more accurate account of the total experience of childhood stressors. Rather than rely on a simple sum score to capture cumulative childhood adversity, as in previous research (Nurius, Green, Logan-Greene & Borja, 2015; Scott-Storey, 2011), this study considers the heterogeneity in the experience and co-occurrence of adverse childhood circumstances. Adversities during

childhood tend to cluster together, producing distinct cumulative experiences of exposure to adversity that have differing impacts on adult psychological distress (Heidinger, 2018). Latent class analysis (LCA; Collins & Lanza, 2010) was used to group participants into classes that describe patterns of co-occurring adverse experiences.

LCA, a probability based approach, considers the heterogeneity among respondents and identifies mutually exclusive and exhaustive subgroups, or latent classes, composed of participants with a high probability of experiencing similar patterns of responses on observed variables. The present analysis identified latent classes of respondents that reflect similar patterns of exposure to adversities, or clusters of stressors, during childhood. Responses to various indicators of adverse childhood experiences determined membership into latent subgroups. These homogenous subgroups, or classes, were qualitatively different and captured the co-occurrence and accumulation of adverse childhood experiences.

To determine the correct number of classes, models with two to ten classes were estimated using Stata 15 (StataCorp, 2017), and the LCA Stata plugin (Lanza, Dziak, Huang, Wagner & Collins, 2011). Akaike information criterion (AIC; Akaike, 1987) and Bayesian information criterion (BIC; Schwarz, 1978) were compared across models. Smaller values of both measures indicated better model fit; however, results acted as a guide, with decisions regarding model fit further informed by appropriate theoretical perspectives and interpretability (Collins & Lanza, 2010).

While eight latent classes offered the lowest BIC, differences in AIC and BIC from six to eight classes were small. Results from the 8-class model revealed two classes that had a high probability of experiencing little to no adversity, indicating poor latent class separation. This problem was resolved in the 7-class model; however, some classes included less than 3 percent of the sample resulting in too little power to detect meaningful differences across classes. Therefore, a 6-class model was determined to provide the best fit for the data.

LCA relies on probabilistic estimates to determine class membership, true membership cannot be known. To use latent classes as an independent variable in multivariate models, a classify-analyze technique is typically utilized to assign participants to the latent class for which they have the highest posterior probability of membership (Collins & Lanza, 2010). This maximum probability assignment treats the latent classes as known. Although the classify-analyze approach is commonly used, a growing literature suggests that it may lead to attenuated estimates and biased results due to two main reasons (Bray, Lanza & Tan, 2015). First, the reliance on the highest probability of class membership to assign participants to classes may result in errors in classification. Second, the inclusion of only manifest variables, instead of all variables from the final model, in LCA classification models may contribute to biased results.

To account for possible classification errors and attenuated results, Bray and colleagues (2015) suggest an “inclusive” LCA model, which is estimated including all covariates used in the final analytic model in the classification model. Including the manifest indicators, covariates, and distal outcome in the LCA classification model may result in more accurate, unbiased estimates. An inclusive LCA classification model was estimated to address these concerns; the model included all covariates and psychological distress measured at 2013, which contained the most complete data for psychological distress. Overall, the estimated classes of exposure to adverse childhood experiences remained consistent across the inclusive and the non-inclusive model. However, in the inclusive model, some of the latent classes were not as well-differentiated by the indicators of childhood adversity. A comparison of results from subsequent multivariate analyses revealed that the coefficients for all classes were larger when the inclusive LCA 6-class model was used. However, there were no differences in the statistical significance of coefficients across models. Therefore, the LCA 6-class non-inclusive model was selected as it provided more distinct differentiation in patterns of exposure to adverse childhood circumstances and downward bias was not evident. In sum, these analyses revealed that the non-inclusive six latent classes model was optimal to best describe patterns of exposure

to cumulative childhood adversity observed in the PSID-CRCS. See Appendix A: Table A3 for fit statistics.

The next step was to examine the association between these latent classes of cumulative childhood adversity and trajectories of adult psychological distress. Identifying latent classes capturing similar experiences of adversity allowed for the analysis of the differential impact of distinct experiences of childhood adversity on trajectories of psychological distress in adulthood. Trajectories of adult psychological distress were estimated using latent growth curve modeling (LGC) to estimate intra-individual change over time and inter-individual differences in trajectories (Collins & Lanza, 2010). This strategy allowed trajectories to be modified by latent classes of experiences of cumulative childhood adversity. The intercept indicated differences in the initial levels of psychological distress across latent classes. The slope determined whether psychological distress was increasing or decreasing over time, and to what degree, depending on patterns of exposure to cumulative childhood adversity.

Missing data: Longitudinal data spanning long periods of time allow for the observation of processes of change across multiple stages of the life course; however, attrition may bias results. While attrition of PSID participants over time has the potential to bias the representativeness of longitudinal results, in the present analysis, data from the CRCS determined inclusion in the analytic sample. The CRCS was collected in 2014, only a year prior to the final data point included in the LCG analysis; therefore, there is no attrition in CRCS respondents from 2001-2015. However, in general, the PSID experiences attrition over time, which in turn affects inclusion in the CRCS. Evidence from previous analyses has determined that the PSID has remained representative over time, with no strong indication of attrition bias on many measured PSID characteristics (Fitzgerald, 2011). The CRCS had a weighted overall response rate of 67%, with younger participants and immigrant participants having a lower response rate.

3.9 Results

Table 3.1 presents adversities that respondents in each class had a high probability of experiencing, and the weighted distribution of the sample across classes. Adversities with conditional probabilities over 60 percent indicated a high probability of occurrence; adversities with conditional probabilities between 50 and 60 percent indicated an elevated risk of occurrence and were also included. Approximately 55 percent of respondents belonged to a class characterized by a high probability of experiencing adversity during childhood. This is consistent with previous literature concluding that the majority of children experience at least one stressor during his or her childhood (Chapman et al., 2004; Surtees & Wainwright, 2007; Friedman et al., 2015). Respondents in Class 1 (47%) had a high probability of experiencing No to Low Adversity. Class 2, Bullied and Alone, was comprised of individuals with a high probability of being bullied inside and outside school, and an elevated risk of experiencing childhood loneliness (14%). Participants in Class 3, Financial Struggle and Neighborhood Disadvantage, had a high probability of experiencing financial struggle, neighborhood disorder, lack of neighborhood cohesion, and an elevated risk of being on welfare during childhood (5%). Class 4, Involvement in Criminal Activity, was comprised primarily of participants with a high probability of being arrested, convicted, on probation, and an elevated risk of experiencing financial struggle (5%).

Respondents with a high probability of experiencing Multiple Adversities across Different Domains comprised Class 5. Although this class was small (7%), the high probability of experiencing various childhood stressors across multiple childhood domains suggested that this was the most disadvantaged group of participants. Respondents in this class had a high probability of experiencing financial struggle, perceived unfavorable finances compared to average, bullying inside and outside of school, childhood loneliness, and poor parental mental health, as well as an elevated risk of experiencing poor childhood mental health, maternal unemployment, perceived lack of safety in school, parental abuse, and sibling abuse. Class 6, Financial Struggle, was the second largest class (22%) and was

characterized primarily by participants with a high probability of experiencing financial struggle.

Table 7: Weighted Probability of Experiencing Adversities by Class (N=3205)

LCA Classes of Cumulative Childhood Adversity	Adversities with a Conditional Probability over 60% and Elevated Risk over 50%	n	%
Class 1: "No to Low Adversity"	(Reference)	1,509	47.09
Class 2: "Bullied and Alone"	Bullied school, Bullied outside school, elevated risk of Childhood loneliness	447	13.95
Class 3: "Financial Struggle and Neighborhood Disadvantage"	Financial struggle, Neighborhood disorder, Neighborhood cohesion, elevated risk of Childhood welfare	164	5.13
Class 4: "Involvement in Criminal Activity"	Arrested, Convicted, Probation elevated risk of Financial Struggle	167	5.20
Class 5: "Multiple Adversities across Different Domains"	Financial struggle, Financial comparison, Bullied in school, Bullied outside of school, Childhood loneliness, Poor parental mental health, elevated risk of Poor childhood mental health, Maternal unemployment, Childhood welfare, Unsafe school, Parental abuse, and Sibling abuse	208	6.48
Class 6: "Financial Struggle"	Financial Struggle	710	22.15

Table 3.2 presents the weighted proportions and means for the independent variables by latent class. Women comprised the majority of respondents in each class, except for Class 4, Involvement in Criminal Activity. Across all classes, a large majority of participants identified as white. The mean age of participants within each class, measured at 2015, varies from approximately 53-58.

Table 8: Weighted proportions and means for key variables by latent class, PSID 2001-2015 (N=3205)

<u>Variable</u>	Class 1 (ref) "No to Low Adversity"	Class 2 "Bullied and Alone"	Class 3 "Financial Struggle and Neighborhood Disadvantage"	Class 4 "Involvement in Criminal Activity"	Class 5 "Multiple Adversities across Different Domains"	Class 6 "Financial Struggle"
Nonspecific Psychological Distress Wave 2001(mean)	2.41	4.13	4.19	4.33	5.31	3.69
Nonspecific Psychological Distress Wave 2015 (mean)	1.86	3.38	3.27	3.65	5.74	2.98
Gender						
Female	0.57	0.53	0.57	0.31	0.59	0.58
Male	0.43	0.47	0.43	0.69	0.41	0.42
Race						
Non-White	0.15	0.14	0.30	0.21	0.20	0.15
White	0.85	0.86	0.70	0.79	0.80	0.85
Age wave 2015 (years)	58.23	55.03	54.44	53.47	55.81	58.40
Education						
Less than High School	0.05	0.08	0.16	0.15	0.17	0.12
High School	0.50	0.50	0.56	0.70	0.57	0.53
College Degree or Higher	0.45	0.42	0.28	0.15	0.26	0.35
Parents Education						
Less than High School	0.14	0.13	0.24	0.13	0.27	0.22
High School	0.52	0.50	0.51	0.59	0.50	0.57
College Degree or Higher	0.27	0.31	0.11	0.21	0.15	0.14
Missing	0.07	0.06	0.14	0.07	0.08	0.07

In order to assess how latent classes of cumulative childhood adversity are associated with initial levels of mental health and changes in mental health over time, latent growth curve models were estimated. Table 3.3 presents the results of the multivariate latent growth curve analysis estimating change in adult psychological distress. Model 1 shows that membership in all of the adversity classes, compared to the reference class of experiencing No to Low Adversity, is associated with significantly worse psychological distress during adulthood. In particular, individuals in Class 5, who had a high probability of experiencing Multiple Adversities across Different Domains during childhood, report the highest levels of adult psychological distress, scoring on average 2.81 points higher than individuals in the reference category characterized by the experience of No to Low Adversity.

Turning to change in adult psychological distress over time, Model 1 further reveals that only the slope for Class 5, comprised of participants with a high probability of experiencing Multiple Adversities across Different Domains, is statistically significant. Individuals who are members of Class 5 experience a 0.05 increase in psychological distress at each successive wave of analysis. In other words, adult psychological distress is highest at the beginning of the analytic period and increases over time for disadvantaged participants who experience Multiple Adversities across Different Domains during childhood compared to participants in the reference category.

Model 2 controls for demographic variables sex, race, age, education, and parental education. Net of demographic characteristics, the effects of latent class membership remain largely unchanged; participants in classes with a high probability of experiencing adversities have significantly higher levels of psychological distress in adulthood compared to the reference class. After the addition of demographic controls, the slope of psychological distress for Class 5 remains statistically significant with an unchanged rate of change ($\beta=0.05$). Slopes for all other classes still do not reach levels of statistical significance.

Results further demonstrate that demographic covariates are associated with differences in adult psychological distress. Women experience higher levels of psychological distress compared to men ($\beta=0.65$). Participants who held a college education or a higher degree experience lower levels of psychological distress compared to participants who did not finish high school or only had a high school diploma. To a lesser extent, participants whose parents held a college degree or higher have lower levels of psychological distress compared to participants whose parents did not finish high school.

Table 9: Growth Curve Models of Psychological Distress, PSID 2001-2015 (N=3205)

	Model 1	Model 2
	β (SE)	β (SE)
LCA Classes of Cumulative Childhood Adversity		
Class 1 "No to Low Adversity"	1 (REF)	1 (REF)
Class 2 "Bullied and Alone"	1.42 (.17)***	1.34 (.17)***
Class 3 "Financial Struggle and Neighborhood Disadvantage"	1.45 (.22)***	.97 (.22)***
Class 4 "Involvement in Criminal Activity"	1.60 (.27)***	1.35 (.26)***
Class 5 "Multiple Adversities across Different Domains"	2.81 (.23)***	2.43 (.22)***
Class 6 "Financial Struggle"	1.10 (.14)***	.95 (.14)***
Wave	-.04 (.01)***	-.04 (.01)***
LCA Classes of Cumulative Childhood Adversity * Wave		
Class 1*Wave	1 (REF)	1 (REF)
Class 2*Wave	.01 (.02)	.01 (.02)
Class 3*Wave	.00 (.02)	.00 (.02)
Class 4*Wave	.03 (.03)	.02 (.03)
Class 5*Wave	.05 (.02)*	.05 (.02)*
Class 6*Wave	-.01 (.01)	-.01 (.01)
Sex (ref: male)		
Female		.65 (.05)***
Race (ref: white)		
Non-White		-.06 (.05)
Age		-.03 (.002)***
Education (ref: College or Higher)		
Less than High School		1.94 (.10)***
High School		.60 (.06)***
Parents Education (ref: College or Higher)		
Less than High School		.57 (.09)***
High School		.09 (.07)
Don't know, Missing		.44 (.11)***

*p<.05; **p<.01; ***p<.001

3.10 Discussion

Existing literature on the long arm of childhood maintains that exposure to adversity during the critical period of childhood is detrimental to mental health in adulthood. However, the heterogeneity in exposure to multiple childhood adversities has not been considered in previous research. Little attention has been paid to the manner in which childhood adversities cluster producing cumulative histories of exposure with varying implications for psychological distress across the life course. The present study used latent class analysis (LCA) to identify distinct cumulative histories of co-occurring childhood adversities in the longitudinal and nationally representative PSID-CRCS data. LCA grouped participants based on similar patterns of exposure to childhood stressors and accounted for the

heterogeneity across adverse childhood experiences. Unlike previous measures of cumulative childhood adversity, LCA was able to account for the complex co-occurrence and overall clustering of childhood stressors across various domains of exposure.

Furthermore, the present study addressed previous gaps in the conceptualization of cumulative childhood adversity and considered a broader range of adverse childhood experiences across various childhood domains, providing a more comprehensive measure of the total experience of cumulative childhood adversity. Indicators of childhood stressors included adverse experiences not included in previous measures of cumulative childhood adversity, such as adversities that arise from disadvantages in childhood school and neighborhood environments. Broadening the range of childhood stressors included in measures of cumulative childhood adversity contributes to the expansion of a stress universe for children. Growth curve modeling was then used to estimate the impact of latent classes of cumulative childhood adversity on trajectories of psychological distress spanning 14 years of data from early to late adulthood. Results reveal four key findings that contribute to the overall understanding of the impact of childhood histories of cumulative adversity on trajectories of adult psychological distress.

First, results reveal that adverse childhood experiences have a persistent impact on adult psychological distress. Emergent classes suggested that the experience of childhood adversity was not uncommon, with approximately 55 percent of participants belonging to a latent class characterized by exposure to adverse childhood stressors. Consistent with cumulative inequality theory, experiences of adversity during childhood were associated with detrimental mental health in adulthood. All latent classes characterized by a high probability of experiencing childhood stressors reported higher initial levels of psychological distress compared to the reference class, characterized by respondents with a low probability of having experienced childhood adversity; results were statistically significant across latent classes. In other words, participants in all classes of adversity experienced statistically significant elevated rates of psychological distress.

The detrimental impact of the distinct histories of cumulative childhood adversity on initial levels of adult psychological distress persisted even after controlling for demographic variables, revealing that experiences of childhood adversity, regardless of latent class, increased subsequent disorder in adulthood net of demographic indicators. Consistent with previous research, results indicated that childhood is a salient developmental period of the life course, and that early insults of adversity during this critical life stage have important long-term implications for psychological distress.

Secondly, adverse childhood experiences tend to co-occur producing varying patterns of adversity that have differential impacts on adult psychological distress. Previous studies that have accounted for the heterogeneity in childhood experiences of adversity have relied on variable-centered approaches that categorize adversities based on variable characteristics such as type or severity (Schilling et al., 2008; Schafer & Ferraro, 2013; Friedman et al., 2015). An LCA approach considered participant experiences of adversity and accounted for the heterogeneity in cumulative exposure to adverse childhood experiences. A person-centered approach holds potential for the conceptualization of cumulative childhood adversity as the clustering, or co-occurrence, of adversities is of central focus. LCA modeling estimated six latent classes of childhood adversity that captured similar cumulative experiences of childhood stressors among study participants. The strength of association with psychological distress differed by latent class indicating that there is heterogeneity in the experience and co-occurrence of childhood adversity that cannot be captured using a simple sum score, the most commonly used approach in previous studies.

It is the combined occurrences of multiple childhood stressors across various domains, rather than the experience of a single adversity, that are important risk factors for subsequent psychological distress. For example, neighborhood circumstances emerged as a salient childhood contextual adversity that contributed to elevated levels of psychological distress in adulthood. Respondents in the Financial Struggle and Neighborhood Disadvantage class (Class 3) had a high probability of experiencing financial struggle, an elevated risk of being a welfare

recipient during childhood, coupled with a high probability of experiencing adversities associated with neighborhood disadvantage, such as neighborhood disorder and a lack of neighborhood cohesion. Membership in this class had a stronger effect on initial levels of psychological distress than the Financial Struggle class (Class 6), characterized by respondents who had a high probability of experiencing only financial struggle during childhood.

Similarly, participants in the Bullied and Alone class (Class 2) had a high probability of being bullied inside and outside of school, as well as an elevated risk of feeling lonely during childhood. Not only were these respondents experiencing hardship in school, but there was a high probability that bullying occurred outside of the school environment, spilling into other domains of childhood life. While temporal ordering of adverse experiences could not be established, results suggest processes of stress proliferation, whereby the experience of childhood adversity increased the risk of experiencing additional childhood stressors (Pearlin et al., 2005). Multiple exposures to adverse childhood experiences may tax and deplete resources necessary to attenuate the impact of additional childhood adversities. It is this accumulation of various adversities across distinct childhood domains that produce a context of disadvantage for children, and have a detrimental impact later in life.

Results provide evidence for the importance of considering how adversities co-occur and which adversities are most likely to cluster together, or occur frequently in tandem with other adversities. Previous research has assumed that adversities have a uniform effect and that the experience of multiple adversities is additive. However, results from the present study revealed variations in the exposure and co-occurrence of childhood stressors. Distinct patterns of histories of cumulative adversity were identified and resulted in differences in the magnitude of effect on psychological distress across classes of cumulative adversity.

Third, the most disadvantaged respondents experienced worsening psychological distress over time. Respondents in the Multiple Adversities across Different Domains class (Class 5) were distinguished by their high probability of

experiencing numerous childhood stressors across various contexts, such as financial struggle, poor parental mental health, experiences of bullying inside and outside of school, and feelings of loneliness. Results revealed that this class had the highest initial levels of psychological distress and were the most consequential for adult mental health. Although this was a small class, results suggested that participants in this class may be the most disadvantaged.

In addition, results revealed that membership in the Multiple Adversities across Different Domains class (Class 5) were associated with a statistically significant increase in psychological distress across 14 years of data. Experiences of childhood adversity were associated with overall increased baseline levels of psychological distress across classes; however, only the most disadvantaged class was associated with increasing psychological distress over time. For the most disadvantaged participants, childhood experiences of adversity were associated with worse mental health that continued to decline and worsen over time. While the increase was modest, this association persisted net of demographic variables, including age. In other words, levels of poor psychological distress among respondents in this class increased with each subsequent wave of analysis. The findings provide evidence that while the majority of participants experienced childhood adversities, a small minority suffered a multitude of traumatic and adverse circumstances during childhood that had a more disadvantageous impact that worsened over time. Results are consistent with cumulative inequality theory observing the pervasive and enduring detrimental impact of experiences of adversity across the life course. Results confirmed the heterogeneity across experiences of adversity, and further suggested that the most disadvantaged children had elevated levels of exposure to adversity and experienced more hardship in adulthood.

Fourth, results suggest that there may be stability in trajectories of psychological distress, whereby early exposure to childhood adversity has a detrimental impact on psychological distress that is maintained over time. The rate of change for all classes of adversity, except for the Multiple Adversities across Different Domains class (Class 5) discussed above, were not statistically significant,

indicating that while levels of psychological distress were not increasing over time there was also no evidence to suggest that levels of psychological distress were decreasing. Because all latent classes of childhood adversity were associated with higher initial levels of psychological distress compared to the reference class, the results suggested that initial disadvantages in psychological distress persisted and remained stable across the life course, contributing to overall disparities in mental health across adulthood.

3.11 Limitations and Future Directions

Results from the current study contribute to the overall understanding of the accumulation of co-occurring adverse childhood experiences and psychological distress across the adult life course; however, there are some limitations that must be noted. Measures of adverse childhood circumstances relied on retrospective accounts of childhood experiences. Previous research suggests that the most disadvantaged participants may amplify or misremember childhood experiences of adversity to account for current circumstances (Yancura & Aldwin, 2009). This could result in recall bias, a systematic error arising when there is a mismatch in the reported circumstances and the circumstances that actually occurred. However, research focusing on assessing the reliability of retrospective reports of childhood circumstances reveals that overall, recollection of childhood circumstances is relatively stable over time. Furthermore, other research reveals that recollections of specific childhood experiences are fairly reliable (Hardt & Rutter, 2004). Due to the challenges of collecting prospective data on childhood adversity and adult psychological distress, and the scarcity of longitudinal data, the PSID-CRCS data offers a valuable alternative.

Another potential limitation is the focus on a single diagnostic outcome. Research finds that the effects of childhood adverse experiences are not disorder specific (Schilling et al., 2008). The experience of childhood adverse circumstances may manifest in other dimensions or indicators of well-being. The impact of co-occurring histories of cumulative childhood adversity may depend on the outcome examined and have different manifestations across populations. Future research

would benefit from considering other mental health outcomes, such as drug use or anti-social behavior. Additionally, researchers should consider the impact of patterns of childhood disadvantage on social and economic outcomes in adulthood.

Lastly, the current study does not consider the pathways that indirectly connect experiences of childhood adversity to adult psychological distress, for example, the mediating influence of adult exposure to risk and adversity. Previous research concludes that children who experience multiple adverse experiences during childhood are at an increased risk of experiencing adversities during adulthood (George, 2006) and engaging in risky health behaviours such as smoking and binge drinking (Felitti et al., 1998). Childhood adversities interact with more recent adult exposure to stress; it may be the more proximal risk factors, instead of distal childhood experiences, that influence change in trajectories of psychological distress over time. Subsequent adult stressful experiences may be a mediator of the association. Furthermore, sources of support and psychosocial resources may contribute to resiliency in adulthood, and the attenuated impact of childhood adversity. In order to better understand processes of disadvantage that accumulate across the life course, future research should consider adult experiences along side childhood exposure.

3.12 Conclusion

Overall, results support the cumulative inequality theory, whereby experiences of cumulative adversity during childhood had a pervasive and enduring impact on adult psychological distress. Findings further support the use of LCA to identify similar patterns of experiences of childhood adversity. Childhood adversities have a tendency to co-occur, and it is important for researchers to consider this co-occurrence when measuring experiences of cumulative childhood adversity. The validity of the LCA approach is in the ability to identify meaningful variability in the co-occurrence of childhood adversities across distinct domains of experience. Results demonstrate that there is variability in adult psychological distress that is shaped by cumulative experiences of childhood stressors. The most disadvantaged class of participants experienced worsening psychological distress contributing to

increasing mental health disparities over time. Although there was no indication of worsening mental health over time for the other classes of adversity, findings indicate that initial levels of disadvantage remained stable and persisted well into adulthood.

From a policy perspective results indicate the importance of childhood antecedents of psychological distress, and demonstrate that the most effective prevention and intervention should be targeted to disadvantaged children. It is better to consider risk profiles across multiple childhood domains of disadvantage rather than focus on exposure to a single adverse experience. Childhood adversities occurring in the school or neighborhood environment can further contribute to the acquisition of opportunities and shape trajectories of adult health across the life course. Children spend a large amount of time outside the realm of the family domain; these contexts may result in additional sources of stress and hardship for children.

3.13 References

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Chapter 4

4 The Context of Disadvantage: Patterns of Exposure to Cumulative Childhood Adversity and Adult Socioeconomic Attainment

4.1 Introduction

Research consistently finds that social and economic disparities have persisted over time, and in some cases even widened (Read & Gorman, 2006; Duncan & Murnane, 2014). Results from studies implementing a life course perspective suggest that, on average, children who experience deprivation, impoverishment, and adversity are more likely to have long-term detrimental outcomes that impede successful status attainment, such as lower levels of education, underemployment or unemployment, and lower wages (e.g., Wagmiller, Lennon, Kuang, Alberti & Aber, 2006). Initial experiences of disadvantage and adversity can shape life pathways, initiating trajectories of inequality that accumulate across the life course (e.g., Shuey & Willson, 2014) and impact academic and labor market outcomes (Wagmiller et al., 2006; Haas, Glymour & Berkman, 2011).

Education is a key marker of adult socioeconomic attainment and plays a critical role in the intergenerational reproduction of social class across the life course (Bourdieu & Wacquant, 1992). High school dropouts experience detrimental outcomes including higher reliance on public services and higher rates of involvement in criminal activity (Belfield & Levin, 2007). College graduation is an important milestone in the life course that contributes to adult occupational attainment, influences life chances, and shapes overall social and health advantages over time (for a review, see Mirowsky & Ross, 2003). For example, college graduates experience better labor market outcomes, higher levels of positive self-rated health, and lower rates of mental health and chronic conditions compared to counterparts with lower levels of education. Because educational attainment is linked to successes in the transition to adulthood, it is important to consider the childhood circumstances and conditions that shape the acquisition of education.

Exposure to childhood deprivation and adversity is an important mechanism that contributes to the reproduction of inequality across the life course by hindering mobility and creating barriers to educational completion and successful status attainment during adulthood. Childhood economic adversity, or childhood poverty, is often cited in ongoing literature as a salient social factor that influences processes of education and subsequent attainment outcomes (Duncan, Ziol-Guest & Kalil, 2010). Ongoing literature typically focuses on dimensions of childhood socioeconomic status as the primary determinant of educational attainment (Luo & Waite, 2005; Duncan et al., 2010). However, the limited focus on the impact of childhood deprivation and poverty on adult achievement neglects the important interplay between childhood economic disadvantage and the experience of other adverse childhood circumstances that co-occur and accumulate during childhood. The accumulation of multiple adversities, including indicators of deprivation, may have a more pervasive cumulative impact on selection into higher education than measures of childhood socioeconomic status alone.

Experiences of economic hardship during childhood do not occur in isolation; rather they occur within social, familial and historical contexts, some of which deplete important resources and, in turn, facilitate the accumulation of childhood adversities (Goosby, 2013). Poor economic circumstances in childhood increase exposure to other childhood adversities, including contextual factors arising from the environments in which children are situated. Ongoing exposure to childhood poverty is often associated with reduced neighborhood, school, and familial resources (Wickrama, Simons & Baltimore, 2012), and is further linked to parental mental health (Santiago, DeCarlo, Wadsworth & Stump, 2011), parental involvement (Yeung, Linver & Books-Gunn, 2002; Cooper, Crosnoe, Suizzo & Pituch, 2010), and the allocation of parental resources necessary for building human capital (Coleman, 1990; Johnson & Schoeni, 2007).

While the majority of children experience at least one adversity (Green et al., 2010; Friedman, Montez, Sheehan, Guenewald & Seeman, 2015), research finds that it is the accumulation of adverse childhood circumstances, rather than a single experience of adversity, that has a detrimental impact on an array of adult outcomes

(Felitti et al., 1998; Chapman et al., 2004; Schilling, Aseltine & Gore, 2007; Nurius, Logan-Greene & Green, 2012). Research on the long-term processes of inequality and attainment would benefit from incorporating measures of exposure to multiple childhood adversities. Focusing on childhood poverty as the sole indicator of adversity during childhood results in an overestimation of the impact of childhood economic conditions on educational attainment, and an oversimplification of the experience of adversity during childhood that shapes patterns of attainment.

Utilizing data from the Panel Study of Income Dynamics' Childhood Retrospective Circumstances Study (PSID-CRCS), the present study analyzes the impact of cumulative experiences of childhood adversity on adult educational attainment. Rather than rely on childhood socioeconomic status as the sole indicator of childhood conditions, measures of cumulative childhood adversity consider multiple adversities across different childhood domains including family, neighborhood, and school conditions. Variations in the experience and co-occurrence of adversity are examined through the use of a more comprehensive measure of cumulative childhood adversity that considers the heterogeneity across experiences of adversities, and identifies similar patterns of exposure to adverse childhood circumstances. These histories of adverse childhood experiences are used to predict the successful completion of high school and college during early adulthood. Guided by cumulative inequality theory (Ferraro & Shippee, 2009), the current research will improve understanding of the interplay between economic hardship and other childhood adversities, and the dynamic mechanisms underlying socioeconomic disparities in adulthood. Analyses will further reveal how variations in co-occurring adversities contribute to differences in educational attainment during early adulthood. Patterns of adverse childhood experiences may contribute to variations in educational attainment, and the differential selection into higher education, which further contributes to status inequalities across the life course.

4.2 Educational Attainment as a Predictor of Adult Socioeconomic Success

Education is an achieved status that occurs causally prior to other indicators of adult socioeconomic status and remains relatively stable across the life course. It has been identified as a determinant of adult inequalities and is an important marker of adult attainment (Mirowsky & Ross, 2003). As such, it is important for researchers to identify the underlying childhood factors that influence educational attainment, and in turn adult success. Higher education is associated with the reproduction of class over time and across generations (Bourdieu & Wacquant, 1992). Human capital investments through the acquisition of formal education contribute to the development of important resources, such as economic, social, and personal capital (O’Rand, 2001; Wickrama et al., 2012). The formative years of education occur during a salient stage in the life course where important development is occurring. In particular, the learning environments of schools encourage general cognitive and social development that improves with each additional year of successful schooling. Higher education further contributes to the attainment of important transferable knowledge and skills, such as logical and rational thinking, the ability to assess and solve problems, and time management (Lawlor et al., 2005; Montez & Hayward, 2014). Upon completion of higher education, these general skills are of value to employers and contribute to a generalized skillset that can be tailored to produce successes in the labor market (Wickrama et al., 2012).

An abundance of research links higher education to the acquisition of better jobs with higher wages and occupational status, more job mobility, and increased financial security (Elman & O’Rand, 2004; Johnson & Schoeni, 2007). Educated adults also benefit from more autonomous occupations, safer work environments, and low exposure to stressors. These occupational advantages contribute to favorable economic outcomes, and are further associated with positive health and well-being. Healthy habits and attitudes, and health promoting lifestyles are also associated with higher levels of education (Room, Mason, Suglia & Clark, 2017). Formal education encourages the avoidance of health risks and unhealthy

behaviors, and results in the ability to effectively apply pertinent health information and knowledge to maintain overall health and well-being. Lastly, processes of learning build psychosocial resources, such as active social support systems, healthy interpersonal relationships, self-esteem, and the sense of control, that help manage the onset of stressors and contribute to psychological well-being across the life course.

Research indicates that individuals with a college degree enjoy a higher standard of living compared to lesser-educated counterparts (Johnson & Schoeni, 2007). However, the benefits associated with higher education depend on the completion and timing of formal education. Non-completion and off-time completion are markers of disadvantage, and are not associated with the typical benefits of educational attainment (O'Rand, Hamil-Luker & Elman, 2009). In other words, individuals who begin college, but do not graduate, are not afforded the same benefits of formal education. Furthermore, later attainment of the same credentials, or off-time completion of education, is not associated with positive labor market and economic outcomes as is on-time completion. Education further contributes to the reduction in disparities associated with disadvantages during early life (Elman & O'Rand, 2004; O'Rand et al., 2009), resulting in a protective effect on inequalities in adulthood.

4.3 Childhood Poverty as a Determinant of Educational Attainment

Early childhood experiences of poverty and poor economic conditions influence overall processes of educational attainment during adulthood and are associated with selection into higher education (Lee, 2014; Wightman & Danziger, 2014). Poor children are more likely to drop out of high school and less likely to graduate from college than children who are more economically advantaged (Brooks-Gunn & Duncan, 1997; Lee, 2014). Children living in poverty experience barriers to early academic success, such as, low academic performance, lack of aspirations and goals, and weak ties to social institutions. Investments in education are lower for economically disadvantaged children, with poor attitudes and behaviors towards

education contributing to disparities in school readiness. Poor economic circumstances in childhood are associated with lower intelligence test scores, problems associated with learning and attention, and higher levels of emotional and behavioral problems (McLeod & Kaiser, 2004), which in turn result in the hindered development of a solid foundation in math and literacy that are necessary for academic success (Duncan et al., 2007; Magnuson et al., 2016).

Childhood poverty is further a reflection of low parental socioeconomic status (Duncan, Yeung, Brooks-Gunn & Smith, 1998). Parental socioeconomic status (SES) is a measure that encompasses aspects of parental education and attainment, and influences parental behaviors, attitudes, and the availability of resources (Astone & McLanahan, 1991; Crosnoe, 2001; Crosnoe, Mistry & Elder, 2002; Yeung et al., 2002). Parents who struggle financially have fewer resources and invest less into the development of children's human capital. Parental SES further dictates the expenditure of limited resources, such as the allocation of time and money. The lack of time is associated with parents that are less attentive, less engaged and supportive, and less energetic. Inconsistent parenting behaviors, such as leniency or severe punishments, and decreased parental emotional health further prevent the ability for low SES parents to effectively parent (Monserud & Elder, 2011). The scarcity of monetary resources results in less involvement in extra-curricular and school programs, additional expenses that contribute to positive developmental outcomes (Macmillan & Hagan, 2004). Furthermore, the lack of parental finances contributes to less nutritious diets, lower rates of physical activity, and increased exposure to various harmful toxins for children.

Despite the importance of childhood economic deprivation, findings from various studies reveal mixed results of the impact of poverty on adult attainment (Wagmiller et al., 2006; Duncan et al., 2010; Veldman, Bultmann, Almansa & Reijneveld, 2015). Inconsistent and modest associations of childhood poverty with educational attainment may be a function of snapshot measures of childhood poverty that do not account for other potential childhood factors, such as family background, that may contribute to reduced levels of education completion (Mayer, 1997). Instead, researchers commonly include potential co-occurring childhood

adversities as controls rather than considering the cumulative impact of multiple adversities on selection into higher education (Duncan et al., 1998; Lee, 2014).

More recently, researchers have considered various dimensions and indicators of childhood poverty in an attempt to capture the differential distribution of resources and capital that contribute to the economic climate of children. For example, studies include measures of parental income, parental employment status, welfare receipt, and financial struggle (for a review, see Duncan & Brooks-Gunn, 1997). Results indicate that considering various important aspects of childhood poverty contributes to differences in adult attainment outcomes and provides a more nuanced account of the overall experience of childhood economic hardship (Wagmiller et al., 2006). However, the dynamic interplay between indicators of economic hardship and additional childhood adversities that may shape educational attainment have not been adequately addressed in previous literature; specifically, the co-occurrence of adverse childhood experiences across different domains may contribute to an overall climate of childhood disadvantage that has important implications for success in education.

4.4 Interplay Between Childhood Poverty and Other Adverse Childhood Experiences

Childhood economic hardship does not occur in isolation of other adverse childhood experiences. Rather, childhood adversities occur in tandem with experiences of economic deprivation to create an overall context of disadvantage that can have a more cumulative and detrimental impact on adult outcomes (Wickrama et al., 2012). By focusing on a single domain of childhood adversity, researchers omit childhood stressors that may have important implications for adult attainment, and instead may wrongfully attribute the impact of clustering negative childhood conditions to the experience of poverty. This approach prevents an overall understanding of processes of early childhood disadvantage, and how the accumulation of adverse experiences, rather than the experience of childhood economic disadvantage alone, may be a powerful predictor of educational attainment (Friedman et al., 2015).

The co-occurrence of childhood adversities is an important facet of the overall experience of childhood disadvantage. An abundance of research links cumulative childhood adversity to disparities in physical and mental health (e.g., Schilling, Aseltine & Gore, 2008; Friedman et al., 2015); however, few studies consider the cumulative impact of multiple childhood adversities on educational attainment (Wickrama, O'Neal & Lee, 2016). Research applying a cumulative inequality theory consistently finds that early childhood conditions of disadvantage have a persisting and enduring impact on disparities in physical and mental health during adulthood (Ferraro & Shippee, 2009). A central principal of cumulative inequality theory is the focus on the social antecedents of inequality, primarily, the structurally generated inequality that cannot be attributed to individual actions or decisions. These inequalities arise out of the everyday social systems in which people are embedded, and further shape exposure to cumulative risk and adversity. The focus on the childhood roots of adult outcomes makes this theory an advantageous framework for examining the impact of cumulative childhood adversity on disparities in adult educational attainment.

Current measures of cumulative childhood adversity attempt to account for the overall experience of adverse childhood circumstances including exposure to economic hardship and poverty as well as other facets of childhood adversity, such as poor parental mental health and parental abuse (Green et al., 2010; Schafer & Ferraro, 2013). Results from previous studies on the impact of childhood adversities consistently demonstrate that it is the cumulative impact of adverse experiences that are more consequential for adult health disparities than any single aspect of childhood adversity (Felitti et al., 1998; Chapman et al., 2004; Schilling et al., 2007; Nurius, Logan-Greene & Green, 2012). Results suggest that exposure to cumulative adversity during childhood, multiple adversities including economic hardship, may further impact selection into higher education.

Therefore, additional adverse experiences associated with childhood poverty may contribute to the association between childhood economic circumstances and educational attainment. Simple measures of childhood poverty fail to account for the multitude of adverse experiences that occur during childhood, which may also have

an enduring impact on selection into higher education. While lower levels of educational attainment are linked to experiences of childhood poverty, results may be biased due to unmeasured characteristics of childhood disadvantage that have a high probability of co-occurring with economic hardship. Overlooking the underlying mechanisms of co-occurring adversities may result in the overestimation of the impact of childhood impoverishment on education outcomes. Although childhood experiences of economic hardship play a role in shaping educational attainment, it is imperative for researchers to consider the full realm of potential childhood adversities that work in tandem with childhood poverty in order to better understand the mechanisms underlying selection into higher education.

Some studies have considered the cumulative impact of economic hardship and family of origin circumstances as predictors of educational attainment. For example, Boden, Horwood, and Fergusson (2007) link the childhood context of disadvantage to education outcomes and find that the co-occurrence of socioeconomic, family of origin, and personal childhood adversities, rather than experiences of sexual and physical abuse alone, contribute to differences in educational attainment. Sobolewski and Amato (2005) find that parents with low SES are more likely to have poor mental health, with increased depressive symptomatology, which is associated with family dysfunction and further impacts childhood experiences of adversity.

While these studies extend the literature on the cumulative impact of multiple childhood adversities on educational attainment, the influence of neighborhood and school level adversities have been largely overlooked in recent research. Poverty during childhood is reflected in various aspects of life, including increased risk of experiencing poor environmental conditions and threats. Experiences of childhood economic conditions interact and co-occur with adverse childhood contexts and circumstances. This interplay between economic conditions and contextual adversities may have important implications for opportunities and barriers that shape the successful completion of schooling, and in turn adult achievement (Boden et al., 2007; Boardman, Alexander, Miech, MacMillan & Shanahan, 2012).

Neighborhood and school conditions are associated with childhood poverty (Santiago et al., 2011; Morrissey & Vinopal, 2017). Children from low socioeconomic backgrounds are more likely to reside in poor communities with other economically disadvantaged families and to experience increased exposure to disordered neighborhoods that lack a sense of cohesion (Ross, Mirowsky & Pribesh, 2001; Johnson & Schoeni, 2007; Kravitz-Wirtz, 2016). Furthermore, poor children are more likely to attend schools with scarce resources and an overall negative school environment. Feelings of alienation, disconnection, and lack of safety in the school environment may further contribute to poor educational outcomes for impoverished children.

Patterns of exposure to adversity may have a differential impact on the completion of formal education. Research on the long-term processes of status inequality would benefit from incorporating measures of exposure to cumulative childhood adversity. Childhood is an influential period of the life course in which cognitive, physical and emotional development is occurring (Schafer, Ferraro & Mustillo, 2011); therefore, the study of cumulative childhood adversity is crucial to understanding socioeconomic attainment in adulthood. Given the persisting and detrimental impact of disadvantage and inequality, it is essential that research consider how cumulative childhood adversity can initiate pathways of disadvantage that transmit and maintain socioeconomic status across the life course.

Utilizing data from the Panel Study of Income Dynamics (PSID) and the supplemental Childhood Retrospective Circumstances Study (CRCS), this research examines the influence of multiple adverse circumstances in childhood on high school completion and on-time college completion. Following a cumulative inequality theory, exposure to cumulative childhood adversity is expected to contribute to disparities in educational attainment with the most disadvantaged persons having the lowest level of degree completion. Analyses focus on the unique clustering, or co-occurrence, of adverse childhood experiences, and include measures of neighborhood and school characteristics that further influence exposure to adversities. In contrast to previous studies, this measure of cumulative childhood adversity identifies similar patterns of exposure to adversity, and

estimates whether variations in the experience and co-occurrence of cumulative adversity contribute to differences in educational attainment.

4.5 Methodology

4.5.1 The Data

The present study links the most recent 2015 core data from the Panel Study of Income Dynamics (PSID) and data from the 2014 Childhood Retrospective Circumstances Study (CRCS), a subset of main PSID respondents. The PSID is an ongoing, nationally representative sample of households and families in the United States (Panel Study of Income Dynamics, 2016). Data collection began in 1968 and longitudinally follows individuals annually until 1997 and biennially thereafter (PSID Main Interview User Manual, 2017). In 2014, 8,072 participants from the PSID 2013 core survey were interviewed for the CRCS, which provides retrospective accounts of experiences of adversity that occurred prior to the age of 17 (McGonagle & Freedman, 2015). Indicators of adversity span multiple childhood domains and include various childhood adverse experiences, such as financial struggle, neighborhood disorder, lack of school safety, and poor parental mental health. The abundance of childhood adversities included in the CRCS allows for the development of a more comprehensive and inclusive measure of cumulative childhood adversity than has been previously utilized in research.

4.5.2 The Analytic Sample

In order to conduct the analysis necessary for the present study, the sample was constrained in a few key ways. Participants who were not included in the CRCS were dropped from the sample. Persons who do not finish college on-time are not afforded the same benefits of higher education as persons who do complete college on-time (Elman & O'Rand, 2014). In order to focus on on-time educational attainment, only participants aged 25-35 during the 2015 PSID core survey were included in the study (N=2071). The study was further limited due to missing measures on key covariates. Approximately 3 percent of participants missing data on race, sex, age, or parental education were dropped from the study (N=1999).

LCA allows for missing values on indicators; therefore, respondents missing on indicators of adversity, approximately 10 percent of the total sample, were not dropped from the sample. Missing data analysis revealed that approximately 86 percent of participants (9 percent of the total sample) missing on indicators of adversity were missing on 3 indicators or less. Only 1 percent of the total sample was missing on more than 3 adversity indicators. Further analysis demonstrated that non-whites were 1.6 times more likely to be missing on an indicator of adversity. Participants with lower levels of education were also more likely to have missing values. The final sample contains 1999 participants.

4.6 Measures

4.6.1 Dependent Variable

Educational Attainment: The outcome variable of focus was a measure of educational attainment observed when participants were between the ages of 25 and 35. Education was categorized into three categories: college degree, high school degree, or no high school degree. Following previous researchers, participants who obtained a GED were considered high school graduates and included in the high school degree category (McLeod & Fettes, 2007; Montez & Hayward, 2014).

4.6.2 Independent Variable

Cumulative Childhood Adversity: The predictor variable was a measure of cumulative childhood adversity. Using data from the PSID-CRCS, retrospective accounts of adverse childhood experiences were used to identify patterns of exposure to adversity. Childhood adversities were all dichotomous measures indicating whether a stressor did or did not occur during childhood. Latent class analysis (discussed below) was then utilized to group participants into similar patterns of experience. Adversities included in the present study fall into six categories: *family context* (parental divorce, poor parental mental health, parental abuse, sibling abuse, family disorder); *school circumstances* (bullied in school, bullied outside of school, perceptions of unsafe school, childhood loneliness, repeated a grade); *health status* (poor childhood health, poor childhood mental

health, missed school due to poor health); *neighborhood environment* (neighborhood disorder, neighborhood cohesion); *economic hardship* (perceived poor financial comparison, paternal unemployment, maternal unemployment, struggled financially, received welfare); and *involvement in crime* (victim of a crime, arrested, convicted of a crime, sentenced to probation).

In order to ensure that indicators of childhood adversity were not highly correlated, a multicollinearity analysis was conducted. Results from estimated variable inflation factors (VIF) indicated that there were no strong correlations among indicator variables. VIFs across all adversity indicators were lower than 10, and the final mean VIF was close to 1.

4.6.3 Control Variables

Other Covariates: Sex, race, age, and parental education were included in the statistical models as controls. Sex was a dichotomous variable coded male (0) and female (1). Race was coded as white (0) and non-white (1). Age was a continuous variable ranging from 25-35. Lastly, parental education was a measure of the highest level of education of the most educated parent. Responses were less than high school degree, high school degree, college degree or higher, and don't know.

4.7 Overview of Statistical Analysis

Initial disadvantages and conditions during childhood contribute to the development of inequalities and can have a lasting impact on educational attainment and adult success across the life course (Ferraro & Shippee, 2009). Latent class analysis (LCA; Collins & Lanza, 2010), a person-centered statistical approach, was used to identify unobserved groups with similar characteristics in a set of data. LCA relies on probabilistic estimates to categorize respondents into mutually exclusive and exhaustive classes based on similar patterns of experience. In the present analysis, LCA was used to identify classes of childhood adversity that had a high probability of co-occurring. Class membership of participants was determined by the highest posterior probability of membership,

a reflection of similar responses to indicators of adverse childhood experiences. Utilizing LCA considered the overall heterogeneity across experiences of childhood adversity, and provided a more accurate estimate of patterns of exposure to adversity than previous measures of cumulative adversity that rely on variable-centered approaches or typical sum scores of total adversities experienced (Heidinger, 2018).

Each participant has a probability of belonging to each class; however, due to the probabilistic nature of LCA, true class membership of participants is not known. When latent classes are used as an independent variable to predict an outcome, the LCA “classify-analyze” approach is often utilized (Bray, Lanza & Tan, 2015). This approach uses the class with the highest probability of membership to classify participants and treats identified classes as known. This approach may introduce bias and lead to attenuated estimates in the effects of the latent classes on the outcome variable (Bray et al., 2015). In order to remedy potential biases, Bray and colleagues (2015) suggest utilizing an inclusive LCA model when identifying the optimal number of classes. Inclusive models include all variables contained in the final analytic model in the LCA classification model.

In the present study, both inclusive and non-inclusive models with two to ten classes were estimated to determine the optimal number of classes that best fit the data. LCA models were estimated using Stata 15 (StataCorp, 2017), and the Stata LCA plugin (Lanza, Dziak, Huang, Wagner & Collins, 2011). Akaike information criterion (AIC; Akaike, 1987) and Bayesian information criterion (BIC; Schwarz, 1978) were compared across models to identify the most optimal number of classes for analysis. Smaller AICs and BICs generally indicate better model fit. Model fit statistics and theoretically driven interpretations determined the 6-class non-inclusive model to be the best fit for the data. See Appendix A: Table A4 for fit statistics. Once latent classes of patterns of adverse experience were identified, they were used to predict differences in educational attainment. Logistic regressions were utilized to predict high school completion, and then college completion among high school graduates.

4.8 Results

The results of the LCA provide the probability of membership in each latent class as well as the probability of experiencing each indicator of adversity for each latent class. Table 4.1 displays the weighted proportion of the sample in each class, as well as, the adversities with a conditional probability over 60 percent for each latent class. Conditional probabilities between 50 and 60 percent were also included to indicate an elevated risk of experience. Class 1, No to Low Adversity, was comprised of participants who had a high probability of experiencing no to low adversities (41%). In turn, a majority of the sample, approximately 60%, had a high probability of belonging to a class experiencing adversity during childhood. Participants in Class 2, Involvement in Criminal Activity, had a high probability of being arrested, on probation, or convicted of a crime during childhood (8%). Class 3, Bullied and Alone, was made up of participants who had a high probability of reporting being bullied and feeling alone during childhood (13%).

Participants who had a high probability of experiencing Financial Struggle belonged to Class 4 (25%). This was the largest adversity class, with a quarter of the sample having a high probability of experiencing economic strain during childhood. Taken together, participants in Class 5 and Class 6 made up approximately 16% of the sample and had a high probability of experiencing multiple adversities. However, LCA classification results indicated that these two classes differed in the types of adversities with a high probability of occurrence, revealing that there were differences in the patterns of exposure to multiple adversities. Class 5, Multiple Adversities Across Different Domains, was comprised of respondents who had a high probability of experiencing multiple adversities including experiences of financial struggle, bullied at school, poor parental mental health, lack of neighborhood cohesion, and parental abuse (10%). Class 6, Multiple Adversities II, had the smallest number of participants (6%). Respondents in this class had a high probability of being involved in criminal activity, experiencing economic hardship, and poor parental mental health.

Table 10: Weighted Probability of Experiencing Adversities by Class (N=1999)

LCA Classes of Cumulative Childhood Adversity	Adversities with a Conditional Probability over 60% and Elevated Risk over 50%	n	%
Class 1: "No to Low Adversity"	(Reference)	810	40.52
Class 2: "Involvement in Criminal Activity"	Arrested, Probation, Convicted	164	8.19
Class 3: "Bullied and Alone"	Bullied school, Childhood loneliness, elevated risk Bullied outside school	262	13.11
Class 4: "Financial Struggle"	Financial struggle, elevated risk Parental mental health, and Childhood welfare	459	22.98
Class 5: "Multiple Adversities across Different Domains"	Financial struggle, Bullied school, Parental mental health, Childhood loneliness, Sibling abuse, Financial comparison, Neighborhood cohesion, Childhood mental health, Mom unemployment, Parental abuse, elevated risk of Bullied outside school, Unhappy at school, Neighborhood disorder, and childhood welfare	191	9.57
Class 6: "Multiple Adversities II"	Arrested, Financial Struggle, Probation, Parental mental health, Childhood welfare, Convicted, Bullied school, elevated risk of Sibling abuse, Parental abuse, Childhood mental health, Neighborhood cohesion, Financial comparison, Neighborhood disorder, Childhood loneliness, and Mom unemployment	113	5.63

Table 4.2 presents the weighted proportions and means for key variables by latent class. Across all classes, the majority of respondents graduated from high school or earned a GED. However, it is important to note that in the No to Low Adversity class (Class 1), 99% of respondents completed high school. In contrast, only 81% of respondents in the Multiple Adversities II class (Class 6), completed high school. The distribution of college completion was less consistent across classes. The No to Low Adversity class (Class 1), and the Bullied and Alone class (Class 3), had a comparable proportion of college graduates, 68% and 66%

respectively. The Involvement in Criminal Activity class (Class 2), Financial Struggle class (Class 4), and Multiple Adversities Across Different Domains class (Class 5) all had a distribution indicating that approximately half the respondents completed college. Again, the largest difference was for the Multiple Adversities II class (Class 6) where only 24% of respondents graduated from college.

Women comprised the majority of most classes, except for the Involvement in Criminal Activity class (Class 2) and the Multiple Adversities II class (Class 6), which had a larger proportion of men. Parental education was also noteworthy for the Multiple Adversities II class (Class 6). The proportion of respondents in this class that had a parent with less than a high school education was at least double that of the other classes. There was also a low proportion of parents with a college degree or higher for respondents in this class. The average age across classes was approximately 29 years. The majority of the sample identified as white.

Table 11: Weighted proportions and means for key variables by latent class, PSID 2015 (N=1999)

Variable	Class 1 (REF) "No to Low Adversity"	Class 2 "Involvement in Criminal Activity"	Class 3 "Bullied and Alone"	Class 4 "Financial Struggle"	Class 5 "Multiple Adversities Across Different Domains"	Class 6 "Multiple Adversities II"
High School						
Graduate	0.99	0.96	0.99	0.96	0.94	0.81
Non-Graduate	0.01	0.04	0.01	0.04	0.06	0.19
College						
Graduate	0.68	0.45	0.66	0.51	0.45	0.24
Non-Graduate	0.32	0.55	0.34	0.49	0.55	0.76
Gender						
Female	0.58	0.28	0.59	0.63	0.63	0.39
Male	0.42	0.72	0.41	0.37	0.37	0.61
Race						
Non-White	0.14	0.14	0.13	0.24	0.14	0.20
White	0.86	0.86	0.87	0.76	0.86	0.80
Age (years)	29.05	28.93	30.07	29.32	29.45	29.39
Parental Education						
Less than High School	0.02	0.02	0.03	0.07	0.08	0.15
High School	0.39	0.44	0.40	0.45	0.51	0.50
College Degree or Higher	0.53	0.47	0.52	0.35	0.33	0.26
Missing	0.06	0.07	0.05	0.13	0.08	0.09

The next step of the analysis was to assess whether experiences of childhood adversity contribute to lower levels of high school completion for young adults.

Table 4.3 presents results from logistic regression models predicting high school

degree completion by distinct histories of cumulative childhood adversity. Patterns of exposure to adverse childhood experiences were used in order to capture the co-occurrence of cumulative childhood adversity. Model 1 presents the crude association. Participants in all adversity classes, except for the Bullied and Alone class (Class 2), are significantly less likely to complete high school compared to participants in the reference No to Low Adversity category (Class 1). Respondents in the Involvement in Criminal Activity class (Class 2) are 68% less likely to complete high school than the reference category (OR= .32). Respondents in the Multiple Adversities II class (Class 6) are 85% less likely to complete high school than the reference category (OR= .15). Results for these two classes are statistically significant ($p < 0.001$).

Model 2 controls for key demographic variables sex, race, age, and parental education. Net of sociodemographic controls, respondents in the Involvement in Criminal Activity class (Class 2), the Multiple Adversities Across Different Domains class (Class 5), and the Multiple Adversities II class (Class 6) are still significantly less likely to complete high school compared to their counterparts in the reference No to Low Adversity class (Class 1). The Financial Struggle class (Class 4) is no longer statistically significant net of controls.

Table 12: Log Odds and Odd Ratios from Logistic Regression Models Predicting High School Degree from Histories of Cumulative Childhood Adversity (N=1999)

	High School Degree		High School Degree	
	Log Odds	Odds Ratio	Log Odds	Odds ratio
LCA Classes of Childhood Adversity				
Class 1: "No to Low Adversity"	(REF)	(REF)	(REF)	(REF)
Class 2 "Involvement in Criminal Activity"	-1.14*** (.316)	.32	-.96** (.332)	.38
Class 3 "Bullied and Alone "	.21 (.458)	1.23	.08 (.466)	1.08
Class 4 "Financial Struggle"	-.68** (.268)	.51	-.34 (.275)	.71
Class 5 "Multiple Adversities across Different Domains"	-.91** (.333)	.40	-.77* (.344)	.46
Class 6 "Multiple Adversities II"	-1.90*** (.307)	.15	-1.56*** (.324)	.21
Sex (ref: male)				
Female			.42* (.203)	1.51
Race (ref: white)				
Non-White			-1.12*** (.210)	.33
Age				
			.08* (.033)	1.08
Parental Education (ref: College or Higher)				
Less than High School			-1.93*** (.482)	.15
High School			-1.85*** (.478)	.16
Don't know, Missing			-1.94*** (.380)	.14

*p<.05; **p<.01; ***p<.001

The last step of the analysis examines the association between patterns of co-occurring cumulative childhood adversity and college completion among high school graduates, and assesses whether there is variation in the probability of completing college by experiences of cumulative adversity. Table 4.4 presents results from logistic regression models predicting college degree among participants who acquired a high school degree. In model 1, participants across all classes of adversity, except the Bullied and Alone class (Class 3) have significantly lower levels of college completion than respondents in the reference No to Low Adversity class (Class 1). Respondents in the Involvement in Criminal Activity class (Class 2) are 58% less likely to graduate from college compared to the reference class (OR=.42). Respondents in the Multiple Adversities II class (Class 6), are 72%

less likely to graduate from college compared to the reference class (OR=.28). Results indicate that respondents in the Multiple Adversities II class (Class 6) have the lowest levels of educational attainment compared to respondents who were not exposed to adversities during childhood. Model 2 controls for sociodemographic variables. All adversity classes, except the Bullied and Alone class (Class 3), maintain statistically significant lower levels of college completion than the reference class net of controls.

Table 13: Log Odds and Odd Ratios from Logistic Regression Models Predicting College Degree from Histories of Cumulative Childhood Adversity among High School Graduates (N=1879)

LCA Classes of Childhood Adversity	College Degree		College Degree	
	Log Odds	Odds Ratio	Log Odds	Odds ratio
Class 1: "No to Low Adversity"	(REF)	(REF)	(REF)	(REF)
Class 2 " Involvement in Criminal Activity"	-.87*** (.176)	.42	-.770*** (.176)	.46
Class 3 " Bullied and Alone "	-.06 (.158)	.94	-.146 (.160)	.87
Class 4 "Financial Struggle"	-.52*** (.118)	.60	-.276* (.119)	.76
Class 5 "Multiple Adversities across Different Domains"	-.64*** (.170)	.53	-.480** (.170)	.61
Class 6 "Multiple Adversities II"	-1.28*** (.237)	.28	-.957*** (.238)	.38
Sex (ref: male)				
Female			.385*** (.105)	1.47
Race (ref: white)				
Non-White			-.812*** (.109)	.44
Age			.063 (.017)	1.07
Parents Education (ref: College or Higher)				
Less than High School			-1.92*** (.217)	.15
High School			-1.08*** (.111)	.34
Don't know, Missing			-.972*** (.217)	.38

*p<.05; **p<.01; ***p<.001

4.9 Discussion

Experiences of economic hardship during childhood have been linked to an array of detrimental adult outcomes, including lower educational attainment. However, previous literature on educational and adult attainment has paid relatively little

attention to cumulative measures of childhood adversity, instead focusing on childhood poverty as the primary predictor of educational attainment and subsequent adult socioeconomic status. While results have made an important contribution to our understanding of the long-term impacts of childhood economic disadvantage on adult outcomes, this approach overlooks the interplay between childhood poverty and other childhood adversities that co-occur and have an important influence on patterns of attainment in early adulthood.

Utilizing data from the PSID-CRCS, the current study considers a cumulative measure of childhood adversity that includes childhood economic hardship as well as other childhood adversities across different childhood domains, such as those arising from family of origin circumstances, neighborhood conditions, and school experiences. Rather than relying on additive measures of cumulative childhood adversity, the present study utilized latent class analysis to identify similar patterns of exposure to adverse childhood experiences. This person-centered approach took into consideration the heterogeneity in the exposure and experience of adverse childhood circumstances and grouped participants based on similar experiences of co-occurring adversity. Distinct latent classes of childhood adversity were then utilized to assess how patterns of exposure to childhood adversity differentially impacted high school and college completion during early adulthood.

Overall findings are consistent with cumulative inequality theory, whereby exposure to initial adverse experiences during childhood contribute to disparities in early adult educational attainment. The implications of educational attainment as a key determinant of adult employment and income further suggest that experiences of adversity may have long-term detrimental consequences for overall adult socioeconomic status across the life course. Two key findings emerge from the present study, which taken together contribute to a better understanding of the cumulative impact of exposure to patterns of co-occurring childhood adversity on selection into higher education during young adulthood.

First, including measures of adversity across various childhood domains, rather than focusing on single indicators of childhood poverty, provided a better

understanding of the experience of cumulative adversity during childhood and the overall economic and social environment of children. Results indicated that certain adversities had a high probability of co-occurring, and it was the variability in patterns of co-occurring adverse experiences that contributed to the differential impact on processes of educational attainment in young adulthood. Relying on simple measures of childhood poverty does not adequately capture the full experience of childhood disadvantage. Rather, clusters of childhood adversities operate as a fundamental source of inequality that produces a context of disadvantage during childhood and leads to detrimental long-term consequences in adulthood.

Experiences of Financial Struggle (Class 4) had a modest association with lower levels of high school completion and college completion. In contrast, the cumulative impact of economic adversity coupled with other adverse childhood experiences had a stronger detrimental impact on both high school and college completion. In other words, considering the co-occurrence revealed patterns of exposure whereby people who experienced financial hardship in tandem with other adversities had significantly lower levels of both high school and college completion. Measures of the co-occurrence of adverse childhood experiences provided a better representation of the total spectrum of childhood adversities. The combined occurrences of economic hardship and family origin circumstances, such as poor parental mental health, sibling abuse, and parental abuse, were important for selection into higher education.

Economic hardship further contributes to the availability and allocation of family resources, and further impacts the social environment of children. Childhood poverty provides a context of disadvantage that dictates the quality of schools and neighborhoods in which children are situated. Economic conditions not only shape neighborhood and school circumstances, but adversities that arise from these social contexts co-occur with experiences of poverty and have a detrimental impact on adult educational attainment. Compared to the reference class (Class 1), the experience of Multiple Adversities across Different Domains (Class 5), such as living in a disadvantaged neighborhood and having a parent with mental health problems,

coupled with experiences of financial struggle and financial comparison, had a stronger association with lower levels of educational attainment than the experience of only Financial Struggle (Class 4).

Second, two classes were identified with participants that experienced multiple adversities across various childhood domains; however, the strength of association differed across both classes indicating that the composition of co-occurring adversities had a differential impact on educational attainment. Adverse factors across multiple domains reduced educational success; however, levels of high school and college completion differed by variations in the accumulation of multiple adversities. Participants in both classes were less likely to finish high school and college compared to participants with No to Low Adversity (Class 1). The Multiple Adversities across Different Domains class (Class 5) was comprised of participants with a high probability of experiencing financial hardship, family of origin adversities, and poor neighborhood and school conditions.

Similarly, participants in the Multiple Adversities II class (Class 6) were characterized by a high probability of experiencing economic hardship, poor parental mental health, and bullying in school; however, this class differed due to the high probability of experiencing additional adversity in the form of involvement in criminal activity. While a high probability of Involvement in Criminal Activity (Class 2) was associated with significantly lower levels of educational attainment, the co-occurrence of multiple adversities coupled with involvement in criminal activity resulted in the lowest levels of educational attainment compared to participants who experienced No to Low Adversity (Class 1). Despite some overlapping experiences of adversity across both classes, levels of educational attainment were much lower for this class (Class 6) than for participants in the Multiple Adversities across Different Domains class (Class 5) compared to the reference class (Class 1).

Results suggest that this was the most disadvantaged class, and that the experience of these multiple adversities coupled with involvement in criminal activity impede the successful completion of high school. For participants in this

Multiple Adversities II class (Class 6) that did complete high school, there was a low probability that college graduation was attained. The gradient in education is clear with participants in this class over 80 percent less likely to complete high school, and over 70 percent less likely to attain a college degree compared to the reference class who experienced No to Low Adversity (Class 1). Circumstances, such as the lack of resources, lack of parental support, and in particular involvement with criminal behavior may compromise success and further contribute to an increased risk of dropping out of high school and not attending or completing college, resulting in the overall low educational attainment of this disadvantaged group.

4.10 Limitations and Future Directions

The current research provides a better understanding of childhood adversity as a mechanism underlying educational attainment; however, despite the strengths of the study, a few limitations must be addressed. First, measures of childhood adversity are collected retrospectively from adult participants and may result in recall bias, whereby participants may misremember or misinterpret childhood circumstances due to current health and economic conditions. Persons with lower levels of educational attainment may over report experiences of adversity to account for current socioeconomic status. However, previous studies find that while there is some bias in retrospective reporting of exposure to childhood adversity during adulthood, in general, the potential biases are minimal and do not invalidate reported childhood adversities (Hardt & Rutter, 2004). Furthermore, the PSID-CRCS is the only nationally representative, long-term survey that provides detailed reports on multiple childhood circumstances, and is a valuable dataset to study patterns of co-occurrence across a broad spectrum of childhood adversities.

Second, future studies should consider differences among participants who drop out of college. The current study focuses on high school graduates and their college attainment; however, individuals who apply and enroll in college but subsequently drop out may be different from students who never apply or enroll in college. Students who drop out of college have the credentials necessary to pursue

college, unlike students who are unable to enroll in college due to lower academic performance in high school. Lastly, future researchers should include measures of resilience. Previous research shows that while the majority of children who experience adverse childhood circumstances are at an elevated risk for experiencing an array of detrimental outcomes in adulthood, not all children end up in disadvantaged circumstances. Focusing on the underlying mechanisms that contribute to the overall selection into higher education would provide a better understanding of processes of disadvantage and success across the life course. Measures of resilience in children who experience multiple adversities would be an important contribution to the ongoing literature on exposure to cumulative childhood adversity.

4.11 Conclusion

Taken as a whole, patterns of exposure to childhood adversity have a detrimental impact on educational attainment in young adulthood and may further result in long-term processes of disadvantage and inequality across the life course. Results confirm that the impact of childhood adversities cannot be reduced to experiences of poverty and economic hardship; rather, the interplay between socioeconomic circumstances and various other adversities are important to consider in order to adequately capture the overall climate of childhood disadvantage. Educational attainment contributes to socioeconomic development and is a marker of adult attainment and status. While hard work and determination may play a part in adult success, certain children grow up in contexts of disadvantage that are not conducive to the successful attainment of education. Structural factors and contextual disparities during childhood hinder the completion of high school and college, especially for the most disadvantaged children.

Results derived from this study can be used to inform policies that target resources towards increasing access to education, especially for disadvantaged children. Exposure to a multitude of childhood adversities across different domains is important for selection into higher education; therefore, initiatives should

consider the full spectrum of potential childhood adversities and move away from focusing on alleviating economic hardship in order to reduce inequalities in adult attainment. It is imperative for future policies to account for the co-occurrence of adversities that cumulatively hinder high school and college completion and overall adult success, and to focus on improving attainment for children exposed to multiple adversities, such as providing more resources and funding to impoverished schools and neighborhoods. Childhood is a salient period during the life course, and an ideal target for policy interventions.

4.12 References

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Chapter 5

5 Conclusion

5.1 Research Objectives

The three integrated articles that make up this dissertation draw on both the stress process model and life course perspective to assess how differences in the accumulation of childhood adversity contribute to inequalities in adult mental health and educational attainment. Exposure to adverse childhood experiences are consistently linked to disparities in adult outcomes across the life course, whereby initial experiences of adversity during childhood set in motion chains of disadvantage that accumulate into adolescence and continue well into old age (Felitti et al., 1998; Chapman et al., 2004; Schilling, Aseltine & Gore, 2007; Johnson & Schoeni, 2011; Schafer & Ferraro, 2013). However, little is known about the heterogeneity in experiences of adversity during childhood, and how differences in the accumulation of adversity during childhood can have important implications for an array of adult outcomes.

The stress process model asserts that exposure to childhood adversity is socially patterned (Pearlin, 1989; Avison, 2010). Adversities have a high propensity of co-occurring in tandem with other adversities; however, previous cumulative measures of adversity have generally not considered differences in exposure to multiple adversities that increase the risk of exposure to additional adversities and reflect the broader structural locations in which children are embedded (Björkenstam et al., 2015). While some studies have attempted to untangle differences in the accumulation and experience of childhood adversities (Schilling, Aseltine & Gore, 2008; Schafer & Ferraro, 2013; Friedman, Montez, Sheehan, Guenewald & Seeman, 2015), differences in the conceptualization and modeling of

cumulative adversity measures across studies and disciplines have resulted in inconsistent findings and have hindered the overall understanding of the underlying processes of childhood disadvantage that have an enduring long-term impact and contribute to disparities in adulthood.

In order to address and improve ongoing disparities in adult mental health and educational attainment, it is imperative to first attain a better understanding of processes of inequality and adversity during childhood. This dissertation aims to fill an important gap in the literature by first assessing how differences in the conceptualization and measurement of cumulative childhood adversity contribute to variations in estimates of adult mental health and the overall interpretation of results. Measures of cumulative childhood adversity challenge the typical sum score measure. Results identify a more adequate and comprehensive measure of cumulative childhood adversity that addresses the heterogeneity in the exposure and experience of adverse childhood circumstances. Subsequent analyses further utilize this measure of cumulative childhood adversity to quantitatively assess the impact of cumulative patterns of co-occurring adversities on trajectories of mental health across adulthood, and on educational attainment in young adulthood.

5.2 Integrated Overview of Major Findings

Overall, this dissertation extends existing literature on the long-term implications of childhood adversity on adult outcomes in three key ways. First, results contribute to the growing literature across various disciplines that identify the importance of moving away from a typical sum score measure of cumulative childhood adversity towards a more comprehensive measure that considers the heterogeneity in the exposure to adverse childhood experiences across multiple domains (Schilling et al., 2008; Schafer & Ferraro, 2013; Björkenstam et al., 2015; Friedman et al., 2015). Chapter 2 compared four distinct measures of cumulative childhood adversity in

order to assess variations in estimates of psychological distress and the interpretation of results across distinct measures of cumulative adversity. Measures of adversity included a typical sum score of total adversities experienced, and three other measures of adversity that categorized respondents in meaningful ways across varying dimensions of adversity. The three additional measures were a regression-based measure focusing on differences in relative severity of adversities, a variable-centered measure based on differences in type of adversities, and lastly a person-centered approach that identified similar patterns of co-occurring adversities across dimensions of severity and type.

Results indicated that estimates of the strength of association between cumulative childhood adversity and adult psychological distress, and the interpretation of results, depended on the modeling and conceptualization of cumulative childhood adversity. All three measures of cumulative childhood adversity that considered the heterogeneity across adverse childhood experiences provided improved estimates of the effect of cumulative childhood adversity on adult psychological distress compared to the typical sum score of total adversities experienced. Using latent class analysis further offered a methodological contribution to ongoing literature on cumulative childhood adversity. This person-centered approach identified similar patterns of co-occurring adversities and provided the most promising technique for measuring the heterogeneity across childhood adversity. This approach focused on variations in the experience and co-occurrence of adversity across participants, rather than relying on variable-centered assumptions that were unable to account for the clustering of stressors across different domains and components of adversity. The identified measure captured distinct histories of disadvantage that varied in severity and type, and provided a more accurate account of childhood disadvantage and processes of accumulation across childhood adversities that have detrimental consequences for adult outcomes. This measure was used in subsequent papers to assess how exposure to distinct patterns of co-occurring adversities impact trajectories of psychological distress and adult educational attainment.

The second key contribution of this dissertation is evidence of the importance of considering co-occurring patterns of exposure to adverse childhood experiences for understanding inequalities in adulthood, and the benefits of broadening the stress universe for children in order to include various adversities across different childhood domains that have been previously overlooked in cumulative measures of adversity (Avison, 2010). In accordance with the stress process model and life course perspective, exposure to childhood adversity was not an uncommon experience, with the majority of participants experiencing childhood adversity (Friedman et al., 2015). Overall results supported the cumulative inequality theory and indicate that experiences of childhood adversity are associated with worse mental health and lower levels of educational attainment during adulthood (Ferraro & Shippee, 2009). This association persisted even after adjusting for important social and demographic characteristics, and in general indicated the strong direct contribution of cumulative childhood adversity in shaping adult outcomes. In other words, childhood experiences of adversity initiate processes of disadvantage that continue well into adulthood, and have important implications for adult inequalities in health and attainment.

Adversities had a high probability of co-occurring during childhood, and different patterns of exposure to adversity resulted in differential outcomes in both psychological distress and educational attainment. Chapter 3 examined the differential impact of cumulative histories of adverse experiences on trajectories of psychological distress spanning 14 years of adulthood. Exposure to disadvantage during childhood was associated with higher initial levels of psychological distress compared to participants who did not experience adversity during childhood. The magnitude of the association differed across various patterns of adverse exposure indicating the importance of considering the heterogeneity in co-occurring adversity that have a differential impact depending on patterns of exposure.

Furthermore, contextual adversities were identified as important contributors to experiences of adversity during childhood. Although exposure to

adverse neighborhoods and impoverished schools are important contextual adversities that are consistently linked to disparities in adult outcomes (Wheaton & Clarke, 2003; Arseneault, Bowes & Shakoor, 2010), cumulative childhood adversity measures typically focus on family-level indicators of adversity, such as parental divorce, parental mental health, and parental employment status (e.g., Chapman et al., 2004; Nurius et al., 2012). In accordance with the stress process model that emphasizes the importance of considering context in measures of exposure to stressors, the improved measure of cumulative childhood adversity included indicators of school and neighborhood circumstances that have been largely overlooked in previous cumulative measures. Inclusion of these contextual, ongoing adversities in the current dissertation contributes to the expansion of the stress universe for children, and broadens the overall range of childhood stressors included in measures of cumulative adversity. Constructing a stress universe for children requires including various adverse childhood experiences that occur across different domains of children's lives. Broadening the range of childhood adversities considered in measures of cumulative childhood adversity results in a more accurate measure of the total experience of childhood stressors, and ensures that the total climate of childhood disadvantage is not wrongfully attributed to the experience of a single measured stressor.

Results from Chapter 3 further confirmed the importance of broadening the range of childhood adversities. Findings indicated that the strength of association with psychological distress for participants with a high probability of experiencing neighborhood disadvantage coupled with financial struggle was larger for initial levels of psychological distress than the association for participants with a high probability of experiencing only financial struggle, compared to the reference category. In other words, the contextual experience of cumulative disadvantage across the domains of family and neighborhoods during childhood may have been more detrimental than the experience of economic hardship alone. Results from Chapter 4 further confirmed the importance of considering co-occurring adversities and contextual adverse experiences. Analyses in this chapter determined that

experiences of economic hardship had a modest association with the probability of completing high school and college; however, experiences of economic hardship coupled with various co-occurring adversities had a stronger impact on the probability of completing both high school and college, compared to the reference category.

Third, results from this dissertation help identify the most at risk and disadvantaged children, revealing that for a small number of participants the cumulative experience of exposure to multiple adversities across different domains during childhood had the most pervasive and enduring impact on adult outcomes. Overall, results indicated that these participants were the most disadvantaged and experienced more detrimental childhoods in terms of exposure to cumulative adversity. Chapter 3 determined that the most disadvantaged group of participants, characterized by a high probability of being exposed to multiple adversities across different domains including financial struggle, poor parental mental health, bullying, and loneliness, had the highest initial levels of psychological distress compared to participants who did not have a history of experiencing childhood adversities. Moreover, results from latent growth curve analysis revealed that the already high initial levels of psychological distress worsened over time for this same group of disadvantaged participants, but not for any other group of participants who experienced childhood adversity.

Results from Chapter 4 support and further extend this finding. Analyses of cumulative patterns of adversity on educational attainment focused on a cohort of young adults. Results identified two groups with a high probability of experiencing multiple adversities across different domains. However, the strength of association with the probability of completing high school and college differed for these two groups, despite both experiencing an array of hardship. Differences in the association suggested that not only was the accumulation of multiple adversities an important contributor to educational attainment, but the composition of co-

occurring adversities across type and severity of stressors may be another important facet of cumulative childhood adversity to consider.

Certain adversities may differentially increase the risk of experiencing additional disadvantage and matter more for selection into higher education. Previous literature asserts that there is heterogeneity in the severity and type of accumulating adverse childhood experiences. While the present study identified patterns of co-occurring adversities, further analysis on the type and severity of stressors within co-occurring patterns of adversity may further provide important insight into the variations in the experience of adversity and the association with disparities in adult outcomes. The experience of multiple adversities with high relative severity may be more detrimental than the experience of multiple adversities with low relative severity. Overall, results confirm the dynamic and complex processes of accumulation and patterns of exposure to adversity on disparities in adult outcomes.

5.3 Limitations and Future Directions

While results from this dissertation contribute to the overall understanding of underlying processes of cumulative childhood disadvantage that contribute to disparities in adult outcomes, there are some limitations that should be considered.

First, measures of cumulative childhood adversity relied on retrospective adult accounts of childhood conditions. Similar to previous research, the lack of good prospective data to analyze the impact of childhood experiences on adult outcomes results in an overreliance on retrospective accounts of childhood circumstances. This approach could result in potential recall or reporting bias due to the propensity for respondents, especially the most disadvantaged, to amplify or misremember early childhood experiences (Yancura & Aldwin, 2009).

Recollection of childhood conditions may further be shaped by a respondent's current state or circumstance. Adult respondents may under report experiences of adversity during childhood due to individual features such as embarrassment or forgetfulness. On the other hand, current mental state or hardship may result in an over-reporting of adverse childhood experiences as a means of unconsciously explaining detrimental adult outcomes. Despite these potential biases, studies that focus on assessing the reliability of retrospective reports of childhood adversity reveal that while some biases may arise in recall, these biases remain relatively small and do not impact the overall integrity of measures of childhood adversity (Hardt & Rutter, 2004).

Second, important life course principles of sequencing, timing, and duration are not addressed in present measures of cumulative childhood adversity and may have important implications on variations in adult outcomes. The primary focus of the chapters within this dissertation was to determine whether an adversity did or did not occur during childhood; therefore, measures of cumulative childhood adversity accounted for the overall accumulation of adversities during childhood but did not account for the temporal ordering or sequencing in the experience of multiple adversities. It is likely that there are cascading effects in the accumulation of adversity, whereby the experience of one adversity depletes resources and increases the risk of experiencing additional adversities (Dannefer, 2003). In other words, some adversities may precede other adversities and contribute to a higher likelihood of exposure to subsequent strains and stressors.

Furthermore, measures of cumulative childhood adversity do not consider the timing of exposure to adversities in childhood, and instead focus on all exposures occurring prior to the age of 17. While, childhood is identified as an overall salient

period during the life course, variations in the timing and age of occurrence of adverse experiences during childhood may be important to consider. An analysis of earlier experiences versus later experiences of adversity during childhood may reveal the important influence of age of occurrence on differences in adult outcomes.

The duration of experiences of childhood adversity may also be important to consider, especially with regards to contextual adversities, adversities that create an ongoing context of disadvantage. Trajectories of childhood disadvantage are not consistent across children. Children may move in and out of poverty, and in turn move through impoverished and advantaged schools and neighborhoods. Some children are consistently poor and consistently exposed to noxious environments, while other children experience positive conditions throughout their childhood (Duncan & Brooks-Gunn, 1997). It may be the long spells, or duration, living in poverty and disadvantaged contexts that matters more for adult outcomes than the overall experience of adversity.

Future research should consider examining these important life course principles in order to further unravel the heterogeneity in the experience of childhood adversity; however, data limitations make this task challenging. Considering the various dimensions of exposure to childhood adversity may result in a better understanding of processes of accumulating adversity during childhood.

A third limitation is that the PSID-CRCS does not include potentially important mediators and moderators that link earlier experiences of adversity with an array of later life outcomes, including mental health and educational attainment. The presence or absence of important psychosocial resources, such as coping skills or social support, may attenuate or moderate the impact of exposures to adversity

during childhood and contribute to differential outcomes following exposure to adversity. Psychosocial resources can be mobilized in the presence of adversity and hardship; however, the distribution of psychosocial resources is socially patterned and may not be available for the most disadvantaged children (Pearlin et al., 1989; Avison, 2010).

Furthermore, experiences of adversity and stressors in adulthood are linked to experiences of adversity in childhood and may amplify the overall impact of childhood adversity on adult outcomes. Previous literature finds that childhood adversities set in motion chains of disadvantage that increase the risk for additional experiences of stressors across the life course (Dannefer, 2003). Adult experiences of adversity and hardship may account for some of the impact of childhood stressors on outcomes of mental health and educational attainment.

Lastly, while a more comprehensive measure of cumulative childhood adversity was considered, this research does not claim to have captured the full realm of total adverse childhood experiences. The measure of cumulative childhood adversity presented throughout this dissertation broadens the overall range of adversities typically included as indicators of adverse childhood experiences in previous literature. Multiple childhood experiences across various childhood domains within the childhood stress universe are considered, including experiences related to the origin family, neighborhood conditions, and school circumstances. However, researchers are encouraged to continue expanding the stress universe for children and building on ongoing literature to identify potential stressors that may contribute to overall disparities in adult outcomes.

Despite these limitations, the present dissertation highlights the benefit of utilizing a more comprehensive and heterogeneous measure of cumulative

childhood adversity to predict mental health and educational attainment during adulthood. The Childhood Retrospective Circumstances Study and the Panel Study of Income Dynamics contain valuable information on numerous childhood stressors and provide a unique opportunity to adequately measure adverse childhood experiences. Measures of psychological distress and educational attainment further support the utility of the PSID-CRCS data for linking childhood experiences to disparities in adult outcomes.

5.4 Concluding Remarks

Evidence from this dissertation point to the long reach of exposure to cumulative childhood adversity on disparities in adult outcomes and are consistent with the stress process model and life course perspective. Results highlight the benefit of considering the heterogeneity in the experience of adversity and the co-occurrence of adverse childhood circumstances, and contribute to the overall knowledge and understanding of complex processes of cumulative childhood adversity and the manner in which differential patterns of adverse experiences contribute to disparities in mental health and educational attainment during adulthood. Results further underscore the importance of broadening the range of childhood adversities to ensure that the full realm of childhood stressors are considered and that important contextual and ongoing stressors that occur across different domains of childhood are included in measures of cumulative adversity.

These studies have important implications for policy development. Results suggest that intervention and prevention programs should be aimed towards children who experience adverse childhood circumstances, in particular the most disadvantaged children who experience a multitude of childhood adversity across various childhood domains. Experiences of adversity during childhood are important determinants of adult outcomes across the life course. Therefore, early

identification and intervention during this salient period may contribute to an overall reduction in disparities across adult outcomes. Given the persisting and detrimental impact of patterns of cumulative childhood adversity, it is essential to adequately measure and understand the childhood roots of inequality.

5.5 References

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Appendices

Appendix A: Supplemental Tables

Table 14: Distribution of Missing on Adversity Indicators N=5095^a

	#	%
Adversity		
Parental Divorce	150	2.94
Childhood Health Status	22	0.43
Missed Month + School for Health Reason	49	0.96
Childhood Mental Health Status	8	0.16
Dad Unemployment	138	2.71
Mom Unemployment	117	2.30
Financial Struggle	248	4.87
Welfare 3+ Months	68	1.33
Family Finance Compared to Average	89	1.75
Neighborhood Disorder	36	0.71
Neighborhood Cohesion	46	0.90
Repeat a Grade	39	0.77
Lonely for Friends	38	0.75
Bullied at School	28	0.55
Bullied Outside of School	42	0.82
Happy at School	40	0.79
School Safety	39	0.77
Crime Victim before Age 17	35	0.69
Arrested before Age 26	53	1.04
Convicted before Age 26	38	0.75
Probation before Age 26	40	0.79
Parental Mental Health Problems	30	0.59
Parental Abuse	57	1.12
Family Disorder	214	4.20
Sibling Abuse	241	4.73

^a876 participants missing on at least one adversity were dropped from the study

Table 15: Weighted Distribution of at least one Experience of Adversity by Type

Types of Adversity	Adversities included in the category	n	%
Family Context	Parental divorce, Parental mental health, Parental Abuse, Family disorder, Sibling abuse	2,637	63.81
School Circumstances	Bullied in school, Bullied outside of school, Happy at school, Safe at school, Childhood loneliness, repeat a grade	2,384	56.50
Neighborhood Environment	Neighborhood disorder, Neighborhood cohesion	901	21.36
Economic Hardship	Dad unemployed, Mom unemployed, Financial struggle, Childhood welfare recipient, Financial comparison	2,473	58.62
Health Status	Childhood health, Missed school, Childhood mental health	1,194	28.31
Involvement in Crime	Crime victim, Arrested, Convicted, Probation	842	19.96

Table 16: Model Fit Statistics for Latent Class Analysis Chapter 3

Model	Degrees of freedom	G ²	AIC	BIC	Adjusted BIC
1	33554406	24369.343	24419.343	24571.155	24491.719
2	33554380	20091.034	20193.034	20502.730	20340.681
3	33554354	19317.817	19471.817	19939.397	19694.735
4	33554328	18263.527	18469.527	19094.991	18767.716
5	33554302	17761.961	18019.961	18803.309	18393.421
6	33554276	17510.295	17820.295	18761.527	18269.026
7	33554250	17237.185	17599.185	18698.302	18123.187
8	33554224	16968.457	17382.457	18639.458	17981.730
9	33554198	16847.062	17313.062	18727.947	17987.606
10	33554172	16668.749	17186.749	18759.518	17936.564

Table 17: Model Fit Statistics for Latent Class Analysis Chapter 4

Model	Degrees of freedom	G ²	AIC	BIC	Adjusted BIC	Entropy
1	33554406	21077.342	21127.342	21267.352	21187.926	-1.999e-07
2	33554380	17970.179	18072.179	18357.799	18195.769	292.97201
3	33554354	16780.853	16934.853	17366.084	17121.451	304.4569
4	33554328	16228.053	16434.053	17010.895	16683.658	474.50587
5	33554302	15846.048	16104.048	16826.500	16416.660	558.37849
6	33554276	15527.193	15837.193	16705.256	16212.812	633.22109
7	33554250	15379.661	15741.661	16755.334	16180.287	709.24723
8	33554224	15255.46	15669.460	16828.743	16171.093	745.27532
9	33554198	15129.015	15595.015	16899.909	16159.655	869.34679
10	33554172	14998.542	15516.542	16967.046	16144.189	891.48174

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