ABSTRACT

Title of Dissertation: ADVERSE CHILDHOOD EXPERIENCES (ACES) IN EARLY CHILDHOOD AND THEIR ASSOCIATIONS WITH MIDDLE CHILDHOOD BEHAVIOR PROBLEMS: A THREE-PAPER DISSERTATION

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Experiences in early childhood lay the foundation for physical and psychological health and wellbeing throughout the life course. A large body of literature demonstrates a graded relationship between adverse childhood experiences (ACEs) and health and social outcomes. Children living in poverty are disproportionately likely to experience multiple adversities, placing them at risk for negative health and developmental outcomes and contributing to widening health disparities. Among the outcomes associated with ACEs are internalizing and externalizing behavior problems, which increase children's risk of later depression and anxiety, substance use, criminality, low socioeconomic status, and chronic physical health problems.

In spite of the substantial knowledge base that has developed around childhood adversity and its association with behavior problems, there are gaps in the literature that

warrant further research. Firstly, few studies utilizing prospective longitudinal data have examined the role of timing and duration of exposure to adversities in early childhood, and their relationship with later behaviors. Secondly, researchers have only just begun exploring whether certain patterns or constellations of risk factors are common among different groups of children, and whether these patterns place certain groups at greater risk for behavior problems. A third gap relates to the role of father involvement by unmarried fathers and the potential for these fathers to promote more positive outcomes among children exposed to various levels of early adversity.

The three studies in this dissertation analyze data from four waves of the Fragile Families and Child Wellbeing Study to document associations between ACEs experienced at ages 1, 3, and 5, and behavior problems at age 9. Life course theory provides an overarching framework for the dissertation. The first study examines the associations between the accumulation, timing, and duration of ACEs in the first five years of life and odds of behavior problems at age 9. The second study employs latent class analysis to identify patterns of risk exposure and their potential association with age 9 behaviors. The third study investigates whether early father involvement by fathers who were unmarried at the child's birth moderates the association between early childhood adversity and age 9 behavior problems.

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CHAPTER 1: INTRODUCTION

Statement of the Problem

A large body of research indicates that exposure to multiple or cumulative risk factors is detrimental to children, and that the more risk factors children are exposed to, the worse their health outcomes tend to be (Evans, Li, & Whipple, 2013). Fundamentally, a risk factor is any individual or contextual factor that is associated with an increased likelihood of developing a particular outcome (Essex et al., 2006). Researchers have used varied metrics of cumulative risk indices to account for the constellation of risk factors to which children may be exposed. Although the concept of multiple or cumulative risk in childhood has been studied for several decades, it was only in the late 1990s that the concept received more widespread attention when findings from the Kaiser Permanente/Centers for Disease Control and Prevention (CDC) "Adverse Childhood Experiences" (ACEs) study were first released. Study findings provided evidence of significant associations between cumulative risk in childhood (now popularized as "ACEs") and negative outcomes well into adulthood (Kalmakis & Chandler, 2015).

Furthering the body of literature on childhood adversities is important because the number of children in the United States (U.S.) and across the globe facing multiple risks is large and growing. An estimated 17% of children in the U.S. under the age of 6 years had experienced three or more of eight potential risk factors (poor, teen mother, unmarried parent, low parental education, unemployed parent(s), residential mobility, large family size, and household without English speakers), according to 2014 data (National Center for Children in Poverty, 2016) Further, the proportion of children living in low-income families has continued to rise, increasing from 39% to 44% between 2008 and 2014 (Jiang, Ekono, &

Skinner, 2016). It has been well established that children in low-income families are exposed to higher numbers of risk factors relative to more affluent children (Brooks-Gunn & Duncan, 1997; Deater-Deckard, Dodge, Bates, & Pettit, 1998; Evans & Cassells, 2014). The CDC estimated that the national lifetime economic burden associated with new cases of child maltreatment in 2008 was between $124 billion and $585 billion (Fang, Brown, Florence, & Mercy, 2012). These estimates do not include the costs resulting from ACEs other than child maltreatment, suggesting that the economic toll of the total burden of disease linked with ACEs could be much higher (Gerson & Corwin, 2015).

Such findings point to the urgency of further expanding the knowledge base of cumulative risk factors (or ACEs). Although numerous studies have examined ACEs and their consequences for children's behavioral health, many of these studies have been based on cross-sectional and retrospective data (Evans et al., 2013). Of the smaller number of studies that have utilized prospective, longitudinal data, most have lacked information on risk exposures from early childhood (Evans et al., 2013).

Metrics of Cumulative Adversity in Early Childhood

Child psychiatrist Michael Rutter observed that most children who experience a single adverse event or risk factor suffer little or no enduring harm, whereas children who experience multiple adversities were far more likely to develop mental health problems (Rutter, 1979, 1981). Developmental psychologist Arnold Sameroff and colleagues (Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987) studied children's early intellectual development and they, too, found that exposure to multiple socioeconomic and family risks predicted worse outcomes than exposure to a single risk factor. Such findings led Rutter, Sameroff, and others to advocate for the study of multiple risk factors or adversities in

childhood as opposed to focusing on singular risk factors (Evans et al., 2013). Subsequently, studies using composite measures of childhood adversity have proliferated.

Creating an index of multiple risk factors confers a number of benefits. One advantage is a reduction in measurement error (Ghiselli, Campbell, & Zedeck, 1981). Furthermore, the index allows for the use of just one predictor rather than having multiple and potentially collinear predictors; multiple and correlated predictors in a linear regression model can lead to diminished statistical power and unstable estimates (Myers & Wells, 2003). In addition to improved measurement, incorporating multiple risk factors into a composite measure better captures the constellations of risk often confronting children (Evans et al., 2013). Research using cumulative risk metrics has consistently demonstrated that exposure to multiple relative to singular adversities is detrimental to health and well-being; the more risk factors children are exposed to, the worse the outcomes tend to be, both in childhood and later in life.

To illustrate, among 994 U.S. high school students participating in a longitudinal study of adolescent drug use, 4% of those exposed to no risk factors smoked daily, 7% with one risk factor smoked daily, and 34% of those exposed to seven or more risk factors smoked daily (Newcomb, Maddahian, & Bentler, 1986). Another study, which utilized data from 17,337 participants in the Kaiser Permanente/CDC ACEs Study, examined associations between risk of suicide attempts and childhood adversities (Dube et al., 2001). Results showed that an ACE score of 7 or higher increased the likelihood of suicide attempts in childhood/adolescence 51-fold, compared to an ACE score of 0; an ACE score of at least 7 increased the likelihood of adult suicide attempts 30-fold.

Outcomes Associated with ACEs

ACEs have been associated in retrospective studies with a multitude of negative health outcomes across the life course (Kalmakis & Chandler, 2015). Adulthood physical health problems linked with ACEs include heart disease (Dong et al., 2004), chronic lung disease (Anda et al., 2008), liver disease (Dong, Dube, Felitti, Giles, & Anda, 2003), headaches (Anda, Tietjen, Schulman, Felitti, & Croft, 2010), and autoimmune disease (Dube et al., 2009). Research has also found associations between ACEs and adulthood mental health and substance use problems, including depression (Chung, Mathew, Elo, Coyne, & Culhane, 2008), anxiety and PTSD (Green et al., 2010), substance use disorders (Douglas et al., 2010), and attempted suicide (Dube et al., 2001). Furthermore, individuals with ACE histories often engage in health risk behaviors such as smoking (Ford et al., 2011), binge drinking (Timko, Sutkowi, Pavao, & Kimerling, 2008), and other substance abuse (Sharp, Peck, & Hartsfield, 2012). Additionally, history of ACEs has been found to influence healthcare utilization; greater exposure to adversity in childhood has been associated with use of more prescription medications (Anda, Brown, Felitti, Dube, & Giles, 2008), high healthcare utilization and lower self-reported quality of life (Corso, Edwards, Fang, & Mercy, 2008), and high healthcare costs (Afifi et al., 2008).

Studies of ACEs have explored a similarly wide range of outcomes in childhood/adolescence (Evans et al., 2013). Research has examined relationships between ACEs and school/cognitive-related outcomes such as academic achievement, school engagement, and cognitive development (Burchinal, Roberts, Zeisel, & Rowley, 2008; Porche, Costello, & Rosen-Reynoso, 2016; Rouse & Fantuzzo, 2009). Other studies have focused on behavioral and mental health outcomes including juvenile delinquency, early

sexual activity, general psychological well-being, somatic complaints, suicide ideation/attempts, substance use, and internalizing and externalizing problems (Fergusson & Lynskey, 1995; Fergusson & Horwood, 2003; Flouri & Kallis, 2007; Margolin, Vickerman, Oliver, & Gordis, 2010; Newcomb et al., 1986; Roberts, Roberts, & Xing, 2010; Sameroff, Bartko, Baldwin, Baldwin, & Seifer, 1998). A smaller body of research has considered how adverse experiences influence child physical health. Secondary analysis of data from the Longitudinal Studies of Child Abuse and Neglect found an association between exposure to ACEs at age 4 and risk of poor physical health and of illness requiring medical attention at age 6 (Flaherty et al., 2006). A physical health outcome that has received considerable attention is childhood overweight and obesity (Gundersen, Mahatmya, Garasky, & Lohman, 2011; Shrewsbury & Wardle, 2008). Researchers using survey data such as the National Survey of Children's Health have incorporated broad child health outcomes of chronic health conditions, which comprise obesity, asthma, attention deficit hyperactivity disorder (ADHD), and others (Bethell, Newacheck, Hawes, & Halfon, 2014). Studies have also looked at physiological changes in children, including the increased activation of the sympathetic nervous system, the hypothalamic pituitary adrenal axis, and others (Danese & McEwen, 2012). Increased activation of such systems has been linked with the acceleration of chronic disease development in adulthood (Miller, Chen, & Parker, 2011). A few studies have attempted to connect early adversity and other biomarkers of cardiometabolic risk in childhood and adolescence, including lipids, carbohydrate metabolism-related factors, and central adiposity (Slopen, Goodman, Koenen, & Kubzansky, 2013).

Internalizing and Externalizing Behavior Problems

The outcomes examined in this dissertation are internalizing and externalizing behavior problems. Internalizing behaviors refer to depression, anxiety, and withdrawal symptoms; externalizing behavior problems include aggressive and hostile behaviors toward others, hyperactivity and impulsivity, and conduct problems (Goodman, Lamping, & Ploubidis, 2010). Both types of childhood behavior problems have been linked to negative consequences not only in childhood but also into adolescence and adulthood. Internalizing behaviors in childhood have been associated with suicidal ideation and increased risk of adult anxiety disorders and depression (Clark, Rodgers, Caldwell, Power, & Stansfeld, 2007; Petersen et al., 1993). Externalizing behaviors have been linked with academic underachievement, substance use, and criminality and other antisocial behaviors in adulthood (Hinshaw, 1992; King, Iacono, & McGue, 2004; Sourander et al., 2006). Both types of behaviors have been associated with adulthood chronic disease, lower socioeconomic status later in life, higher levels of medical service usage in adulthood, and heightened risk of mortality between the ages of 11 and 46 years (Fronstin, Greenberg, & Robins, 2005; Jokela, Ferrie, & Kivimäki, 2009; Sourander et al., 2006; Temcheff et al., 2011).

ACEs and Behavior Problems: Gaps in the Literature

Cross-sectional and longitudinal studies provide evidence of a graded relationship between ACEs and behavior problems in childhood and adolescence, demonstrating across a range of age groups and types of adversities that the more ACEs to which children are exposed, the greater their risk of developing behavior problems (Evans et al., 2013). However, few prospective studies have collected repeated measures of ACEs during early childhood. This limitation is significant because most types of adversities are dynamic and

may vary over time (Obradovic, Shaffer, & Masten, 2012). For example, an adversity such as maternal depression may be experienced at age 1 only, at age 5 only, or chronically over the early childhood years. Collecting information on such adversities at multiple time points allows researchers to more precisely identify whether children are more vulnerable to cumulative adversity at certain "sensitive periods" of development, such as the first 1-3 years of life (Kuh, Ben-Shlomo, Lynch, Hallqvist, & Power, 2003). Studies using repeated measures of ACEs could also provide insight into the role of chronic versus episodic exposure to adversity.

Furthermore, most studies that have investigated ACEs and behavioral adjustment lack information about whether certain patterns of early adversity are more predictive of behavior problems in middle childhood. ACE indices typically combine risks related to socio-demographics (e.g., low family income) with risks in such domains as the family (e.g., low parental involvement) and neighborhood (e.g., low safety). It may be that exposure to certain combinations of ACEs and/or exposure across multiple domains are more disruptive to development than others (Evans et al., 2013). While the traditional index approach is important to understanding the relationship between levels of adversity and children's outcomes, there is a need for additional research to consider what constellations of risks and risk contexts are most likely to be linked with later distress (Roy & Raver, 2014).

In concert with the mounting body of research focused on ACEs, there has been growing interest in examining protective or "promotive" factors that may offset the effects of childhood adversity and promote resilience (Luthar, Cicchetti, & Becker, 2000). Such factors are often organized into child-, family-, and community-level domains (Owens & Shaw, 2003). In the family domain, supportive and positive family relationships – such as

emotionally responsive parenting and close parent-child relationships – have been associated with positive behavioral outcomes among children exposed to a variety of ACEs (Cummings, Davies, & Campbell, 2000; Masten & Shaffer, 2006). Most of this research has focused on relationships between mothers and their children. There has recently been greater recognition that researchers need to also consider the role of father involvement in promoting children's wellbeing and development in the context of adversity (Cabrera, 2010; Lamb, 2010). Among low-income families, there is evidence that greater involvement from resident and nonresident fathers is linked with better behavioral and cognitive outcomes for preschool-aged children (Adamsons & Johnson, 2013; Bzostek, 2008). Few longitudinal studies have explored whether early childhood father involvement and/or father involvement in middle childhood moderates the association between early childhood adversity and middle childhood behavior problems.

Overview of Studies

The studies comprising this dissertation are secondary analyses of data from the Fragile Families and Child Wellbeing Study (FFCWS), a longitudinal birth cohort study. The first study examined: 1) whether cumulative ACEs in the first five years of life are associated with behavior problems at age 9, and 2) whether timing and/or duration of ACEs in early childhood are associated with age 9 behavior problems.

The second study sought to identify patterns of ACEs at age 5 and their associations with age 9 behavior problems. ACEs represented multiple domains of risk, including child maltreatment, inter-parental conflict, parental adjustment, and financial hardship. Latent class analysis was employed to determine: 1) whether there are classes of children characterized by common constellations of early adversity, and 2) whether these classes are associated with

age 9 behaviors.

The third study investigated biological father involvement among children born to unmarried parents. Specifically, the study explored: 1) whether high levels of positive father involvement from ages 1 to 5 years moderate the association between early adversity and age 9 behavior problems, and 2) whether adjusting for positive father involvement at age 9 changes the role of early father involvement.

Theoretical Framework

Life course theory serves as the guiding framework for the dissertation. Life course theory has emerged as an influential framework for studying how social contexts shape family life and individual development over time (Fine & Kotelchuck, 2010). The perspective is rooted in the sociological study of multiple birth cohorts (Elder, 1998). Over the past two decades, the life course perspective has increasingly been applied to public health research, offering researchers a model for considering the long-term health effects of exposure to social and environmental risk factors during various life stages (Kuh et al., 2003). Government agencies such as the Maternal and Child Health Bureau (MCHB) of the U.S. Department of Health and Human Services have integrated a life course approach into their maternal and child health planning and programmatic training initiatives, viewing life course theory as a framework "that promotes optimal health and healthy development across the lifespan…and that promotes equity in health across communities and populations" (Fine & Kotelchuck, 2010, p. 2). I draw on several key constructs from life course theory, including 1) *timing*, 2), *the accumulation of risk,* and 3) *context*.

Life course theory posits that the timing of events – such as exposure to adversity – plays an important role in the effects of those events on health outcomes (Kuh et al., 2003).

While adverse events can impact an individual at any stage of life, life course theory points to the potential importance of critical or sensitive periods of development during which the impact on one's health may be greatest (Fine & Kotelchuck, 2010). For example, researchers have identified critical periods of fetal development wherein exposure to an infection or particular toxins can negatively affect subsequent prenatal development. Early childhood may be a critical or sensitive period for exposure to adversities such as maternal depression, poverty, and maltreatment; such exposures in early childhood have been associated with poor school performance and behavior problems among school-age children (Duncan & Brooks-Gunn, 2000; Keiley, Howe, Dodge, Bates, & Petti, 2001).

A related concept utilized by life course researchers is the *accumulation of risk.* Over the life course, exposures or "insults" accumulate (Riley, 1989) and compromise one's future health and development (Fine & Kotelchuck, 2010). Experiencing stress or hardship at a single time period or at low levels may have only minimal impact on an individual's developmental trajectory, but the cumulative impact of persistent or severe adversity may be more detrimental. Children of chronically depressed mothers, for instance, may experience a greater number of withdrawn or otherwise negative interactions with their mothers, which may lead to more behavior problems over time (Turney, 2011). Mothers who are chronically depressed may also be more vulnerable to long-term economic instability, substance use, and conflict-ridden relationships with intimate partners (Turney, 2011), resulting in the piling up or clustering of different types of adversities (Kuh et al., 2003).

The third life course construct employed in the studies is *context,* which emphasizes that "the life course of individuals is embedded in and shaped by the historical times and places they experience" (Elder, 1998, p. 3). "Place" includes not only geographical location,

but also individuals' and families' location in the broader social structure as defined by such factors as class and ethnicity (Kuh et al., 2003). The social structures in which individuals are located profoundly influence their cumulative exposure to adversity and the resources they have available to help them respond to adversity. For example, a family with a parent that loses a job in an economic downturn may recover quickly (and shield children from prolonged negative effects) thanks to the support of stable kin networks and the availability of skills training programs that prepare the parent for better-paying employment in different sector. On the other hand, the family may face an accumulation of risk if the parent had a criminal record that impeded the job search, the family had no access to public or private rent assistance and was forced to move to a more disadvantaged neighborhood, or the job loss led to a loss of health insurance and the parent's chronic physical or mental health condition could no longer be managed. Individuals and social structures are thus inextricably linked, as individuals make choices and take action within the constraints and opportunities afforded them by their social circumstances (Elder, 1998).

The research questions and hypotheses of the three studies were informed by these life course constructs. The first study examined the importance of accumulation, timing, and duration of adverse experiences in shaping children's later behavioral health. From a life course perspective, the accumulation of various types of adversities over the first five years of life may be associated with subsequent health problems, including problem behaviors in middle childhood. Within those first five years, 0 to 3 years of age may be a sensitive period of development, during which high exposure to adversity is more detrimental to children's wellbeing than high exposure at 3 to 5 years. Duration of exposure may also be important,

such that chronic exposure to adversity across the first five years is most damaging. Each of these hypotheses is tested in the first study.

The second study investigated whether children are exposed to common patterns of adversity in early childhood, paying particular attention to the potential importance of how adversities may cluster together. This exploratory study considered whether certain patterns of adversity are most strongly associated with subsequent internalizing and externalizing problem behaviors. Life course theory emphasizes the significance of the family context and the interdependence of family members' lives. It also draws attention to the socioeconomic contexts and environments in which families are embedded. Given the importance of various social contexts in shaping children's development, I hypothesized that exposure to risks across multiple contexts (e.g., family-related and socioeconomic) would be most detrimental to children's behavioral adjustment. I further examined how socio-demographic characteristics, which reflect aspects of social structure and context, are associated with class membership.

The third study focused on risk and resilience from a life course perspective, exploring the accumulation of risk (and accumulation of protective factors) as well as context. A variety of protective factors may interact with risk factors to buffer children from the negative effects of cumulative adversity. The aim of this study was to explore the potentially protective effects of father involvement in early childhood on behavioral adjustment in middle childhood, focusing on children born to unmarried parents. It is not well understood how or whether unmarried fathers' positive involvement in their young children's lives may contribute to children's wellbeing in contexts of early adversity. The study investigated whether high levels of father involvement from child ages 1 to 5 years

reduced behavior problems at age 9, and whether the protective effects varied by level of ACEs exposure. I further explored whether father involvement at age 9 changed the association between early father involvement and subsequent behavior problems.

CHAPTER 2: LITERATURE OVERVIEW

Adverse Childhood Experiences and Links with Behavior Problems

As established in the previous chapter, adverse childhood experiences (ACEs) – such as child maltreatment, parental incarceration, and housing insecurity – are associated with a broad range of negative developmental outcomes (Felitti et al., 1998; Menard, Bandeen-Roche, & Chilcoat, 2004). Research demonstrates that multiple ACEs are worse for children's present and future physical and mental health than exposure to a single adversity (Evans et al., 2013; Kalmakis & Chandler, 2015; Menard et al., 2004). It has also been well established that children living in poverty are more likely than affluent children to experience multiple risk factors or ACEs (Deater-Deckard et al., 1998; Evans & Cassells, 2014). Given that the number of children living in poverty in the U.S. has continued to rise, and with it the extraordinary individual-, family-, and societal-level costs associated with ACEs (Gerson & Corwin, 2015), it is important that researchers expand the knowledge base about ACEs. The literature covered in this review describes how metrics of cumulative risk (or ACEs) have been conceptualized in previous studies. As the proposed set of studies focus on the associations between ACEs and behavior problems, the subsequent section reviews cross-sectional and longitudinal research that has examined ACEs and behavioral adjustment in childhood and adolescence.

Conceptualizing Indices of Cumulative Risk

The most common method of forming a composite index of risk has been to construct a set of dichotomous risk factors or ACEs (whereby exposure to the risk factor is assigned a score of 1, no exposure assigned a 0) that are summed together to create an aggregate score (Evans et al., 2013). The particular combination of risk factors is not important in this model;

what matters is the number of exposures to risk. Risk assignment may be determined by a priori theory (e.g., household poverty = 1; no household poverty = 0) or by a statistical benchmark (e.g., upper quartile of exposure to risk = 1; all others = 0). Some studies begin with a group of risk factors that previous research has found to be related to the outcome of interest. This group is then narrowed down to include only those risk factors with significant bivariate associations with the outcome.

The Adverse Childhood Experiences Scale

The Kaiser Permanente/CDC ACEs Study was initiated in 1995 and to date is one of the largest investigations of the long-term impact of childhood abuse and parental/family incapacities (Felitti et al., 1998; Lanier, Maguire-Jack, Lombardi, Frey, & Rose, 2017). The original study surveyed more than 17,000 Health Maintenance Organization (HMO) participants in Southern California regarding their experiences in childhood and their current health and health behaviors. Ultimately the ACEs scale incorporated three categories of child abuse – physical, psychological, and contact sexual abuse – and five categories of parental or family incapacity – household mental illness, household substance abuse, mother treated violently, parental separation or divorce, and incarcerated household member (Dube et al., 2001). Some categories (e.g., exposure to incarceration) were established with just one item, while others were derived from as many as 4 items (e.g., violent treatment of mother). For categories measured by more than a single item, respondents were considered “exposed” if they answered “yes” to at least one question in the category. The ACEs score was calculated by summing the total number of categorical exposures, with a possible range of 0 to 8 (Dube

et al., 2001).[1]

Adaptations to the ACE Scale

Due to its ability to predict a broad range of negative mental and physical health problems in later life (findings summarized below), the ACEs scale has grown in popularity among researchers concerned about the lasting effects of childhood abuse and other adversities (Finkelhor, Shattuck, Turner, & Hamby, 2015). Although it has shown strong predictive abilities, efforts have therefore been made to improve upon it. One study identified several childhood adversities not included in the original ACEs scale that also showed considerable associations with negative developmental outcomes among adolescents (Finkelhor, Shattuck, Turner, & Hamby, 2015). Their revised inventory added measures of low socioeconomic status, peer isolation/rejection, community violence exposure, and peer victimization. The inventory was included in the National Survey of Children's Exposure to Violence 2014, a survey conducted with a nationally representative sample of children and adolescents aged 10-17 years and their caregivers (Finkelhor et al., 2015).

The ACEs scale was also adapted for use in the 2011-12 National Survey of Children's Health (NSCH), a cross-sectional survey collecting information about a nationally representative sample of children age 0 to 17 years (Bethell et al., 2014). The NSCH included a 9-item measure of parent-reported "adverse family experiences" in order to provide child-level information on adversities similar to those included in the Kaiser Permanente/CDC study of adults (Bethell et al., 2014). The measure included five items from the original ACEs questionnaire and added four items comprising socioeconomic hardship, exposure to neighborhood violence, death of a parent, and racial/ethnic discrimination.

[1] The Felitti et al. (1998) study did not include parental separation/divorce in the ACEs scale and thus the score ranged from 0 to 7.

ACEs and Behavior Problems

Cross-Sectional Studies

Masten and colleagues (Masten, Miliotis, Graham-Bermann, Ramirez, & Neemann, 1993) utilized cross-sectional data investigating ACEs and behavior problems of 159 homeless children and 62 low-income children who lived at home (aged 8-17 years). All homeless children in the study were living at a shelter with at least one parent at the time of the study. Seven parent-reported ACEs were included in the risk index: single parent, parental divorce/separation, parent high school dropout, parental death, child in foster care, child exposure to violence, and child abuse. Parental psychological distress was measured separately from the index. Hierarchical regressions indicated that parental psychological distress and ACEs were both significantly associated with behavior problems.

Using cross-sectional data from a sample of 121 low-income, Mexican-American and Mexican immigrant families with fourth-grade children, researchers examined associations between an index of 20 ACEs and children's behavior problems (Dumka, Roosa, & Jackson, 1997). They also tested whether parenting practices mediated the effects. The ACEs index included items such as single mother-headed household, parental incarceration, and parental mental health problem. There were significant associations between number of ACEs and mother-reported child behavior problems. Mothers' inconsistent discipline practices partially mediated these associations.

Ackerman and colleagues examined associations between ACEs and teacher-reported problem behaviors of 6- and 7-year-old children (N=155) from low-income families recruited from Head Start centers (Ackerman, Schoff, Levinson, Youngstrom, & Izard, 1999). The 11-item ACEs index included parent-related factors (e.g., history of parental substance abuse),

socio-demographic factors (e.g., single parent family), and family process factors (e.g., three or more changes in primary caregiver's intimate relationships during child's lifetime). Behavior problems were teacher-reported. Higher ACEs scores were associated with greater likelihood of children being in the clinical range of behavior problems. The likelihood was zero for those with zero to one indicator, compared to a likelihood of approximately 50% for those with six or seven indicators.

Another study used cross-sectional data collected from a Tennessee-based sample of 335 middle school students (aged 10-15 years), their parents, and their teachers (Gerard & Buehler, 1999). Most of the children were Caucasian (86%) and lived with married parents (87%). Three risk factors were assessed: children's report of parenting quality, children's report of parents' overtly hostile conflict style, and economic hardship as measured by children's school lunch status. In linear regressions, the risk factor index was significantly associated with internalizing and externalizing behaviors.

Sandler (2001) explored ACEs and child behavior problems using cross-sectional data from two samples: children of divorced parents (9-12 years, $N = 356$) and recently bereaved children (8–16 years, $N = 220$). Four risk factors were incorporated into the composite measure of ACEs (e.g., poverty, recent negative life events). Exposure to ACEs increased the likelihood of clinically significant levels of externalizing problems in both samples, and of internalizing problems the bereaved sample.

Gassman-Pines and Yoshikawa (2006) explored the association between ACEs and behavior problems in a sample of nearly 1,200 children ages 2-10 years. Nine poverty-related risk factors comprised the ACEs index (e.g., maternal depressive symptoms, material hardship). The authors reported significant linear relationships between ACEs and behavior

problems. Another study used data from a London-based sample of 381 16- to 18-year-olds (Flouri & Kallis, 2007). Risk factors included 25 potentially traumatic events (e.g., negative change in family financial situation, someone in family arrested). Adolescents reported retrospectively on risk factors for three time periods: when they were age 10, age 15, and during the past month. Adolescents reported on their current behavioral and emotional difficulties, including conduct problems (externalizing problems), emotional symptoms (internalizing problems), hyperactivity, and peer problems. Ordinary least squares regression found that the number of adverse life events occurring in the past month was associated with behavioral/emotional difficulties, but risk factors that had been retrospectively reported for ages 10 and 15 were not significant.

Some cross-sectional research has found associations between ACEs and either (but not both of) internalizing and externalizing problems. One such study examined associations between cumulative risk and behavior problems among 277 African-American children (7-15 years) from single-mother-headed households in two southeastern states (Jones, Forehand, Brody, & Armistead, 2002). The ACEs index, which included nine indicators (e.g., maternal depressive symptoms, inadequate income) was significantly associated with internalizing problems but there was no significant association with externalizing problems. By contrast, a study of 252 children ages 9-11 who were in out-of-home care due to maltreatment found associations between ACEs and externalizing problems but not internalizing problems (Raviv, Taussig, Culhane, & Garrido, 2010). The study tested two ACE indices, the first of which was theoretically based and included 18 hypothesized risk variables, the second of which included only seven risk variables that showed significant bivariate associations with behavior problems. The latter ACEs index was significantly associated with externalizing

problems.

Longitudinal Studies

Although the cross-sectional studies reviewed above provide compelling evidence for an association between ACEs and behavior problems across a wide range of age groups, the studies are subject to concerns that accompany all cross-sectional research, namely whether causal interpretations are valid (Evans et al., 2013). To better examine the directionality of associations between adversities and behaviors, researchers have employed longitudinal data. Below, I highlight findings of this body of research.

Shaw and colleagues investigated the association between family adversity at ages 1 and 2 and behavior problems at age 3 among 100 economically disadvantaged families in Allegheny County, Pennsylvania (Shaw, Vondra, Hommerding, Keenan, & Dunn, 1994). Higher scores on the six-item family adversity index (e.g., extreme poverty, parental criminal behavior, maternal depression) at ages 1 and 2 were associated with more behavior problems at age 3.

Deater-Deckard and colleagues assessed the relationship between ACEs and externalizing problems among a Tennessee- and Indiana-based sample of 100 Black and 466 White children followed from ages 5 to 10 years (Deater-Deckard et al., 1998). Twenty ACEs were assessed at age 5. Externalizing behavior problems were scored and averaged over all five years of the study for children with at least three valid assessments. Number of ACEs accounted for 19% to 21% of the variance in externalizing problem behaviors. Furthermore, ACEs status was related to subsequent externalizing problems after controlling for initial levels of externalizing behaviors.

In a sample of more than 200 Black children, six ACEs were measured at age 5 (e.g.,

economic hardship, maternal depression) and behavior problems were measured at ages 5 and 6 (Krishnakumar & Black, 2002). Children with zero to two ACEs at age 5 had fewer externalizing problems at both ages 5 and 6 compared to children with three or more exposures. Children with no ACEs at age 5 had fewer internalizing problems at age 5 than children with at least three ACEs, but there were no associations between age 5 ACEs and internalizing problems at age 6.

A longitudinal study of 139 Black children from single-mother-headed households investigated the associations between ACEs at age 11 and behavior problems at ages 11 and 15 (Kim & Brody, 2005). ACEs included seven socio-demographic risk factors (e.g., teenage mother, low maternal education). Structural equation modeling suggested that cumulative risk at age 11 was associated with behavior problems at age 15. The association was mediated by maternal psychological functioning at age 12, parenting practices at age 13, and youth self-regulation at age 14. These paths remained significant after controlling for age 11 behaviors.

Another longitudinal study examined the relationship between cumulative violence exposure assessed at ages 10, 11, and 12, and behavior problems measured at age 12 (Margolin et al., 2010). The authors summed marital physical aggression, parent-to-child aggression, and community violence exposure over time to create a cumulative violence exposure index. With each one-point increase on the index, the odds of meeting benchmark levels of internalizing problems increased by 50% and the odds of externalizing problems increased by 25%.

Fanti and Henrich (2010) analyzed data from the National Institute of Child Health and Human Development Study of Early Child Care to investigate early childhood risk

factors and trajectories of behavior problems among a sample of approximately 1,200 children ages 2 and 12. Two indices of risk exposures were created: the first contained six medical risks during the first 6 months of the child's life (e.g., mother smoking, child's respiratory problems) and the second incorporated socio-demographic risks (e.g., maternal education, financial hardship). Behavior problems were measured during at least two of nine assessment periods from ages 2-12. Children with higher scores on the socio-demographic risk index had greater odds of chronic and co-occurring behavior problems (both internalizing and externalizing behaviors as opposed to one or the other). Children with more early medical risks had greater odds of co-occurring behavior problems, as well as increased odds of chronic externalizing problems.

A recent analysis of data from the Fragile Families and Child Wellbeing Study (FFCWS) examined the association between ACEs exposure at age 5 and outcomes including externalizing problems at the end of kindergarten (Jimenez, Wade, Lin, Morrow, & Reichman, 2016). ACEs were modeled on the Kaiser/CDC study ACE scale. They included four indicators of child maltreatment (physical, psychological, and sexual abuse, and neglect) and four indicators household dysfunction (mental illness, substance use, incarceration, and caregiver treated violently). Authors found significant associations between exposure to three or more ACEs and higher externalizing problem scores.

Summary

As evidenced above, there is a sizeable body of research connecting ACEs and behavior problems. Both cross-sectional and longitudinal studies point to a relationship between cumulative adversity and behaviors in childhood and adolescence. In spite of the substantial knowledge that has been gained about childhood adversity and its association

with child behavioral adjustment, a number of gaps remain. Among them are questions about timing and persistence of early childhood adversity and later behavior problems; patterns of risk in early childhood and their differential association with behavior problems in middle childhood; and the protective effects of father involvement by unmarried fathers in contexts of early adversity. The following chapters contain three studies conducted to address these gaps.

CHAPTER 3: STUDY ONE

Accumulation, Timing, and Duration of Adverse Childhood Experiences (ACEs) from Ages 1 to 5 and Associations with Behavior Problems at Age 9

Abstract

This study examined associations between the accumulation, timing, and duration of adverse childhood experiences (ACEs) from ages 1 to 5 years and clinical internalizing and externalizing behavior problems at age 9. Utilizing data from a subset of children (N=1,789) in the Fragile Families and Child Wellbeing Study, seven ACEs were assessed at child ages 1, 3, and 5. Two ACEs indices were created, one that summed adversities across the three time points and a second that categorized timing and duration of ACEs exposure. Logistic regression models estimated the associations of each index and age 9 behavior problems, sequentially controlling for socio-demographic covariates, age 9 ACEs exposure, and age 5 behavior problems. In final models, children exposed to ≥6 ACEs faced increased odds of age 9 internalizing problems (adjusted odds ratio [AOR]: 3.74; 95% confidence interval [CI]: 2.03, 6.91) and externalizing problems (AOR: 3.91; CI: 2.11, 7.25). Final models examining timing/duration of early adversity found that intermittent adversity (≥2 ACEs at ages 1 and 5 but not age 3) predicted the greatest increase in odds of internalizing (final model AOR: 3.72; CI: 1.66, 8.36) and externalizing problems (AOR: 4.69; CI: 2.08, 10.58). High early exposure (≥2 ACEs at ages 1 and/or 3) and high late exposure (≥2 ACEs at ages 3 and 5 or age 5 only) predicted between two and three times the odds of age 9 behavior problems. Chronic adversity (≥2 ACEs at ages 1, 3, and 5) was not associated with age 9 behaviors once models adjusted for age 5 behaviors. Study findings add to the literature demonstrating the importance of attending to the accumulation, timing and duration of early childhood exposure to ACEs. Implications for research and clinical interventions are discussed.

Introduction

Extensive research has documented the detrimental impact of exposure to adverse childhood experiences (ACEs) on children's present and future mental and physical health outcomes (Evans, Li, & Whipple, 2013; Kalmakis & Chandler, 2015). Among the health outcomes that have been studied in relationship to childhood adversity are internalizing behaviors (e.g., depression, anxiety) and externalizing behaviors (e.g., aggression, conduct problems) (Goodman, Lamping, & Ploubidis, 2010). Across various types of adversities and a broad range of age groups, research on the accumulation of ACEs has documented a graded relationship between ACEs and behavior problems in childhood and adolescence (Evans et al., 2013). In order to better understand the temporal ordering of exposure to adversities and the development of subsequent behavior problems, a growing number of studies have capitalized on prospective, longitudinal data. Findings from some prospective studies suggest that exposure to ACEs in early childhood predicts behavior problems in later childhood (Fanti & Henrich, 2010; Hunt, Slack, & Berger, 2016; Jimenez, Wade, Lin, Morrow, & Reichman, 2016). Although such research has substantially advanced the science of early childhood adversity and its association with children's behavioral adjustment, several gaps remain. Even among prospective studies, most lack repeated measures of adversity (Evans et al., 2013), which could result in underestimating ACEs exposure over time. Moreover, very few studies have examined how the developmental *timing* of adversity or *duration* of exposure may contribute to childhood behavior problems. The current study utilized a prospective, longitudinal dataset with repeated measures of adversity to examine how the accumulation of ACEs over the first five years of life were associated with behavior problems at age 9 years, with careful attention to the timing and duration of exposure.

Childhood Adversity and Behavior Problems

A handful of prospective, longitudinal studies have asked whether children exposed to more ACEs in early childhood face a higher risk of behavior problems in later childhood. In some of these studies, the length of time between measurement of exposures and outcomes has been quite short. One study found associations between adversity measured at age 5 and behavior problems less than a year later (Jimenez et al., 2016). Another measured exposure to adversities by age 2 and child behavior problems at age 3 (Shaw, Vondra, Hommerding, Keenan, & Dunn, 1994). Other research has explored how early adversity relates to behavior problems over a longer period of time. For example, Fanti and Henrich (2010) considered exposure to adversities up to 2 years of age and behavior problem trajectories from ages 2 to 12 years. They found that children exposed to the greatest number of ACEs demonstrated higher odds of internalizing and externalizing problems during at least two time points between ages 2 and 12. While such studies offer evidence of a dose-response relationship between exposure to ACEs in early childhood and subsequent behavior problems, a notable limitation is that few of them have collected or reported on repeated measures of ACEs during early childhood (Evans et al., 2013; McLaughlin, 2016). Such studies are unable to capture the dynamic nature of adversity (Obradovic, Shaffer, & Masten, 2012) and may undervalue its accumulation.

One recent study that considered ACEs at multiple time points was an analysis of data from the Fragile Families and Child Wellbeing Study (FFCWS), the dataset also utilized by the present study. The authors (Hunt et al., 2016) examined exposure to ACEs at ages 1, 3, and 5, counting a child as “exposed” to a particular adversity if it was endorsed at any of those time points. Higher ACEs scores were associated with more age 9 internalizing and

externalizing behaviors and a greater likelihood of being diagnosed with attention deficit and hyperactivity disorder (ADHD). Although the use of repeated measures improved the authors' ability to capture whether children were *ever* exposed to a set of adversities in early childhood, the study did not attend to the potential importance of exposure at multiple time points. For example, children exposed to the same two adversities at each of the three time points would have received the same score (=2) as children exposed to one ACE at age 1 and a different ACE at age 5. Thus it is still likely that the study underestimated the accumulation of adversities and, potentially, the extent of its association with later behavior problems. In addition, the study did not address *when* in early childhood the exposures occurred or *for how long*, leaving unanswered the questions of whether timing and duration of ACEs exposure are related to behavioral adjustment in middle childhood.

Life Course Theory and its Application to Early Adversity

Life course theory provides a valuable framework for considering the ways in which cumulative childhood adversity may influence later outcomes (Halfon, Larson, Lu, Tullis, & Russ, 2014). One aspect of adversity to which life course theory attends is the timing of exposure (Fine & Kotelchuck, 2010; Michel & Tyler, 2005). While adverse events can accumulate and impact an individual at any stage of life, early childhood (i.e., 0-5 years) may be especially important because experiences in the early years set the trajectory for children's subsequent interactions with their environment (Halfon et al., 2014). If the harm from an earlier developmental period is not resolved, developmental tasks associated with later stages may be compromised (Masten & Cicchetti, 2010). In addition to timing, life course theory posits that the duration or length of exposure to adverse experiences also shapes future health and development (Fine & Kotelchuck, 2010). Whereas the experience of stress or hardship at

a single time point may have little or no impact on an individual's developmental trajectory, adversity that persists over time may undermine the gradual development of various competencies important for behavioral adjustment, such as emotion regulation (Ackerman, Brown, & Izard, 2004).

Timing of Adversity and its Association with Behavior Problems

On the whole, studies on timing of adversity and subsequent behavior problems have produced mixed findings (e.g., Kotch et al., 2008; Thornberry, Ireland, & Smith, 2001). Some research supports the hypothesis that early childhood is a period of heightened vulnerability to adversity while other research fails to find a connection between early adversity and later behavior problems. Most of the research investigating the developmental timing of exposure to adversity has focused on single risk factors as opposed to cumulative risk. For example, the effects of poverty on children's behavior appear to be stronger when they are experienced in the first five years of life compared to later years (Brooks-Gunn & Duncan, 1997; Duncan & Brooks-Gunn, 2000). Similarly, longitudinal studies of child maltreatment have linked earlier age of onset of child maltreatment to more behavior problems in middle childhood (Keiley, Howe, Dodge, Bates, & Petti, 2001; Manly, Kim, Rogosch, & Cicchetti, 2001). The few studies that have investigated timing of exposure to multiple ACEs demonstrate mixed results. For instance, Appleyard and colleagues (2005) measured five adversities at two time points – early childhood (0-5 years) and middle childhood (6-12 years) – among a sample of 171 children. They collected behavioral outcomes at age 16. Compared to children exposed to fewer ACEs in early childhood, children exposed to higher numbers of early ACEs demonstrated more externalizing but not internalizing problems.

Some research suggests that very early childhood (e.g., infancy to 3 years) may be a sensitive period of development during which exposure to adversity is especially harmful to children's behavioral development. Findings from several studies of maternal depression show that children who are exposed to mothers' depression by age 3 are at greater risk for later mental health problems than children who are older at first exposure (Goodman et al., 2011). One hypothesis is that exposure to adverse events such as maternal depression or child maltreatment disrupts the development of secure attachment relationships, which in turn negatively affects behavioral adjustment (Manly et al., 2001). Additionally, children whose own needs have not been adequately met in the first few years of life – whether due to parental functioning, socioeconomic disadvantage, or for other reasons – may develop little capacity for perspective taking and empathy, both of which are crucial to self-regulation and related skills that promote behavioral health (Manly et al., 2001). Further, evidence from both animal and human studies suggests that adversity very early in life may lead to stress-related changes in brain development and structure that predispose children to depression and other mental health problems later in life (Andersen & Teicher, 2008; De Bellis, 2001). There is a clear need for additional research that assesses the role of timing of exposure to multiple ACEs during early childhood.

Duration of ACEs Exposure in Relation to Behavior Problems

Compared to timing of exposure to adversity, even fewer studies have examined the effects of duration of exposure. A handful of studies, primarily examining single adversities, have found associations between chronic adversity and child behavior problems (Ackerman et al., 2004). Children growing up in chronic poverty, for example, have shown greater risk for externalizing problem behaviors (Dearing, McCartney, & Taylor, 2006; Macmillan,

McMorris, & Kruttschnitt, 2004) and higher lifetime risk of depression (Gilman, Kawachi, Fitzmaurice, & Buka, 2002). Manly and colleagues (2001) found that chronic child maltreatment and onset of maltreatment in infancy/toddlerhood or the preschool years predicted worse behavioral outcomes than maltreatment that occurred during a single developmental period. Similarly, a study by Turney (2011) demonstrated an association between chronic maternal depression (0-5 years) and age 5 behavior problems. In one of the few studies to assess the relationship between duration of multiple adversities and behavior problems, Ackerman and colleagues (2004) did not find an association between exposure to persistent adversity from preschool to 5th grade and behavior problems measured at age 11 years. Instead they found that recent exposure and intermittent exposure to adversity had the strongest associations with behavior problems. Notably, this study was limited by a small sample size (*N*=110) and it lacked information on adversity prior to preschool. The dearth of research exploring whether chronic exposure to cumulative adversity in early childhood is associated with more behavior problems than exposure at a single or intermittent time points to a significant gap in the ACEs literature.

The Present Study

While the body of evidence connecting exposure to ACEs in early childhood with later behavior problems is substantial and growing, the literature attending to not only the accumulation of adversity but also its timing and duration is underdeveloped. To contribute to this critical area of research, we utilized data from the FFCWS to address two primary research aims. The first was to examine the association between cumulative adversity in early childhood (summing across reports at ages 1, 3, and 5 years) and behavior problem status at age 9. We hypothesized that cumulative adversity in early childhood would demonstrate a

graded relationship with age 9 behavior problems, adjusting for age 9 adversity and age 5 behavior problem status. Second, we explored how timing and duration of exposure to ACEs in early childhood were associated with age 9 behavior problem status. Specifically, we investigated associations between: high early adversity (≥2 ACEs at age 1 and/or 3 years but not age 5); high late adversity (≥2 ACEs at ages 3 and 5 years or age 5 only but not at age 1); intermittent high adversity (≥2 ACEs at ages 1 and 5 years); and chronic high adversity (≥2 ACEs at ages 1, 3, and 5 years) and internalizing and externalizing problems at age 9. We hypothesized that high early adversity and chronic exposure would be associated with the highest odds of behavior problems at age 9.

Methods

Data and Sample

Our study conducts secondary analyses of data from FFCWS, a longitudinal birth cohort study of 4,898 children born between 1998 and 2000 (Reichman, Teitler, Garfinkel, & McLanahan, 2001). The FFCWS utilized a multistage stratified random sampling design that oversampled non-marital births. Twenty cities were sampled from all U.S. cities with populations greater than 200,000, and within those cities, hospitals were systematically sampled to increase coverage of births to unmarried parents (Reichman et al., 2001). At baseline, the full cohort included 3,711 non-marital births and 1,187 births to married parents (Reichman et al., 2001). Mothers and fathers who gave informed consent were interviewed within 48 hours of the child's birth, typically at the hospital. Both parents were contacted for subsequent phone-based interviews ("core" interviews) when the focal child was approximately age 1 year (Y1), 3 years (Y3), 5 years (Y5), and 9 years (Y9) (Geller, Jaeger, & Pace, 2015). Of the mothers who participated at baseline, response rates at Y1, Y3, Y5,

and Y9 were 90%, 88%, 87%, and 76%, respectively. In-home data were also collected from a subset of respondents at Y3 (*n* = 3,258), Y5 (*n* = 2,981), and Y9 (*n* = 3,630) to survey the person the focal child lived with at least half the time (the primary caregiver [PCG], usually the mother). Further details about the original study methodology are available elsewhere (Geller et al., 2015; Reichman et al., 2001).

The present study is based on data collected from mothers at baseline, four follow-up core interviews, and in-home interviews conducted at Y3, Y5, and Y9. The sample is limited to children whose mothers participated in all core and in-home surveys, the Y9 child assessment, and reported living with the child at least half the time (*n* = 1940). One hundred and sixteen children were excluded because some Y5 interviews, where the measures were piloted, were missing items on children's behavior problems and 35 cases were excluded due to incomplete data on the outcome variables, resulting in an analytic sample of 1,789. Cases with partial missing data on ACEs were not excluded from analyses; missing responses were coded as zero, or no exposure. At Y1, eight cases (0.45%) were missing data on one ACE measure. At Y3 and Y5, respectively, 4.42% (79 cases) and 9.28% (166 cases) were missing data on one ACE. One case each at Y3 and Y5 was missing data on two ACEs (0.06%). Across the three early childhood waves, the majority of the sample (98%) was missing data on no more than one ACE total.

Measures

Adverse childhood experiences (ACEs). A total of seven ACEs were assessed at each of the early childhood waves (Y1, Y3, and Y5) and at Y9, including: child physical abuse, maternal depression, household substance use, paternal incarceration, intimate partner violence (IPV), housing instability, and food insecurity.

Child physical abuse. At Y3, Y5, and Y9, child physical abuse was assessed using items in the Parent-Child Conflict Tactics Scale (CTS) (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). Following Font and Berger (2015), physical abuse was indicated by the mother's report that she or another caregiver living in the house hit the child with a belt, stick, or other hard object three or more times in the previous year, or shook the child at any time in the previous year. Mothers were not asked to report hitting or shaking by other caregivers at Y9, thus at Y9 we used child physical abuse by mothers. The Parent-Child CTS items were not asked at Y1. Child physical abuse at Y1was measured by the mothers' response to the question, "In the past month, have you spanked the child because s/he was misbehaving or acting up?" Children whose mothers reported spanking them every day, a few times a week, or a few times in the past month (versus none or 1-2 times in the past month) were considered exposed to child physical abuse.

Maternal depression. At each wave beginning at Y1, mothers completed the Major Depression Episode subscale of the Composite International Diagnostic Interview–Short Form (CIDI-SF) (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). The questions of the CIDI-SF were designed to correspond to diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994). Mothers were asked about feelings of depression or being unable to derive pleasure from activities they used to enjoy. Respondents who experienced either of these conditions most of the time, every day, for a 2-week period during the previous year were asked additional questions related to concentration problems, trouble sleeping, feeling tired, changes in weight, thinking about death, and feelings of worthlessness (Kessler et al., 1998). Affirmative responses were summed to construct a score from 0 to 8. Mothers who indicated

they were taking medication to treat depression were assigned a score of 8. Each score corresponds to a probability of a depression diagnosis ranging from .0001 to .9083 (Nelson, Kessler, & Mroczek, 2001). Mothers scoring 3 or higher were considered a probable case and were categorized as experiencing depression at that wave.

Household substance use. To measure household substance use at each wave mothers responded to questions pertaining to drug and alcohol use in the past 12 months. They were asked, "Was there ever a time when your drinking or being hung over interfered with your work at school, or a job, or at home?" and (in all waves except Y9) "Have you sought help/been treated for drug/alcohol problem?" Mothers were also asked if they had used marijuana, cocaine or crack, heroin, hallucinogens, amphetamines, or any prescription drugs (e.g., sedatives, pain medications) without a prescription or for longer /in greater quantities than prescribed. Finally, mothers reported if the biological father and/or (if applicable) current live-in partner "had problems such as keeping a job or getting along with family and friends because of alcohol or drug use." Following Jimenez and colleagues (2016), a positive response to one or more of these questions was categorized as exposure to household substance use.

Paternal incarceration. Y1 father incarceration was measured by baseline and Y1 reports that the child's biological father was in prison. If the father was in prison at the time of one or both interviews, children were categorized as exposed to paternal incarceration at Y1. At Y3 and Y5, mothers reported whether the father had spent time in prison since the last interview. At Y9, father incarceration was operationalized as father being in jail at the time of the Y9 interview.

IPV. Previously validated items were used to measure IPV at each wave (Lloyd, 1997; Sweet, Bumpass, & Call, 1988). Mothers were asked to consider how the focal child's biological father (if in relationship with him) or current partner (if applicable) behaves toward them, answering the following questions: 1) "How often does he slap or kick you?" 2) "How often does he hit you with a fist or object that could hurt you?" 3) "How often does he try to make you have sex or do sexual things you don't want to do?" 4) "Have you and the biological father or current partner had a physical fight in front of the child since the last interview?" and 5) "Have you been seriously hurt in a fight with the father or current partner since the last interview?" Following Suglia and colleagues (Suglia, Duarte, Chambers, & Boynton-Jarrett, 2012), a response of "sometimes" or "often" (rather than "never") to any of the first three items or an affirmative response to either of the last two items was categorized as an IPV exposure.

Housing instability. Items from the New York City Social Indicators Survey (Meyers & Garfinkel, 1999) and the Survey of Income and Program Participation (SIPP) (U.S. Department of Commerce, 1998) assessed exposure to housing instability. At each wave, mothers were asked if they had faced any of the following problems in the past 12 months because of lack of money: 1) been evicted from home or apartment; 2) moved in with other people; 3) stayed at a shelter, in a vehicle, or in an abandoned building even for one night; or 4) not paid the full amount of rent or mortgage. Mothers were also asked if they had moved residences more often than once per year since the previous interview. Following Geller and Franklin (2014), affirming one or more of these items was considered exposure to housing instability for that time period.

Food insecurity. The measure of *food insecurity* was derived from three SIPP items that asked whether, in the past 12 months, mothers had received free meals, mothers had been hungry but could not afford to buy more food, or their children had been hungry but they could not afford to buy more food. Endorsing one or more of the three items was categorized as exposure to food insecurity (Suglia et al., 2012).

Index of cumulative early adversity. Dichotomous variables were created for the seven ACEs at Y1, Y3, and Y5. A score of 1 was given for each ACE that was endorsed, such that index scores could range from 0 to 7 at each wave. A cumulative ACEs score was calculated by summing the scores across the three time points, with possible scores ranging from 0 to 21. To examine the gradient effect, this cumulative score was broken into four categories representing total number of ACEs in early childhood (0-1 ACEs [reference group]; 2-3; 4-5; ≥6 ACEs).

Timing and duration of early adversity. The ACEs index scores at each early childhood wave were dichotomized to represent high adversity (1 = two or more ACEs at wave) versus no/low adversity (0 = zero or one ACE at wave). To assess the potential significance of timing and duration of adversity in early childhood, a 5-level variable was created as follows: 1) no or low adversity at each wave (<2 ACEs at Y1, Y3, and Y5; reference category); 2) high early adversity (≥2 ACEs in Y1 and/or Y3 but not Y5); 3) high late adversity (≥2 ACEs in Y3 and Y5 or Y5 only but not Y1); 4) intermittent high adversity (≥2 ACEs in Y1 and Y5 but not Y3); and 5) chronic high adversity (≥2 ACEs in Y1, Y3, and Y5).

Index of recent (Y9) adversity. As with the early ACEs index, dichotomous variables for the seven risk factors at Y9 were created and summed to produce an index score

ranging between 0 and 7. Scores were divided into four categories (no ACEs [reference group]; 1 ACE; 2 ACEs; ≥3 ACEs).

Internalizing and externalizing behaviors at Y9. Internalizing and externalizing behaviors were calculated using sub-scales of the Child Behavior Checklist for children 6 to 18 years old (CBCL/6-18) (Achenbach & Rescorla, 2001). Mothers answered items on the CBCL on a 3-point scale (1 = *not true of this child,* 2 = *sometimes or somewhat true,* 3 = *very or often true*). The internalizing behaviors score is calculated as the sum of three subscales: anxious/depressed (e.g., "Child is too fearful or anxious"), withdrawn/depressed (e.g., "Child is withdrawn, doesn't get involved with others"), and somatic complaints (e.g., "Child has nightmares"). The scale contains a total of 32 items. To measure externalizing behaviors, scores from two subscales are summed: rule breaking (e.g., "Child doesn't seem to feel guilty after misbehaving") and aggressive behaviors (e.g., "Child is cruel, bullies, or shows meanness to others"). The externalizing behaviors scale consists of 35 items. The CBCL provides normative T-scores for the internalizing and externalizing scales, with T-scores greater than or equal to 64 classified as being in the clinical range, or sufficiently high to warrant professional support (Achenbach & Rescorla, 2001). Dichotomous variables were created to represent internalizing and externalizing behavior problem status (1= clinical range; 0=normal range).

Internalizing and externalizing behavior problems at Y5. For models that adjusted for age 5 behavior problem status, we used mothers' responses to items on the CBCL (CBCL/4-18) (Achenbach, 1991) at Y5. Scores from the anxious/depressed and withdrawn/depressed subscales were summed to measure internalizing behaviors (22 items). Somatic problems were not measured at Y5. Scores from the rule breaking and aggressive

behaviors subscales (30 items) were summed to calculate the externalizing behaviors score. As at Y9, scores were dichotomized to represent internalizing and externalizing behavior problem status in the clinical vs. normal range.

Socio-demographic control variables. Baseline control variables include *child gender, mother's age, mother's race/ethnicity* (non-Hispanic Black, Hispanic, other race, and White non-Hispanic (reference)), *mother's level of education* (< high school, high school, and some college or more (reference)), *marital status at child's birth* (1 = married to child's father; 0 = not married), and *receipt of public assistance.* Public assistance was counted as 1 (versus 0) if the mother reported receiving at least one of the following types of aid in the past year: welfare (cash assistance), food stamps/Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutritional Program for Women, Infants, and Children (WIC), or Medicaid. We also created categorical variables to control for consistency of public assistance and of cohabitation between Y1 and Y9. Use of public assistance was categorized as public assistance receipt at all four waves, at two or three waves, and at zero or one wave (reference group). Mothers' cohabitation status (living with child's father or a current partner, versus not) was categorized as cohabitating at waves three or four, at two waves, or zero or one wave (reference group). Similar to other researchers analyzing FFCWS data (Carlson, Pilkauskas, Mclanahan, & Brooks-Gunn, 2011; Geller & Franklin, 2014; Pilarz & Hill, 2014; Ryan, Johnson, Rigby, & Brooks-Gunn, 2011), we controlled for raking variables that were used to create the survey weights (mothers' baseline age, race/ethnicity, and education, and parents' baseline marital status), rather than apply the survey weights to the analyses.

Analyses

Analyses were conducted using SAS statistical software version 9.4. Un-weighted descriptive statistics were obtained for all categorical and continuous variables, including socio-demographics, individual ACEs, variables representing accumulation and timing/duration of ACEs, and clinical behavioral problems at Y5 and Y9. We conducted chi-square and t-tests to compare baseline demographic characteristics of the full sample to the analytic sample. Chi-square tests were used to identify bivariate associations between key independent variables (cumulative and timing/duration of early adversity, cumulative proximate adversity, and Y5 behavior problems) and outcome variables.

We ran two series of hierarchical logistic regression models. Testing hypothesis 1, we regressed Y9 behavioral outcomes on cumulative early ACEs. Model 1 controlled for socio-demographic characteristics described above (see Measures). Model 2 controlled for ACEs at Y9 (recent adversity) in addition to socio-demographic characteristics, in order to examine the independent effects of early versus recent adversity. Model 3 adjusted for the above as well as Y5 behavior problem status, in order to predict change in behavior problem status between ages 5 and 9. To test hypothesis 2, a set of models regressed Y9 behavioral outcomes on timing and duration of early ACEs. As above, Model 1 adjusted for socio-demographic factors, Model 2 further adjusted for recent adversity, and Model 3 included Y5 behavior problem status.

Results

Univariate and Bivariate Analyses

Descriptive statistics are presented in Table 1. The analytic sample contained 927 boys (52%) and 862 girls (48%). Just over half the mothers (52%) reported their

race/ethnicity as non-Hispanic Black, followed by 23% identifying as non-Hispanic White and 22% as Hispanic. Slightly more than 3% reported another race/ethnicity. At baseline, approximately six out of ten women (60%) had a high school education or less and nearly two-thirds of the sample (65%) received at least one type of public assistance. One-quarter of mothers (25%) were married to the child's biological father at the time of the child's birth. Compared to the full baseline sample, a larger proportion of mothers in the analytic sample was Black and a lower proportion was Hispanic. Mothers in the analytic sample had higher levels of education and were less likely to report baseline receipt of public assistance compared to the full sample. Across the four waves, 53% of the sample received public assistance at all time points (see Table 1). Fewer than half of mothers (44%) reported they were cohabiting with the child's father or another partner at three or four waves.

Prevalence of clinical internalizing and externalizing behaviors at Y5 was 9.00% and 10% respectively. At Y9, 8% of the sample demonstrated internalizing problems and the same percentage demonstrated externalizing problems. More than half the sample (55%) reported exposure to one or more ACEs at Y1 (see Table 2) while a quarter of the sample had experienced two or more ACEs. In subsequent years, at least 60% affirmed one or more of seven ACEs, with more than 30% reporting two or more exposures. Chi-square analyses demonstrated significant bivariate associations between the categorical adversity variables (cumulative early adversity, timing/duration of early adversity, and proximate adversity) and Y9 behavior problems, as well as between Y5 and Y9 behavior problems (see Table 3).

Multivariate Analyses: Cumulative Early Adversity and Y9 Behavior Problems

Results of logistic regressions examining associations between cumulative adversity across early childhood and behavior problems at Y9 are presented in Table 4. Model 1

showed a dose-response relationship between number of early adversities and odds of clinical behavior problems. Compared to the reference group (0-1 ACEs), odds of internalizing problems at Y9 were more than twice as high for children exposed to two or three ACEs (AOR: 2.12; CI: 1.21, 3.74), 3.65 times as high for those exposed to four or five ACEs (CI: 2.01, 6.62), and more than five times as high for children with six or more ACE exposures (AOR: 5.60; CI: 3.16, 9.95). The highest two exposure groups showed similar associations between early adversity and externalizing problems. Compared to the reference group, children exposed to four or five ACEs in early childhood faced a four-fold increase in odds of externalizing problems at Y9 (AOR: 4.33; CI: 2.38, 7.87) while exposure to six or more ACEs was associated with a nearly six-fold increase (AOR: 5.91; CI: 3.31, 10.55).

Adding recent (Y9) adversity in Model 2 attenuated the relationship between cumulative early adversity and later behavior problems, but associations still remained significant. Compared to the reference group, exposure to six or more ACEs in early childhood was associated with nearly four times the odds of Y9 internalizing (AOR: 3.74; CI: 2.03, 6.91) and externalizing problems (AOR: 3.91; CI: 2.11, 7.25). Recent exposure to two or more adversities was also related to odds of behavior problems. Compared to children who experienced no recent ACEs, those exposed to three or more ACEs at Y9 had more than twice the odds of internalizing problems (AOR: 2.53; CI: 1.44, 4.43) and nearly three times the odds of externalizing problems (AOR: 2.84; CI: 1.59, 5.09).

Model 3 further adjusted for Y5 behavior problem status. Cumulative early adversity remained significantly associated with odds of Y9 behavior problems. Exposure to six or more early ACEs was associated with approximately three times the odds of internalizing problems (AOR: 2.96; CI: 1.58, 5.56) and externalizing problems (AOR: 3.06; CI: 1.64,

5.77). Internalizing problem status at Y5 was strongly associated with internalizing problem status at Y9 (AOR: 4.82; CI: 3.09, 7.52), and likewise there was a strong association between Y5 and Y9 externalizing problem status (AOR: 5.02; CI: 3.26, 7.74). Exposure to multiple recent ACEs continued to be significantly associated with odds of Y9 behavior problems in Model 3.

Multivariate Analyses: Timing and Duration of Early Adversity and Y9 Behaviors

Table 5 shows the results of logistic regressions investigating associations between timing and duration of early childhood adversity and odds of Y9 behavior problems. In Model 1, compared to the no/low adversity group, children in all other adversity groups had increased odds of behavior problems. Intermittent high adversity was associated with the greatest increase in odds of internalizing problems (AOR: 5.39; CI: 2.51, 11.60) and externalizing problems (AOR: 7.89; CI: 3.71, 16.78). Chronic high adversity was associated with 3.5 times the odds of internalizing problems (AOR: 3.58; CI: 2.04, 6.29) and approximately four times the odds of externalizing problems (AOR: 3.96; CI: 2.22, 7.08). Exposure to high late adversity also predicted four times the odds of externalizing problems compared to no/low adversity (AOR: 4.08; CI: 2.44, 6.83). In Model 2, all early adversity timing and duration variables remained significantly associated with Y9 behavior problems. Intermittent adversity was still associated with the largest odds ratios (Internalizing AOR: 3.92; CI: 1.79, 8.57; Externalizing AOR: 5.52; CI: 2.54, 11.97). Exposure to high early, high late, and chronic adversity were associated with roughly two to three times the odds of both types of problems. In addition to early adversity, exposure to two or more recent ACEs was associated with increased odds of behavior problems (see Table 5).

In Model 3, odds ratios for intermittent high adversity remained the most pronounced

(Internalizing AOR: 3.72; CI: 1.66, 8.36; Externalizing AOR: 4.69; CI: 2.08, 10.58). High early and high late adversity were each associated with approximately 2.5 times the odds of Y9 externalizing problems and twice the odds of Y9 internalizing problems, adjusting for Y5 behavior problem status. Chronic adversity was no longer associated with Y9 behavior problems. The relationship between recent adversity and Y9 behavior problems was virtually unchanged in Model 3.

Discussion

The goal of the current study was to examine the relationship between accumulation, timing, and duration of early childhood adversity and behavioral outcomes in middle childhood. We used data from the FFCWS to investigate the relationship between the accumulation of adversity across the first five years of children's lives and its association with later behavior problems, independent of exposure to recent adversity. We also explored whether duration and/or timing of exposure across early childhood predicted later behavior problems.

We hypothesized that (1) cumulative adversity measured at ages 1, 3, and 5 years would demonstrate a dose-response relationship to internalizing and externalizing problems at age 9 and (2) high early adversity (≥2 ACEs in Y1 and/or Y3 but not Y5) and chronic high adversity (≥2 ACEs at Y1, Y3, and Y5) would predict the greatest odds of behavior problems. The data supported our first hypothesis. In models adjusting for socio-demographic characteristics (Model 1) and recent adversity (Model 2), odds of age 9 internalizing and externalizing behavior problems increased the most for children exposed to six or more ACEs (compared to 0-1 ACE) in early childhood, followed by children exposed to four or five ACEs. Our results suggest that exposure to higher levels of adversity in early

childhood predicts greater odds of behavior problems in middle childhood, and this association is independent of the effects of recent adversity. Moreover, results from Model 3 indicated that high cumulative adversity in early childhood was significantly associated with age 9 behavior problem status after adjusting for behavior problem status at age 5. Current study findings not only add to the literature demonstrating that exposure to adversity in early childhood can have a lasting impact on children's behavioral adjustment (e.g., Davis, MacKinnon, Schultz, & Sandler, 2003; Fanti & Henrich, 2010; Hunt et al., 2016; Manly et al., 2001), but also extend previous research. The use of repeated measures of ACEs allowed us to better account for the total accumulation of a set of adversities over a period of five years, a limitation of prior research. Further, by including age 5 behavior status in final models, our analyses modeled how early adversity was associated with change in children's behavior problem status between ages 5 and 9.

The present study also found associations between timing and duration of early adversity and age 9 behavior problems. However, the results did not align with the study's second hypothesis. Among all timing/duration groups, children exposed to intermittent adversity in early childhood (≥2 ACEs at Y1 and Y5 but not Y3) had the highest odds of clinical behavior problems at age 9. After adjusting for recent adversity and Y5 behavior problems, intermittent adversity in early childhood predicted a nearly four-fold increase in odds of internalizing problems and a nearly five-fold increase in odds of externalizing problems at age 9, compared to the no/low-adversity reference group. While chronic adversity in early childhood was significantly associated with Y9 behavior problems in Models 1 and 2, the association became non-significant when Y5 behavior problems were added to Model 3. These results were surprising in light of research that has found

associations between persistent early exposure to adversities (e.g., poverty) and behavior problems (Dearing et al., 2006; Gilman et al., 2002). One possible explanation is that chronic adversity in early childhood is more strongly associated with proximate outcomes (i.e., Y5 behavior problems), such that the association with middle childhood behaviors is mediated by earlier behavior problems. The present study did not include tests for mediation, but this issue is an important one for future research to consider. Additional studies are needed to elucidate the different pathways by which chronic adversity may influence behavioral health over time.

While not hypothesized, the finding that intermittent adversity was strongly associated with later behavior problems is consistent with a few studies that have shown volatile or unpredictable adversity may be more damaging to children's adjustment than persistent adversity that is predictable (Dearing, McCartney, & Taylor, 2001). It could be that intermittent adversity is more disruptive to children's wellbeing over time because it requires regular readjustment to changing circumstances (Ackerman et al., 2004). Future research should investigate the relationship between intermittent and episodic early childhood adversity and later behavior problems among other samples of children to determine whether these findings are replicable.

Similar to the pattern for intermittent adversity but less pronounced, final models showed that high early adversity was associated with approximately twice the odds of internalizing problems, and between two and three times the odds of externalizing problems, compared to the reference group (see Model 3, Table 5). High late adversity (≥2 ACEs at Y3 and Y5 or Y5 only) conferred nearly the same level of risk as high early adversity. While these findings do not support our hypothesis that the first one to three years of life represent a

sensitive period of development for children's behavioral health, they do align with other research showing that exposure to high adversity in any stage of childhood (i.e., infancy, toddlerhood, preschool years, more proximate) negatively impacts child behavioral outcomes (Ackerman et al., 2004; Flouri & Kallis, 2007; Manly et al., 2001; Schoon et al., 2002). The results of this study caution us not to overlook the importance of proximate adversity.

Limitations and Contributions

This study was subject to several limitations that deserve consideration. First, attrition of FFCWS participants and the fact that only a subsample of families took part in all three in-home interviews reduced the sample size considerably. Given that mothers lost to follow-up were less educated and more likely to report baseline receipt of public assistance, the analytic sample may be less disadvantaged than the population FFCWS was designed to represent. Children exposed to the highest levels of adversity may therefore be underrepresented in the sample, limiting the generalizability of the findings. A second limitation was our reliance on a single informant – the mother – for all data. Mothers may have underreported adversities such as child physical abuse, IPV, and substance use. Mothers' perceptions of child behavior may also have been affected by their own exposure to stress, their mental health, or other factors that could lead mothers to focus more on negative behaviors or, alternatively, not to notice them (Goodman et al., 2011).

Third, FFCWS did not administer a consistent ACEs inventory across time points. Although repeated measures of adversity were collected, some of the measures changed slightly from one wave to the next. Because a sizeable proportion of parents were unmarried, many of the mothers reported losing contact with the father over the course of the study and therefore were unaware of the father's incarceration status. In these cases, we scored the

ACE as zero. In addition, Parent-Child CTS measures of child maltreatment were not available at Y1, so we measured child physical abuse at Y1 as spanking the child at least a few times in the past month. Such irregularities may have resulted in underestimating the true prevalence of certain adversities. A recent review concluded that one overarching limitation of research linking childhood adversity to later mental and behavioral health outcomes is the lack of consistency in how researchers define and operationalize child adversity (McLaughlin, 2016). The present study adapted its ACEs index from previous research utilizing FFCWS data (Hunt et al., 2016; Jimenez et al., 2016; Suglia et al., 2012) and we attempted to capture risk factors that have been linked with childhood internalizing and externalizing problems (e.g., Dearing et al., 2006; Font & Berger, 2015; Turney, 2011). However, we also acknowledge the need for a more consistent and evidence-based definition of childhood adversity. The field would be well served by further development and testing of instruments to measure childhood adversity (e.g., Finkelhor, Shattuck, Turner, & Hamby, 2015).

In spite of these limitations, the present study makes several important contributions to the literature on early childhood adversity and later behavior problems. First, we examined ACEs at three time points in early childhood in order to better account for the dynamic nature of adversity and the potential roles of timing and duration of exposure. We also accounted for ACEs reported the same year as outcomes were collected, allowing us to distinguish between contributions of early versus recent adversity. Finally, we added age 5 behavior problems to analyses to examine associations between early adversity and change in behavior problem status between ages 5 and 9. Results demonstrated that it is not only the total amount of adversity that matters for behavior problems in middle childhood. It is also important to

consider when the adversity occurred and for how long it persisted. As noted above, further research is needed to identify various mechanisms by which the developmental timing and duration of adversity are linked to behavior problems across early and middle childhood (and beyond). Future prospective studies should include in their design repeated and consistent measures of adversity at regular time points across childhood and adolescence.

Clinical Implications and Conclusions

Our findings suggest that the prevention of mental and behavioral health problems in middle childhood requires attending to children's early environment, including the parent or parents' ability to meet their family's material needs, family members' access to mental and behavioral health care in addition to physical health care, and access to stable and secure housing. Providing more consistent, integrated, and universal supports to families would likely reduce the number of ACEs children are exposed to, as well as reduce the impact of adversity on children's development (Larkin, Felitti, & Anda, 2014). Interventions such as the Triple P Positive Parenting Program and the Nurse-Family Partnership are potential models for integrating prevention-based programming with access to services that respond to/mitigate the consequences of adversity (Daro & Dodge, 2009; Olds, 2006; Prinz, Sanders, Shapiro, Whitaker, & Lutzker, 2009). Evaluations have shown positive results including reduction of child maltreatment and improvements in child behavior (Prinz et al., 2009; Sanders, 2012). Further intervention research is warranted to assess the potential for such models to reduce adversities in addition to child maltreatment. Given that recent adversity also appears to significantly contribute to risk of behavior problems in middle childhood, interventions that focus on early childhood (such as the Nurse Family Partnership) are necessary but likely not sufficient. Improving the life course health of children and families

calls for supports that address their unique needs across developmental stages.

Another promising approach to preventing and/or reducing childhood adversity is the family-centered medical home (FCMH) model, defined by the American Academy of Pediatrics as care that is family-centered, continuous, comprehensive, accessible, coordinated, compassionate, and culturally-effective (Stille et al., 2010). The FCMH model has been implemented in a variety of ways, but components that warrant consideration for their potential to prevent/reduce adversity are equipping healthcare providers to implement multi-generational care that takes family context into account, co-locating mental health care providers with primary care providers, and fostering cross-sector collaborations that link families with a broad range of services such as legal services, housing assistance, and others (Williams, Costa, Odunlami, & Mohammed, 2008). Future research ought to evaluate different types of FCMH models from the perspective of adversity prevention/reduction.

In conclusion, the results of the present study indicate that reducing or preventing early childhood adversity could substantially reduce the risk of behavior problems in middle childhood. Our findings suggest that exposure to adversity in the first five years of life increases the odds of clinical internalizing and externalizing behaviors by age 9.

Tables

Table 1. Descriptive statistics of analytic sample (un-weighted) compared to full baseline sample

Characteristic	Analytic sample (N = 1,789)	Full baseline sample (N = 4,898)
	Mean (SD[a])	*Mean (SD)*
Mother's age (BL[b])	25.25 (6.00)	25.28 (6.04)
Child gender	*Frequency (%)*	*Frequency (%)*
Female	48.18	47.55
Male	51.82	52.45
Mother's race/ethnicity		
Non-Hispanic Black	51.65[c]	47.49
Hispanic	22.19[d]	27.28
Non-Hispanic White	22.86	21.03
Other	3.30	4.18
Mother's education (BL)		
Less than high school	29.07[d]	34.69
High school	31.30	30.33
Some college or more	39.63[e]	34.98
Marital status (BL)	25.43	24.23
Receipt of public assistance (BL)	65.23[f]	67.97
Receipt of public assistance (Y1-Y9)		
All 4 waves	53.16	
2-3 waves	25.82	
0-1 wave	21.02	
Mother cohabiting[g] (Y1-Y9)		
3-4 waves	43.88	
2 waves	23.76	
0-1 wave	32.36	
Internalizing problems, Y5	9.00	
Externalizing problems Y5	10.12	
Internalizing problems, Y9	8.38	
Externalizing problems, Y9	8.38	

a. SD=standard deviation; b. BL=baseline; c. Differs significantly from full baseline sample, $p<.01$; d. Differs significantly from full baseline sample, $p<.0001$; e. Differs significantly from full baseline sample, $p<.001$; f. Differs significantly from full baseline sample, $p<.05$; g. mother cohabiting with child's biological father or a current partner.

Table 2. Adverse childhood experiences (ACEs) at ages 1, 3, 5, and 9 Years (N = 1,789)

	Age 1		Age 3		Age 5		Age 9	
Risk factor	*n*	%	*n*	%	*n*	%	*n*	%
Child physical abuse	229	12.80	399	22.30	489	27.33	381	21.30
Maternal depression	297	16.60	370	20.68	290	16.21	302	16.95
Household substance use	250	13.97	266	14.87	266	14.87	360	20.12
Paternal incarceration	112	6.26	346	19.34	214	11.96	134	7.49
Intimate partner violence	101	5.65	59	3.30	147	8.22	110	6.15
Housing instability	496	27.72	358	20.01	389	21.74	447	24.99
Food insecurity	181	10.12	299	16.71	288	16.10	303	16.94
Total ACEs								
None	813	45.44	678	37.90	687	38.40	693	38.74
1	527	29.46	546	30.52	558	31.19	534	29.85
2	282	15.76	290	16.21	285	15.93	314	17.55
≥ 3	167	9.34	275	15.37	259	14.48	248	13.86

Table 3. Bivariate associations between adversity and age 5 behavior problems by at age 9 behavior problems (N = 1,789)

Cumulative Early Adversity (Y1-Y5)	Total sample	Internalizing Y9		Externalizing Y9	
		n (row %)		*n* (row %)	
	n (%)	Yes	No	Yes	No
0-1 ACEs[a]	590 (32.98)	22 (3.73)	568 (96.27)	19 (3.22)	571 (96.78)
2-3 ACEs	518 (28.95)	35 (6.76)	483 (93.24)	24 (4.63)	494 (95.37)
4-5 ACEs	320 (17.89)	36 (11.25)	284 (88.75)	42 (13.13)	278 (86.88)
≥ 6 ACEs	361 (20.18)	57 (15.79)	304 (84.21)	65 (18.01)	296 (81.99)
		$\chi2$[b] (df[c]=3, N=1789) = 47.63, $p < .0001$		$\chi2$ (df=3, N=1789) = 82.84, $p < .0001$	
Timing/Duration of Early Adversity (Y1-Y5)					
No or low adversity	888 (49.64)	41 (4.62)	847 (95.38)	31 (3.49)	857 (96.51)
High early adversity	357 (19.96)	34 (9.52)	323 (90.48)	37 (10.36)	320 (89.64)
High late adversity	302 (16.88)	36 (11.92)	266 (88.08)	41 (13.58)	261 (86.42)
Intermittent high adversity	58 (3.24)	11 (18.97)	47 (81.03)	13 (22.41)	45 (77.59)
Chronic high adversity	184 (10.29)	28 (15.22)	156 (84.78)	28 (15.22)	156 (84.78)
		$\chi2$ (df=4, N=1789) = 41.56, $p < .0001$		$\chi2$ (df=4, N=1789) = 66.15, $p < .0001$	
Recent Adversity (Y9)					
0 ACEs	693 (38.74)	33 (4.76)	660 (95.24)	25 (3.61)	668 (96.39)
1 ACE	534 (29.85)	35 (6.55)	499 (93.45)	41 (7.68)	493 (92.32)
2 ACEs	314 (17.55)	41 (13.06)	273 (86.94)	38 (12.10)	276 (87.90)
≥3 ACEs	248 (13.86)	41 (16.53)	207 (83.47)	46 (18.55)	202 (81.45)
		$\chi2$ (df=3, N=1789) = 44.53, $p < .0001$		$\chi2$ (df=3, N=1789) = 59.94, $p < .0001$	
Y5 Internalizing Problems					
Yes	161 (9.00)	51 (31.68)	110 (68.32)	27 (16.77)	134 (83.23)
No	1628 (91.00)	99 (6.08)	1529 (93.92)	123 (7.56)	1505 (92.44)
		$\chi2$ (df=1, N=1789) = 124.96, $p < .0001$		$\chi2$ (df=1, N=1789) = 16.20, $p < .0001$	
Y5 Externalizing Problems					
Yes	181 (10.12)	35 (19.34)	146 (80.66)	55 (30.39)	126 (69.61)
No	1608 (89.88)	115 (7.15)	1493 (92.85)	95 (5.91)	1513 (94.09)
		$\chi2$ (df=1, N=1789) = 31.45, $p < .0001$		$\chi2$ (df=1, N=1789) = 129.91, $p < .0001$	

a. ACEs=adverse childhood experiences; b. $\chi2$=chi-squared; c. df=degrees of freedom

Table 4. Cumulative early adversity and odds of internalizing and externalizing behavior problems at age 9 (*N*= 1,789)

	Model 1[a]		Model 2[a]		Model 3[a]	
	AOR[b] (95% CI[c])		AOR (95% CI)		AOR (95% CI)	
Cumulative Early Adversity (Y1-Y5)	Internalizing	Externalizing	Internalizing	Externalizing	Internalizing	Externalizing
0-1 ACEs[d, e]						
2-3 ACEs	2.12 (1.21, 3.74)	1.45 (0.77, 2.71)	1.87 (1.05, 3.32)	1.25 (0.66, 2.36)	1.65 (0.92, 2.97)	1.17 (0.62, 2.25)
4-5 ACEs	3.65 (2.01, 6.62)	4.33 (2.38, 7.87)	2.90 (1.57, 5.36)	3.37 (1.83, 6.23)	2.48 (1.33, 4.61)	2.99 (1.60, 5.60)
≥ 6 ACEs	5.60 (3.16, 9.95)	5.91 (3.31, 10.55)	3.74 (2.03, 6.91)	3.91 (2.11, 7.25)	2.96 (1.58, 5.56)	3.06 (1.64, 5.77)
Recent Adversity (Y9)						
0 ACEs[e]						
1 ACE			1.23 (0.73, 2.05)	1.67 (0.98, 2.86)	1.13 (0.67, 1.92)	1.62 (0.93, 2.79)
2 ACEs			2.33 (1.37, 3.96)	2.32 (1.31, 4.10)	2.26 (1.32, 3.89)	2.26 (1.26, 4.05)
≥3 ACEs			2.53 (1.44, 4.43)	2.84 (1.59, 5.09)	2.15 (1.20, 3.85)	2.72 (1.49, 4.97)
Y5 Behavior Problems						
Internalizing					4.86 (3.12, 7.58)	1.00 (0.59, 1.72)
Externalizing					1.53 (0.94, 2.50)	4.85 (3.14, 7.47)

a. All models adjusted for child gender, maternal race/ethnicity, baseline maternal education, baseline maternal age, baseline marital status of parents, Y1-Y9 consistency of cohabitation status, and Y1-Y9 consistency of public assistance; b. AOR = adjusted odds ratios; c. CI = confidence interval; d. reference group; e. ACEs = adverse childhood experiences.

Table 5. Timing and duration of early adversity and odds of internalizing and externalizing behavior problems at age 9 (*N*= 1,789)

	Model 1[a]		Model 2[a]		Model 3[a]	
	AOR[b] (95% CI[c])		AOR (95% CI)		AOR (95% CI)	
Timing/Duration						
Adversity (Y1-Y5)	Internalizing	Externalizing	Internalizing	Externalizing	Internalizing	Externalizing
No/low[d]						
High early	2.21 (1.33, 3.65)	2.87 (1.71, 4.83)	1.94 (1.16, 3.24)	2.48 (1.46, 4.20)	1.87 (1.11, 3.16)	2.40 (1.40, 4.10)
High late	2.91 (1.76, 4.81)	4.08 (2.44, 6.83)	2.25 (1.33, 3.79)	3.08 (1.81, 5.25)	1.95 (1.14, 3.34)	2.51 (1.45, 4.33)
Intermittent	5.39 (2.51, 11.60)	7.89 (3.71, 16.78)	3.92 (1.79, 8.57)	5.52 (2.54, 11.97)	3.72 (1.66, 8.36)	4.69 (2.08, 10.58)
Chronic	3.58 (2.04, 6.29)	3.96 (2.22, 7.08)	2.24 (1.23, 4.10)	2.50 (1.35, 4.64)	1.59 (0.84, 3.01)	1.70 (0.88, 3.26)
Recent Adversity (Y9)						
0 ACEs[d, e]						
1 ACE			1.26 (0.76, 2.11)	1.71 (1.00, 2.91)	1.18 (0.70, 2.00)	1.62 (0.94, 2.80)
2 ACEs			2.54 (1.50, 4.30)	2.57 (1.46, 4.52)	2.55 (1.49, 4.37)	2.50 (1.40, 4.47)
≥3 ACEs			2.71 (1.54, 4.78)	3.27 (1.83, 5.83)	2.50 (1.40, 4.49)	3.22 (1.76, 5.87)
Y5 Behavior Problems						
Internalizing					5.13 (3.29, 8.01)	1.06 (0.62, 1.81)
Externalizing					1.58 (0.96, 2.58)	5.10 (3.30, 7.90)

a. All models adjusted for child gender, maternal race/ethnicity, baseline maternal education, baseline maternal age, baseline marital status of parents, Y1-Y9 consistency of cohabitation status, and Y1-Y9 consistency of public assistance; b. AOR = adjusted odds ratios; c. CI = confidence interval; d. reference group; e. ACEs = adverse childhood experiences.

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CHAPTER 4: STUDY TWO

Latent Classes of Early Childhood Adversity and Prospective Associations with Middle Childhood Behavior Problems

Abstract

While research has clearly established the negative effects of adverse childhood experiences (ACEs) on later health and wellbeing, few studies have examined common patterns of ACEs exposure in early childhood and their relationship with later outcomes. The current study utilized latent class analysis to identify subgroups of children exposed to similar constellations of ACEs at age 5 and to test their associations with behavioral outcomes at age 9. Utilizing prospective data from a diverse, urban sample of U.S. children and families (N = 2,114), we assessed nine ACEs to estimate classes of age 5 adversity. Five classes were identified: low adversity (75%), substance use/incarceration (8%), economic hardship (7%), multi-domain risk (5%), and child maltreatment (4%). Compared to children in the low adversity class, children in all other classes had higher probabilities of behavior problems at age 9. Faring the worst were children in the multi-domain risk class, characterized by financial hardship, parental conflict, and parental mental/behavioral health problems. Membership in this class was associated with seven times the odds of internalizing problems (odds ratio [OR]: 6.96, 95% confidence interval [CI]: 3.51, 13.77) and 11 times the odds of externalizing problems (OR: 11.16; CI: 5.75, 21.67), compared to low adversity. Greater understanding of common patterns of early childhood adversity could improve the development and targeting of appropriate interventions to mitigate risk for subsequent behavior problems.

Background

Exposure to adverse experiences in early childhood has been consistently linked with increased risk of psychopathology in childhood and across the life course (Copeland, Shanahan, Costello, & Angold, 2009; Evans, Li, & Whipple, 2013; Oliver, Kretschmer, & Maughan, 2014). Cross-sectional and longitudinal studies have demonstrated that many types of adversities – e.g., child maltreatment, intimate partner violence, poverty-related stressors, parental mental health problems – are associated with poor behavioral adjustment (Essex et al., 2006; Evans et al., 2013). Over the past several decades, with mounting evidence that exposure to cumulative risk or adverse childhood experiences (ACEs) predicts worse behavioral adjustment than exposure to a single adversity, studies using cumulative measures of risk have proliferated (Evans et al., 2013; Masten & Cicchetti, 2010; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). Studies typically dichotomize ACEs to represent the presence or absence of a particular risk factor or adversity (e.g., maternal depression) and then sum the adversities to create an ACE index score (Evans et al., 2013).

While cumulative risk approaches have demonstrated that the accumulation of adversity is harmful to development, they face several limitations. One is that all adversities are weighted equally (Copeland et al., 2009; Lanza, Rhoades, Nix, & Greenberg, 2010). Child physical abuse, for example, is viewed as being interchangeable with exposure to housing instability (e.g., eviction), to a household member abusing drugs or alcohol, to food insecurity, or to a child's father being incarcerated. The index approach would assign the same ACE score to a child exposed to housing problems and food insecurity as it would to a child exposed to physical abuse and household substance abuse. While the score would specify that each child was exposed to two ACEs, it would not provide any information about

the types or domains of exposure and the ways in which the adversities may interrelate (Lanza et al., 2010). In order to guide policy and intervention efforts, additional research needs to identify common constellations of ACEs and their associations with health outcomes. The present study aimed to extend this body of research by investigating configurations of ACEs in early childhood among an urban sample of more than 2,000 children, and by testing associations between these configurations and internalizing and externalizing behavior problems in middle childhood.

Alternatives to a Cumulative Risk Approach

Multiple indices to examine domains of risk. As an alternative to examining a single index of risk, several studies have developed separate risk indices to represent different domains of adversity (e.g., family, school, neighborhood). This approach allows researchers to explore the effects of exposure to adversity in one versus multiple domains and to test for interactions between domains (Evans et al., 2013). Compared to single-domain exposure, several studies have found that multi-domain exposure is more strongly related to a range of negative outcomes (Candelaria, Teti, & Black, 2011; Marsh, Evans, & Weigel, 2009; Stouthamer-Loeber, Loeber, Wei, Farrington, & Wikström, 2002; Thornberry, Smith, & Howard, 1997).

In addition to ACEs across multiple domains, a small number of studies have found associations between particular domains of adversity and behavior problems. For example, one study of 6- to 7-year-old (Ackerman, Schoff, Levinson, Youngstrom, & Izard, 1999) found associations between the domain of family instability (e.g., frequent residential and/or relationship changes) and externalizing problems, and between parental adjustment (e.g., parental mental health problems, substance use problems) and internalizing problems among

6- to 7-year old children. Another study (Gerard & Buehler, 2004) assessed ACEs in family, peer, school, and neighborhood domains among 7th to 11th graders. Results suggested the total number of domains was more important than type; exposure to three or four ACE domains was associated with significantly more behavior problems than exposure to two or fewer domains.

Person-centered approaches to studying adversity. Models employing one or more indices of adversity are variable-centered approaches. Such approaches explore relationships between variables (Muthen & Muthen, 2000). Person-centered approaches offer an important complement to variable-centered methods by providing a more holistic view of individuals' real-life experiences and risk exposures (von Eye & Bergman, 2003). Although there is evidence that adversities often cluster together and overlap (Essex et al., 2006; Oliver et al., 2014), few studies have tested whether there are common constellations of early childhood adversities and whether particular constellations are more salient to behavioral adjustment (Roy & Raver, 2014). Latent class analysis (LCA) is one person-centered approach that aims to detect subgroups (or latent classes) of individuals based on their similarities across a set of observed variables (Collins & Lanza, 2010; Muthen & Muthen, 2000). In recent years, researchers have begun to employ LCA to identify patterns of childhood adversity (Copeland et al., 2009; Lanza et al., 2010). One study conducted LCA using eight observed indicators of childhood stress (Menard, Bandeen-Roche, & Chilcoat, 2004). The authors identified six classes of stressors, the most prevalent being *low-risk* or *non-nuclear family structure*, and the least prevalent being *universal high risk.* While such studies shed light on potentially common patterns of childhood adversity, few have investigated how these patterns relate to subsequent psychological outcomes.

Associations Between Latent Classes of Adversity and Later Behavior Problems

Of the limited number of studies that have identified latent classes of adverse experiences and linked those classes to behavioral/mental health problems, several of them have focused on a narrow band of adversities. For example, one study enumerated latent classes based on eight indicators of violence exposure (e.g., physical abuse at home, victimization at school) among urban adolescents (Slopen, Fitzmaurice, Williams, & Gilman, 2012). Of the four latent classes identified (low violence, neighborhood violence/traumatic news, home violence, and multiple settings), odds of depression and anxiety measured two years later were both highest among youth exposed to multiple settings of violence. Odds of anxiety were also higher among adolescents in the neighborhood/traumatic news class compared to the low violence class. Another study focused on patterns of child maltreatment and domestic violence based on college students' retrospective reports (Berzenski & Yates, 2011). Results of LCA suggested that children exposed to emotional abuse, either alone or combined with other maltreatment types, experienced more anxiety and depression symptoms, whereas a combination of emotional and physical abuse was associated with conduct problems.

More closely aligned with the aims and methods of the present study, a handful of researchers have examined patterns of exposure to a broader array of family and social risk factors and their associations with behavioral adjustment. Most often these studies have modeled risk factors on the ACEs scale developed as part of the seminal Centers for Disease Control/Kaiser Permanente "Adverse Childhood Experiences Study" (Felitti et al., 1998; Finkelhor, Shattuck, Turner, & Hamby, 2015). The original scale measured eight ACEs including three forms of child abuse, household mental illness, household substance abuse,

violent treatment of mother, parental separation or divorce, and incarceration of a household member (Felitti et al., 1998). A common modification to the ACEs scale has been to include measures of economic adversity, given that poverty-related hardship has been shown to have psychosocial and neurobiological consequences (Braveman et al., 2017; Evans & Kim, 2013; Finkelhor et al., 2015; Mersky, Janczewski, & Topitzes, 2016). In addition, several of the below studies replaced parental divorce/separation with the indicator of "single parent" to account for the growing number of single-parent-headed households.

In their exploration of risk profiles of 750 kindergarteners, Lanza and colleagues (2010) measured 13 adversities, some adapted from the ACE scale and others incorporating poverty-related risks. They identified four latent classes of adversity: two-parent low risk, single-parent/history of problems, single-parent multilevel risk, and two-parent multilevel risk. Classes characterized by multiple risks across multiple domains were most strongly associated with behavior problems in Grade 5. Secondary analyses of data from the Avon Longitudinal Study of Parents and Children (ALSPAC), a birth cohort study conducted in the United Kingdom, also utilized 13 ACEs to explore patterns of early adversity from birth to 4 years (Oliver et al., 2014). As with the previous study, some ACEs were adapted from the original ACE scale (e.g., maternal depression, child physical abuse) and other indicators incorporated socio-demographic risks (e.g., inadequate housing). The best-fitting model suggested four latent classes of early adversity: low adversity, socio-demographic risk, family dysfunction (characterized primarily by high levels of child maltreatment), and multiple risks (characterized by multiple parent-related issues e.g., mental health, IPV, substance use). Child outcomes were assessed at 7-8 years of age. Children in the family

dysfunction or multiple risk classes had greater odds than the other two groups of clinically significant internalizing and externalizing problems.

In a study based on a sample of 600 children enrolled in Head Start, five risk factors (e.g., caregiver depression, single parent) were included in the model (Roy & Raver, 2014). Four classes were identified, characterized as low risk, single and stressed, deep poverty and single, and deep poverty and crowded. Children belonging to the "single and stressed" class demonstrated more internalizing and externalizing problems at early elementary school-age compared to children categorized as low risk. Another study analyzed data from 2,100 participants in the Child Development Supplement and Transition to Adulthood surveys of the Panel Study of Income Dynamics (Björkenstam et al., 2015). From seven observed indicators of adverse experiences measured when children were between 4 and 13 years of age, the authors identified four latent classes of adversity: no adversity, public assistance and single parent household, single parent household but low probability of other adversities, and multiple adversities. Individuals in the multiple adversities class showed the highest rates of psychological distress in young adulthood.

Summary and Study Aims

On the whole, studies that have applied LCA to childhood adversity suggest that it is possible to identify subgroups of children exposed to similar constellations or patterns of ACEs, and these patterns may point towards certain subgroups of children that are particularly vulnerable to developing behavior problems (Lanza et al., 2010). Some studies have examined a specific subset of adversities such as child maltreatment (Berzenski & Yates, 2011) and violence exposure (Slopen et al., 2012). Other researchers have formulated classes by modifying and/or expanding upon the CDC/Kaiser ACE Study scale (e.g., Lanza

et al., 2010; Oliver et al., 2014). An overarching finding has been that children exposed to multiple risks across multiple domains are more likely than others to display subsequent behavior problems. Oliver and colleagues' (2014) found that two classes - multiple risks *and* family dysfunction – faced higher odds of internalizing and externalizing behavior problems compared to the low adversity and socio-demographic risk classes. However, the generalizability of these findings is limited given the lack of racial/ethnic and socioeconomic diversity among the UK-based sample. There is a clear need for additional research based on prospective data representing more diverse populations. Such research would assist in identifying groups of at-risk children and informing the development of interventions tailored to address/ameliorate the specific needs of these children and their families.

The current study aimed to identify and confirm valid patterns or profiles of childhood adversity and their impact on later behavioral health outcomes. We used data from the Fragile Families and Child Wellbeing Study (FFCWS), which represents a large and diverse sample of children from 20 U.S. cities. Given strong evidence that exposure to multiple adversities in early childhood is associated with subsequent behavior problems (Evans, 2006; Evans et al., 2013), our study assessed exposure to adversities at age 5 and internalizing and externalizing behavior problems at age 9. We selected nine ACEs representing several domains of risk, including child maltreatment, parental adjustment, inter-parental conflict, and economic hardship. The study had three primary aims. First, we sought to identify whether young children could be categorized into subgroups based on common configurations of ACEs exposures. We hypothesized that subgroups (i.e., latent classes) would be identified, but the LCA was exploratory in nature and thus we did not have specific hypotheses about the number or nature of classes. The second aim was to explore

how baseline socio-demographic characteristics such as mother's education and relationship status were associated with class membership. Unlike other studies that included such characteristics as indicators of adversity, we chose to examine them as covariates that would potentially predict class membership. Finally, we tested the predictive validity of classes by investigating associations between latent class membership and age 9 internalizing and/or externalizing problems. We hypothesized that membership in classes characterized by exposure to adversities across multiple domains would demonstrate the strongest associations with age 9 behavior problems.

Methods

Data and Sample

The current study was a secondary analysis of data from the FFCWS, an ongoing longitudinal birth cohort study of nearly 5,000 children born between 1998 and 2000 (Reichman, Teitler, Garfinkel, & McLanahan, 2001). One objective of FFCWS has been to increase knowledge and understanding of the circumstances and wellbeing of unmarried parents and their children over time. The study design employed multistage stratified random sampling, first selecting twenty cities from the U.S. with populations of at least 200,000. Within those cities, hospitals were systematically sampled with an explicit goal of increasing coverage of non-marital births (Reichman et al., 2001). At baseline, the full cohort included 3,711 births to unmarried parents and 1,187 births to married parents (Reichman et al., 2001). Within 48 hours of the child's birth, mothers and fathers who gave informed consent were interviewed. Both parents were subsequently contacted for follow-up interviews when the focal child was approximately 1 year of age (Y1), 3 years (Y3), 5 years (Y5), and 9 years (Y9) (Geller, Jaeger, & Pace, 2015). Of the mothers who participated at baseline, response

rates at Y1, Y3, Y5, and Y9 were 90%, 88%, 87%, and 76%, respectively. A subset of respondents completed in-home interviews at Y3 (*n* = 3,258), Y5 (*n* = 2,981), and Y9 (*n* = 3,630). The original study methodology is explained in greater detail in other publications (Geller et al., 2015; Reichman et al., 2001).

The present study utilized data collected from mothers at baseline, Y5, and Y9. Socio-demographic data about mothers and children were obtained from the baseline interview. ACEs at Y5 were assessed with items from the core and in-home interviews. We obtained Y9 child behavioral outcomes from the in-home interview. The analytic sample was limited to children whose mothers completed the baseline assessment, Y5 core and in-home surveys, and the Y9 child assessment portion of the in-home survey (*N* = 2,114). Less than one percent of respondents were missing data on latent variable indicators. We accounted for these missing data using full-information maximum likelihood in Mplus version 8.0 (Muthén & Muthén, 1998-2017).

Measures

Latent class indicators: Age 5 adverse childhood experiences (ACEs). A total of nine ACEs were assessed at Y5. ACEs represented family and social risk factors known to be associated with children's behavioral adjustment (Brooks-Gunn & Duncan, 1997; Cutts et al., 2011; Dearing, McCartney, & Taylor, 2006; Font & Berger, 2015; Amanda Geller, Cooper, Garfinkel, Schwartz-Soicher, & Mincy, 2012; Holt, Buckley, & Whelan, 2008; Turney, 2011), including child physical abuse, supervisory neglect, and emotional abuse; maternal depression; household substance use; father incarceration; intimate partner violence (IPV); housing instability; and food insecurity. All ACEs were dichotomized to indicate the presence or absence of the adversity. The majority of our ACEs were modeled on the CDC-

Kaiser ACE Study scale, with two exceptions. First, we added the two indicators of economic hardship mentioned above to incorporate poverty-related stressors that prior studies have linked with child behavior problems (Gershoff, Aber, Raver, & Lennon, 2007). Second, following several other studies using FFCWS data (Hunt, Slack, & Berger, 2016; Jimenez, Wade, Lin, Morrow, & Reichman, 2016; Suglia, Duarte, Chambers, & Boynton-Jarrett, 2012), we excluded parental divorce/separation as an indicator of adversity because the FFCWS oversampled non-marital births. We instead included baseline parental relationship status as a covariate to determine whether or how relationship status was associated with latent class membership.

Child maltreatment. Three ACEs representing child maltreatment were drawn from items of the Parent-Child Conflict Tactics Scale (CTS) (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) included in waves Y3 and Y5. Following previous FFCWS analyses (Font & Berger, 2015), *physical abuse* was indicated by mother's affirmative response that she or another primary caregiver (e.g., father, cohabiting partner) hit the child with a belt, stick, or other hard object three or more times in the previous year, or shook the child at any time in the previous year. *Supervisory neglect* was indicated by an affirmative response to either of two items, including whether in the past year the mother had left the child home alone and whether the mother/caregiver had been too intoxicated from drugs or alcohol to care for the child. A dichotomous variable approximated *emotional abuse* based on whether the mother or another primary caregiver did two or more of the following in the previous year: called the child a disparaging name, swore at the child on three or more occasions, or threatened to send the child away.

Maternal depression. Maternal depression was assessed at Y5 with the Major

Depression Episode subscale of the Composite International Diagnostic Interview–Short Form (CIDI-SF) (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). The questions of the CIDI-SF correspond to diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994). Mothers were asked if they experienced feelings of depression or being unable to derive pleasure from activities they used to enjoy. Additional questions were asked of respondents who experienced either of these conditions most of the time, every day, for a 2-week period during the previous year. Questions related to concentration problems, feelings of worthlessness, feeling tired, trouble sleeping, changes in weight, and thinking about death (Kessler et al., 1998). Affirmative responses were summed to construct a score from 0 to 8. Mothers who indicated they were taking doctor-prescribed medication to treat depression were automatically assigned a score of 8 (Nelson, Kessler, & Mroczek, 2001). Mothers scoring 3 or higher were considered a probable case and were categorized as experiencing depression.

Household substance use. Several items were employed to measure household substance use at Y5. Mothers responded to questions pertaining to drug and alcohol use in the past 12 months. They were asked, “Was there ever a time when your drinking or being hung over interfered with your work at school, or a job, or at home?” and “Have you sought help/been treated for drug/alcohol problem?” Mothers were also asked if they had used marijuana, cocaine or crack, heroin, hallucinogens, amphetamines, or any prescription drugs (e.g., sedatives, pain medications) without a prescription or for longer /in greater quantities than prescribed. Finally, mothers reported if the biological father or (if applicable) current live-in partner “had problems such as keeping a job or getting along with family and friends because of alcohol or drug use.” Following Jimenez and colleagues (2016), a positive

response to one or more of these questions was categorized as exposure to household substance use.

Paternal incarceration. Mothers reported whether the child's father had spent time in prison in the past two years.

IPV. Previously validated items were used to measure physical, sexual, and emotional IPV at Y5 (Lloyd, 1997; Sweet, Bumpass, & Call, 1988). Respondents were asked to consider their relationship with the focal child's biological father (if currently in a relationship with him) or their current partner (if applicable) and indicate whether he often, sometimes, or never engaged in the following behaviors: 1) "slapped or kicked you," 2) "hit you with a fist or object that could hurt you," 3) "tried to make you have sex or do sexual things you don't want to do," 4) "tried to prevent you from going to work/school," 5) "withheld/made you ask for money or took your money," and 6) "tried to isolate you from friends and family." Mothers were also asked whether she and the father/current partner 7) "had a physical fight in front of the child since the last interview?" A response of "sometimes" or "often" to any of the first six items or an affirmative response to the last item was categorized as IPV exposure (Hunt, Slack, & Berger, 2016; Suglia, Duarte, Chambers, & Boynton-Jarrett, 2012).

Housing instability. Items from the New York City Social Indicators Survey (Meyers & Garfinkel, 1999) and the Survey of Income and Program Participation (U.S. Department of Commerce, 1998) assessed exposure to housing instability. Mothers were asked if they had faced any of the following problems in the past 12 months because there was not enough money: 1) been evicted from home or apartment; 2) moved in with other people; 3) stayed at a shelter, in a vehicle, or in an abandoned building even for one night; or 4) not paid the full

amount of rent or mortgage. Following Geller and Franklin (2014), affirming one or more of these items was considered exposure to housing instability.

Food insecurity. The measure of *food insecurity* was derived from SIPP items that asked whether, in the past 12 months, mothers had been hungry but could not afford to buy more food, or their children had been hungry but they could not afford to buy more food. Endorsing one or both items was categorized as exposure to food insecurity (Suglia et al., 2012).

Socio-demographic characteristics. Several socio-demographic characteristics relevant to childhood adversity were examined as covariates of latent classes. These included child gender (male=1, female=0), mother's race/ethnicity {categorized as Non-Hispanic Black, Non-Hispanic White (reference), Hispanic, and other race/ethnicity. Mother's baseline education was dichotomized to represent less than a high school education (=1) versus high school or more education (=0). We also dichotomized mother's baseline age as teenage mother, defined as 19 years or younger at the child's birth (=1), versus greater than or equal to 20 years at the child's birth (=0). Lastly, mothers reported their baseline relationship status with the child's biological father. We dichotomized relationship status as married or cohabiting (=1) or not married/cohabiting (=0).

Outcomes: Internalizing and externalizing problems at Y9. Mothers completed the Child Behavior Checklist for children ages 6 to 18 years (CBCL/6-18) (Achenbach & Rescorla, 2001). The CBCL consists of eight subscales with statements that mothers rate on a 3-point scale (1 = *not true of this child,* 2 = *sometimes or somewhat true,* 3 = *very or often true*). Subscales have demonstrated satisfactory reliability and validity (Achenbach & Rescorla, 2001). To calculate the internalizing behaviors score, three subscales are summed:

anxious/depressed (e.g., “Child is too fearful or anxious”), withdrawn/depressed (e.g., “Child is withdrawn, doesn’t get involved with others”), and somatic complaints (e.g., “Child has nightmares”). The internalizing scale contains a total of 32 items. The externalizing behaviors score is measured as the sum of the rule breaking subscale (e.g., “Child doesn’t seem to feel guilty after misbehaving”) and the aggressive behaviors subscale (e.g., “Child is cruel, bullies, or shows meanness to others”). A total of 35 items comprise the externalizing behaviors scale. The CBCL provides normative T-scores for the internalizing and externalizing scales, with T-scores greater than or equal to 64 classified as being in the clinical range, or sufficiently high to warrant professional support (Achenbach & Rescorla, 2001). Dichotomous variables were created to represent internalizing and externalizing behavior problems falling in the clinical range (=1) versus normal range (=0).

Analyses

Using Mplus 8.0 (Muthén & Muthén, 1998-2017), we conducted LCA to estimate classes of early childhood adversity using nine observed indicators of ACEs reported at age 5. LCA estimates two sets of parameters: probabilities of latent class membership (i.e., the estimated prevalence of each class) and conditional response probabilities (i.e., the probabilities of a “Yes” or “No” response on each observed indicator conditional on latent class membership) (Collins & Lanza, 2010). Following the recommendations of Nylund-Gibson and colleagues (Nylund-Gibson & Masyn, 2016; Nylund, Asparouhov, & Muthén, 2007) and Collins and Lanza (2010), we evaluated LCA models on the basis of multiple statistical criteria as well as model interpretability. We fit a one-class model first and then fit successive models up to six classes. Among the statistical criteria we compared was the likelihood ratio chi-square statistic, which tests goodness-of-fit. Several measures of relative

fit were assessed, including the Bayesian information criterion (BIC) (Schwarz, 1978), the sample-size adjusted BIC (SABIC) (Sclove, 1987), Akaike's information criterion (AIC) (Akaike, 1987), and the bootstrapped likelihood ratio test (BLRT). Lower values on the likelihood-ratio chi-square, BIC, ABIC, and AIC statistics generally indicate a closer fit of the model to the data (Nylund et al., 2007). The BLRT produces a *p*-value that, if significant, indicates the model with *k* classes is a better fit than the model with *k*-1 classes.

In accordance with best practices, latent classes were enumerated using only the class indicators (ACEs); covariates and outcomes were not included in the enumeration process (Asparouhov & Muthén, 2014; Nylund-Gibson & Masyn, 2016). Once the best-fitting model was selected, we checked for violations of the assumption of measurement invariance by examining modification indices. Modification indices suggest whether model fit would significantly improve if covariates were allowed to have direct effects on latent class indicators, which would be an indication of differential item functioning (DIF) and point towards potential measurement non-invariance (Masyn & Nylund-Gibson, 2012). Modification indices provided no evidence of DIF, thus we fixed direct associations between socio-demographic covariates and latent class indicators to zero.

After the latent class model was estimated, we tested associations between socio-demographic characteristics and class membership using a three-step procedure carried out by the R3STEP option of the Auxiliary command in Mplus (Asparouhov & Muthén, 2014). This procedure creates a most likely class variable that accounts for classification measurement error by calculating predicted posterior class membership probabilities (Vermunt, 2010). The most likely class variable is then regressed on covariates in an

auxiliary multinomial regression model, estimating parameters of the covariates as they relate to classes.

To examine associations between latent classes of adversities at age 5 and behavioral outcomes at age 9, we estimated a separate auxiliary model in Mplus using the DCAT option. DCAT treats the outcome variables as additional latent class predictors in a multinomial logistic regression, producing distributions of outcome probabilities for each class (Asparouhov & Muthén, 2014; Lanza, Tan, & Bray, 2013). Based on these distributions, we assessed differences in the probabilities of behavior problems at age 9 for each class. Wald's chi-square test provided a general test of association. We further examined pairwise class comparisons of the probabilities of behavior problems, using odds ratios to compare the odds of behavior problems in one class versus another.

Results

Sample Characteristics

Descriptive characteristics of the study sample are presented in Table 1. The sample contained slightly more males (*n* = 1,096, 52%) than females (*n* = 1,018, 48%). Just over half of mothers identified as Non-Hispanic Black (*n* = 1,088, 51%), 23% as Hispanic (*n* = 490), 22% as Non-Hispanic White (*n* = 471), and the remainder as Other (*n* = 65, 3%). Three out of ten mothers (30%) had less than a high school education at baseline (*n* = 634). Mothers who were teenagers at the time of the child's birth comprised 18% of the sample (*n* = 372). Almost six out of ten mothers (59%) reported being married to or cohabiting with the child's biological father at baseline (*n* = 1247). The most commonly reported adversity at the age 5 interview was child physical abuse, reported by just over 27% of mothers (*n* = 571). Far fewer mothers reported their children were exposed to other types of child maltreatment

(neglect: *n* = 50, 2%; emotional abuse: *n* = 113, 5%). Frequencies of the remaining six ACEs ranged between 12% (paternal incarceration) and 20% (housing instability). At age 9, the incidence of internalizing problems was 8% (*n* = 172). The incidence of externalizing problems was slightly higher at 9% (*n* = 194).

Latent Class Analysis

As shown in Table 2, the AIC, sample-adjusted BIC, and BLRT provided support for a five-class solution. The BIC, on the other hand, suggested a three-class solution was a better fit. Although simulation studies have found that the BIC tends to outperform the AIC and SABIC in identifying the correct number of classes, others have suggested that the SABIC may perform better than BIC in situations in which class sizes are more unequal (Dziak, Coffman, Lanza, & Runze, 2012). After examining fit statistics, class sizes, conditional response probabilities, and overall interpretability of the three-, four-, and five-class solutions, we selected the five-class model, illustrated in Figure 1. Brief descriptions of each class are below, with detailed response probabilities displayed in Table 3.

Class 1: Child maltreatment. Class 1 was the smallest group, comprising 4% of the sample (*n* = 92). This class (referred to as *child maltreatment*) was characterized by high probability of child physical abuse (0.74) and emotional abuse (0.63). The class also reflected moderate probability of household substance use (0.24), IPV (0.24), housing instability (0.24), and food insecurity (0.31).

Class 2: Multi-domain risk. Class 2 reflected moderate or high probability of exposure to adversities representing multiple domains including parental mental and behavioral health issues, IPV, and economic hardship. This class (referred to as *multi-domain risk*, 5%, *n* = 105, of the sample) demonstrated high probability of maternal depression

(0.83), IPV (0.81), and housing instability (0.74), and a greater than 50% likelihood of substance use (0.58) and food insecurity (0.53). The multi-domain risk class was further characterized by moderate probability of child physical abuse (0.44) and father incarceration (0.39).

Class 3: Economic hardship. Class 3 was characterized predominantly by socioeconomic disadvantage, represented by high probability of housing instability (0.68) and nearly 60% likelihood of food insecurity (0.57). Also noteworthy, this class (named *economic hardship,* 7% of sample, n = 152) showed a moderate probability of maternal depression (0.34).

Class 4: Substance use and incarceration. Class 4 reflected at least 50% probability of father incarceration (0.56) and household substance use (0.50). Similar to Class 1, it also demonstrated moderate probability of IPV (0.24), housing instability (0.26), and food insecurity (0.25). This class (referred to as *substance use and incarceration* [*SU/I*], 10%, n = 176) also had a 25% probability of child physical abuse.

Class 5: Low adversity. In class 5, there was low probability of exposure to all ACEs with the exception of child physical abuse (0.23). Class 5 (named *low adversity*) was the largest class, representing 75% of the sample (n = 1,589).

Socio-Demographic Characteristics Associated with Age 5 Class Membership

Significant associations between socio-demographic covariates and latent class membership are presented in Table 4. Children whose mothers had less than a high school education (compared to a high school education or more) had more than three times the odds of being in the *child maltreatment* class than in either the *economic hardship* class (B: 1.20, standard error [SE]: 0.41, odds ratio [OR], 3.32, $p < .01$) or the *low adversity* class (B: 1.20,

SE: 0.30, OR: 3.32, $p < .0001$). Children of teenage mothers, compared to children whose mothers were at least 20 years old at the child's birth, had lower odds of membership in the *child maltreatment* class than in the *multi-domain risk* class (*B*: -1.34, *SE*: 0.53, OR: 0.26, $p < .05$) or the *SU/I* class (*B*: -1.15, *SE*: 0.52, OR: 0.32, $p < .05$). Further, teenage motherhood was associated with nearly twice the odds of classification in *multi-domain risk* versus the *low adversity* class (*B*: 0.64, *SE*: 0.32, OR: 1.90, $p < .05$). Children whose parents were unmarried/non-cohabiting at baseline were less likely than children whose parents were married/cohabiting to be in the *child maltreatment* class compared to the *SU/I* class (*B*: -0.98, *SE*: 0.47, OR: 0.38, $p < .01$). However, they were more likely to be members of the *SU/I* class compared to *multi-domain risk* (*B*: 1.30, *SE*: 0.50, OR: 3.67, $p < .01$) or *low adversity* (*B*: 1.06, *SE*: 0.34, OR: 2.89, $p < .01$).

Maternal race/ethnicity demonstrated several significant associations with class membership. Compared to children whose mothers were White, children born to Black or Hispanic mothers were more likely to be in the *child maltreatment* class than the *SU/I* class. Black maternal race was associated with more than four times the odds (*B*: 1.50, *SE*: 0.72, OR: 4.48, $p < .05$) and Hispanic with more than six times the odds (*B*: 1.86, *SE*: 0.73, OR: 6.42, $p < .05$) of being in the *child maltreatment* class versus *SU/I*. In addition, children of Hispanic mothers (compared to White) had lower odds of belonging to the *SU/I* class than the *low adversity* class (*B*: -0.98, *SE*: 0.41, OR: 0.38, $p < .05$). Child gender did not show any significant associations with class membership.

Associations Between Age 5 Class Membership and Age 9 Behavior Problems

Overall, latent classes of age 5 adversities were predictive of age 9 behaviors. The Wald chi-square test statistic found significant associations between latent classes and

internalizing problems ($X^2_{df=4} = 28.35$, $p < .0001$) and between latent classes and externalizing problems ($X^2_{df=4} = 38.97$, $p < .0001$). Class-specific probabilities of age 9 internalizing and externalizing behavior problems, displayed in Table 5, were greatest for the *multi-domain risk* class (0.26 and 0.33, respectively) and lowest for the *low adversity* class (0.05 and 0.04, respectively). Table 5 also shows odds ratios (OR) and 95% confidence intervals (CI) of behavior problems in classes 1-4 compared to the reference group, class 5 (*low adversity*). Results indicated significantly higher probabilities of both types of behavior problems for classes 1-4 compared to class 5. Compared to the *low adversity* class, *multi-domain risk* predicted approximately seven times the odds of internalizing problems (OR: 6.96; CI: 3.51, 13.77) and 11 times the odds of externalizing problems (OR: 11.16; CI: 5.75, 21.67). Children in the *child maltreatment* class had four times the odds of age 9 internalizing problems (OR: 4.13; CI: 1.78, 9.58) and nearly the same odds of externalizing problems (OR: 3.58; CI: 1.39, 9.25). Membership in the *economic hardship* class predicted approximately three times the odds of both types of behavior problems (internalizing OR: 2.97; CI: 1.44, 6.14; externalizing OR: 3.16; CI: 1.36, 7.34). Children in the *SU/I* class had twice the odds of internalizing problems (OR: 2.14; CI: 1.00, 4.55) and nearly 5 times the odds of externalizing problems (OR: 4.78; CI: 2.55, 8.93) compared to the *low adversity* reference group.

Pairwise analyses comparing all classes indicated significant differences in probabilities of behavior problems between the *multi-domain risk* class and other classes of adversity. Membership in the *multi-domain risk* class was associated with higher probabilities of both internalizing and externalizing problems compared to the *SU/I* class (internalizing: $X^2_{df=1} = 5.79$, $p < .05$; externalizing: $X^2_{df=1} = 4.75$, $p < .05$). It was further

associated with a higher probability of externalizing problems compared to the *economic hardship* class ($X^2_{df=1} = 7.57$, $p < .01$) and the *child maltreatment* class ($X^2_{df=1} = 5.59$, $p < .05$). The probability of internalizing problems for the *multi-domain risk* compared to the *economic hardship* class approached significance ($X^2_{df=1} = 3.35$, $p = .07$).

Discussion

The present study analyzed prospective data from a large, diverse, urban sample, to examine patterns of adversities children encountered at age 5. Approximately two-thirds of the sample (66%) had been exposed to at least one ACE at age 5, and nearly one in five children (18%) had been exposed to three or more ACEs. Although the number of exposures is striking, the use of LCA allowed us to better understand common ways in which adversities clustered together. Further, we explored how these patterns of adversities differentially predicted subsequent behavior problems. Confirming our first hypothesis, we identified five latent classes of age 5 adversities. Approximately three-quarters of the sample fell into the *low adversity* class, which was characterized by low probability of all ACEs except for child physical abuse (probability of 0.23). Other studies using LCA to investigate childhood adversity have similarly found the most prevalent class to be one that represents low risk or no ACEs (Lanier, Maguire-Jack, Lombardi, Frey, & Rose, 2017; Oliver et al., 2014).

There were notable differences in the patterns of ACEs exposures represented by each class. Children in the *child maltreatment* class had a 75% probability of experiencing physical abuse and more than a 60% probability of emotional abuse. This was the only class for which probability of child emotional abuse exceeded 10%. Although the probability of supervisory neglect was a moderate 19%, this adversity was only affirmed for 2% of the

sample as a whole. This class was thus distinct in representing multiple forms of maltreatment. Baseline maternal education status of less than a high school education (versus high school or more) and maternal race/ethnicity of Black or Hispanic (versus White) predicted increased odds of membership in the *child maltreatment* class. Other studies have also found significant differences in the prevalence of child maltreatment based on characteristics such as race (Miller & Cross, 2006). However, it should be noted that our race/ethnicity categories were broad and did not take into account important factors such as immigration status or father's race/ethnicity. Researchers have further cautioned that associations between race/ethnicity and child maltreatment may actually be better explained by neighborhood-level characteristics such as concentrated poverty and inequitable access to resources, which the present study did not capture (Nadan, Spilsbury, & Korbin, 2015).

Class 2, *multi-domain risk*, was characterized by a greater than 50% probability of exposure to five of the nine ACEs, and by moderately high probabilities of two other ACEs (39-44%). The probability of maternal depression was highest (83%), followed by IPV (81%), housing instability (74%), household substance use (58%), and food insecurity (53%). Children in this class were thus exposed to ACEs across domains of parental adjustment, inter-parental conflict, and economic hardship, all at age 5. Children whose mothers were teenagers at baseline (versus 20+ years) were at particular risk of belonging to this high-adversity class. Previous research has shown that many teenage mothers grow up in contexts of childhood disadvantage and face limited educational or employment opportunities, both of which predispose them to early pregnancy (Kennedy, Agbényiga, Kasiborski, & Gladden, 2010; SmithBattle & Leonard, 2016). In other words, teenage mothers are disproportionately disadvantaged even before they become pregnant. Without comprehensive supports to

interrupt the accumulation of disadvantage, the adversities these mothers have experienced are likely to continue and be reinforced in the next generation (SmithBattle & Leonard, 2016).

The third class, *economic hardship,* was characterized by housing instability (68%) and food insecurity (57%), with lower probabilities of ACEs in other domains. None of the socio-demographic covariates were associated with higher odds of membership in the *economic hardship* class compared to other classes. This finding might be explained by the fact that the FFCWS over-sampled non-marital births and was a disproportionately economically disadvantaged sample as a result. Given that parental relationship and cohabitation status varied considerably over time among Fragile Families respondents (Carlson, Pilkauskas, Mclanahan, & Brooks-Gunn, 2011; Osborne & McLanahan, 2007), perhaps a more relevant predictor of class membership of age 5 adversities would have been parents' relationship/cohabitation status from ages 3 to 5 years.

The fourth class, *SU/I,* was uniquely characterized by high probabilities of exposure to two ACEs, household substance use (50%) and father incarceration (56%). Previous studies have also found strong links between paternal incarceration and substance use. Research has shown that the majority of incarcerated parents reported having used drugs in the month before their offense (Mumola & Karberg, 2006). Moreover, paternal incarceration negatively affects families in a multitude of ways, including caregiver stress, relationship disruption, perceived stigma, and family isolation (Arditti, 2012; Parke & Clarke-Stewart, 2003; Roy & Dyson, 2005), all of which could contribute to substance use by either parent. In the present study, two socio-demographic characteristics were associated with higher odds of belonging to the *SU/I* class. Children whose parents were not married/cohabiting at

baseline were more likely than children of married/cohabiting parents to belong to this class than to *child maltreatment* or *low adversity*. In addition, children of teenage mothers had higher odds of membership in the *SU/I* class versus the *child maltreatment* class.

Analyses supported our third hypothesis that classes of age 5 adversities would predict age 9 behavior problems. Classes 1 through 4, each of which represented exposure to one or more domains of adversity, were associated with higher odds of internalizing and externalizing problems compared to the *low adversity* class (class 5). The *multi-domain risk* class represented the highest probability of exposure to ACEs across multiple domains, including parental mental and behavioral health issues, inter-parental violence, and economic hardship. This class was associated with dramatically increased odds of behavior problems compared to the *low adversity* class: children in this class had seven times the odds of internalizing problems and 11 times the odds of externalizing problems. *Multi-domain risk* was also associated with a significantly higher probability of internalizing problems (0.26) compared to the *SU/I* class (0.10). The probability of externalizing problems (0.33) was significantly higher for children in the *multi-domain risk* class compared to all other classes.

Two classes of age 5 adversities – *economic hardship* and *multi-domain risk* – were characterized by a greater than 50% probability of housing instability and food insecurity. Children in the *economic hardship* class were approximately three times as likely as those categorized as *low adversity* to demonstrate behavior problems at age 9. In the multi-domain risk class, children were exposed not only to financial hardship but also to probable IPV, household substance use, and maternal depression. The addition of these exposures significantly increased the probability of externalizing problems (from 0.12 for the *economic hardship* class to 0.33 for *multi-domain risk*). The difference in probabilities of internalizing

problems between economic hardship (0.13) and multi-domain risk (0.26) approached significance ($X^2_{df=1} = 3.35$, $p = .07$). In other words, exposure to substantial financial hardship alone was detrimental to children's later behavioral health. However, financial hardship combined with a constellation of parental conflict and mental/behavioral health issues predicted substantially worse child behavioral outcomes, especially externalizing problems. While risk factors such as IPV and parental mental/behavioral health may be less "visible" to providers (e.g., teachers, pediatricians) than other risk factors, it is critically important that systems be put in place to ensure they are screened for. In turn, screening must be linked with systems of care that respond to the specific needs of children and families.

Limitations

Our study had several limitations. Firstly, we limited our research aims to identifying classes of age 5 adversity, how socio-demographics predicted class membership, and how class membership predicted age 9 behavior problems. Similar to other studies that have applied LCA in an exploratory fashion (Conrad-Hiebner & Paschall, 2017; Miller, Paschall, & Azar, 2017), we did not examine how socio-demographics and other variables may affect the association between classes of early adversity and later behavior problems, nor how classes of early adversity may mediate or moderate associations between socio-demographics and behavior problems. Subsequent analyses ought to more closely examine the interplay of socio-demographic characteristics and patterns of adversity in shaping behavioral adjustment.

A second limitation of the present study was that it only identified classes of adversity at age 5. It is possible that the constellations of risk to which children are exposed vary over time. Had we assessed classes at ages 1 and 3, for example, they may have looked different from those we identified. It is also possible that the ways in which children transition into or

out of classes of adversity over time could shed further light on the connections between clusters of risk factors and subsequent outcomes. Future studies could employ longitudinal person-centered approaches such as latent transition analysis to examine how classes/class membership change over time, and how or whether transitions between classes are associated with outcomes.

Lastly, all indicators of adversity and behavioral outcomes were mother-reported. Utilizing multiple informants and/or data sources may have resulted in more accurate reports of adversities such as child neglect, emotional abuse, or household substance use. In particular, two of our latent class indicators (neglect and emotional abuse) had very low prevalence in our sample, whether due to the self-reported nature of the data, limitations of the measures, or other reasons. Underreporting of some adversities could have affected class enumeration.

Implications and Conclusions

In contrast to a traditional cumulative risk approach to measuring ACEs, the present study demonstrated that LCA is able to provide a more nuanced account of how adversities cluster together. While recent studies have employed LCA to identify subgroups of children with distinct patterns of ACEs exposure, very few studies have tested their prospective validity by investigating how classes are associated with later outcomes (Miller et al., 2017). Our findings contribute to a handful of studies that suggest there are common patterns of exposure to childhood adversity, and these patterns demonstrate differential impacts on subsequent behavioral outcomes (Lanier et al., 2017; Lanza et al., 2010; Oliver et al., 2014). This study showed how 5-year-old children exposed to multiple ACEs across multiple domains had dramatically increased odds of internalizing and (particularly) externalizing

problems at age 9. Although less striking *than multi-domain risk*, other classes of adversity – including *economic hardship, child maltreatment*, and *substance use/incarceration* – also had higher odds of behavior problems compared to the *low adversity class*.

Such research is vitally important to informing policies that would reduce ACEs and provide more targeted interventions for children and families based on their particular risks. Effectively targeting services will require the development and use of screening tools by a variety of providers across a wide range of settings (e.g., doctors' offices, schools, social service offices). It will also require greater capacity for collaboration and coordination within and across sectors that may not traditionally work together, such as healthcare, education, and criminal justice (Larkin, Shields, & Anda, 2012; Porter, Martin, & Anda, 2017). Various collaborative models have already been piloted with the aim of delivering more integrated and holistic care to at-risk populations. One model, the family-centered medical home (FCMH), has inspired a number of innovative efforts to provide care that is family-centered, coordinated, and committed to both prevention and treatment (Stille et al., 2010). Rather than react to problems, the FCMH aims to promote health, build resiliency, and identify risks. Medical homes commonly incorporate mental and behavioral health into physical health care, whether by co-locating services or by developing a seamless network of providers with shared goals, communication systems, and funding mechanisms (Stille et al., 2010). Some initiatives also provide two-generational care by fostering collaboration among OB/GYN, internal medicine, and pediatrics clinicians to address parents' and children's health in a holistic way (Cheng, Kotelchuck, & Guyer, 2012). Such an approach has shown promising results for disadvantaged and high-risk populations like teenage mothers. A smaller number of initiatives have employed the FCMH model to promote cross-sector collaboration that

links families with a broad range of social services. As an example, the Medical-Legal Partnership (MLP) was developed by the Boston Medical Center (Williams, Costa, Odunlami, & Mohammed, 2008). The MLP added on-site lawyers to the medical team in order to address a wide variety of stressors affecting patients' and families' health and wellbeing (e.g., health insurance, immigration, housing, government benefits).

This study and others provide compelling evidence that certain groups of children are at extremely high risk of developing behavior problems. Childhood behavior problems are important to address not just because of the immediate negative effects they have on child and family functioning, but also because they are associated with greater risk of a multitude of problems across the life course. Among these problems are depression and anxiety, substance use, criminality, and adulthood chronic disease (Clark, Rodgers, Caldwell, Power, & Stansfeld, 2007; Jokela, Ferrie, & Kivimäki, 2009; Sourander et al., 2006; Temcheff et al., 2011). In essence, family and social risk factors increase children's risk of behavior problems, which in turn increase their risk of physical, mental, and behavioral health problems as adults. These problems then become ACEs for the next generation (Grimes, 2017). In order to interrupt the intergenerational transmission of disadvantage, comprehensive systems are needed to reduce childhood adversity, promote child health, and provide supports and opportunities to parents.

Tables

Table 1. Descriptive statistics of study participants (un-weighted) (N = 2,114)

Characteristic	*n*	%
Child gender		
Female	1,018	48.16
Male	1,096	51.84
Mother's race/ethnicity		
Non-Hispanic Black	1,088	51.47
Hispanic	490	23.18
Non-Hispanic White	471	22.28
Other race/ethnicity	65	3.07
Mother's baseline education		
Less than high school	634	29.99
High school or more	1480	70.01
Mother's baseline age		
19 years or younger	372	17.60
≥ 20 years	1742	82.40
Parents married or cohabiting at baseline		
Yes	1247	58.99
No	867	41.01
ACEs[a] at Y5		
Child physical abuse	571	27.01
Child neglect	50	2.37
Child emotional abuse	113	5.35
Maternal depression	348	16.46
Household substance use	301	14.24
Paternal incarceration	244	11.54
Intimate partner violence	331	15.66
Housing instability	424	20.06
Food insecurity	354	16.75
Total ACEs at Y5		
0 ACEs	763	36.09
1 ACE	627	29.66
2 ACEs	351	16.60
≥ 3 ACEs	373	17.64
Internalizing behavior problems at Y9	172	8.14
Externalizing behavior problems at Y9	194	9.18

a. ACEs = adverse childhood experiences.

Table 2. Model fit indices for latent class analysis of age 5 adversities (*N* = 2,114)

Model	AIC	BIC	SABIC	X^2_{LR} (df), *p*-value	$BLRT_{(K, K-1)}$	Entropy
1-class	14821.98	14872.89	14844.29	541.23 (488), 0.05	--	--
2-class	14221.41	14328.88	14268.52	526.46 (491), 0.13	<0.000	0.60
3-class	14163.93	14327.96	14235.83	449.72 (481), 0.84	<0.000	0.72
4-class	14115.74	14336.34	14212.43	383.12 (472), > 0.99	<0.000	0.78
5-class	14079.45	14356.61	14200.93	326.83 (445), > 0.99	<0.000	0.70
6-class	14076.13	14409.85	14222.40	303.51 (452), > 0.99	0.113	0.65
□						

Table 3. Item response probabilities by latent class (*N* = 2,114)

	Class 1 (4.35%)	Class 2 (4.97%)	Class 3 (7.20%)	Class 4 (8.33%)	Class 5 (75.17%)
	Child maltreatment	Multi-domain risk	Economic hardship	Substance use, incarceration	Low adversity
Physical abuse	0.74	0.44	0.20	0.25	0.23
Neglect	0.19	0.07	0.02	0.00	0.01
Emotional abuse	0.63	0.09	0.02	0.01	0.01
Maternal depression	0.19	0.83	0.34	0.15	0.09
Household substance use	0.24	0.58	0.14	0.50	0.04
Paternal incarceration	0.16	0.39	0.00	0.56	0.03
Intimate partner violence	0.24	0.81	0.16	0.24	0.09
Housing instability	0.24	0.74	0.68	0.26	0.07
Food insecurity	0.31	0.53	0.57	0.25	0.05

Table 4. Significant associations between baseline sociodemographic characteristics and latent classes of age 5 adversities (N = 2,114)

	C1 vs. C2			C1 vs. C4			C1 vs. C5			C2 vs. C4			C2 vs. C5			C4 vs. C5		
	B	SE	OR	*B*	SE	OR	*B*	SE	OR	*B*	SE	OR	*B*	SE	OR	*B*	SE	OR
Less than high school	-	-	-	1.20[b]	0.41	3.32	1.20[a]	0.30	3.32	-	-	-	-	-	-	-	-	-
Teenage mother	-1.34[c]	0.53	0.26	-1.15[c]	0.52	0.32	-	-	-	-	-	-	0.64[c]	0.32	1.90	-	-	-
Not married/cohabiting	-	-	-	-0.98[c]	0.47	0.38	-	-	-	-1.30[b]	0.50	0.27	-	-	-	1.06[b]	0.34	2.89
Black	-	-	-	1.50[c]	0.72	4.48	-	-	-	-	-	-	-	-	-	-	-	-
Hispanic	-	-	-	1.86[c]	0.73	6.42	-	-	-	-	-	-	-	-	-	-0.98[c]	0.41	0.38
Other race	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

B = coefficient; SE = standard error; OR = odds ratio; a: p<.0001; b: p<.01; c: p<.05. C1 = class 1, *child maltreatment*; C2 = class 2, *multi-domain risk*; C3 = class 3, *economic hardship*; C4 = class 4, *substance use/incarceration*; C5 = class 5, *low adversity*.

Figure 1: LCA of Age 5 Adversities: 5-Class Solution (N = 2,114)

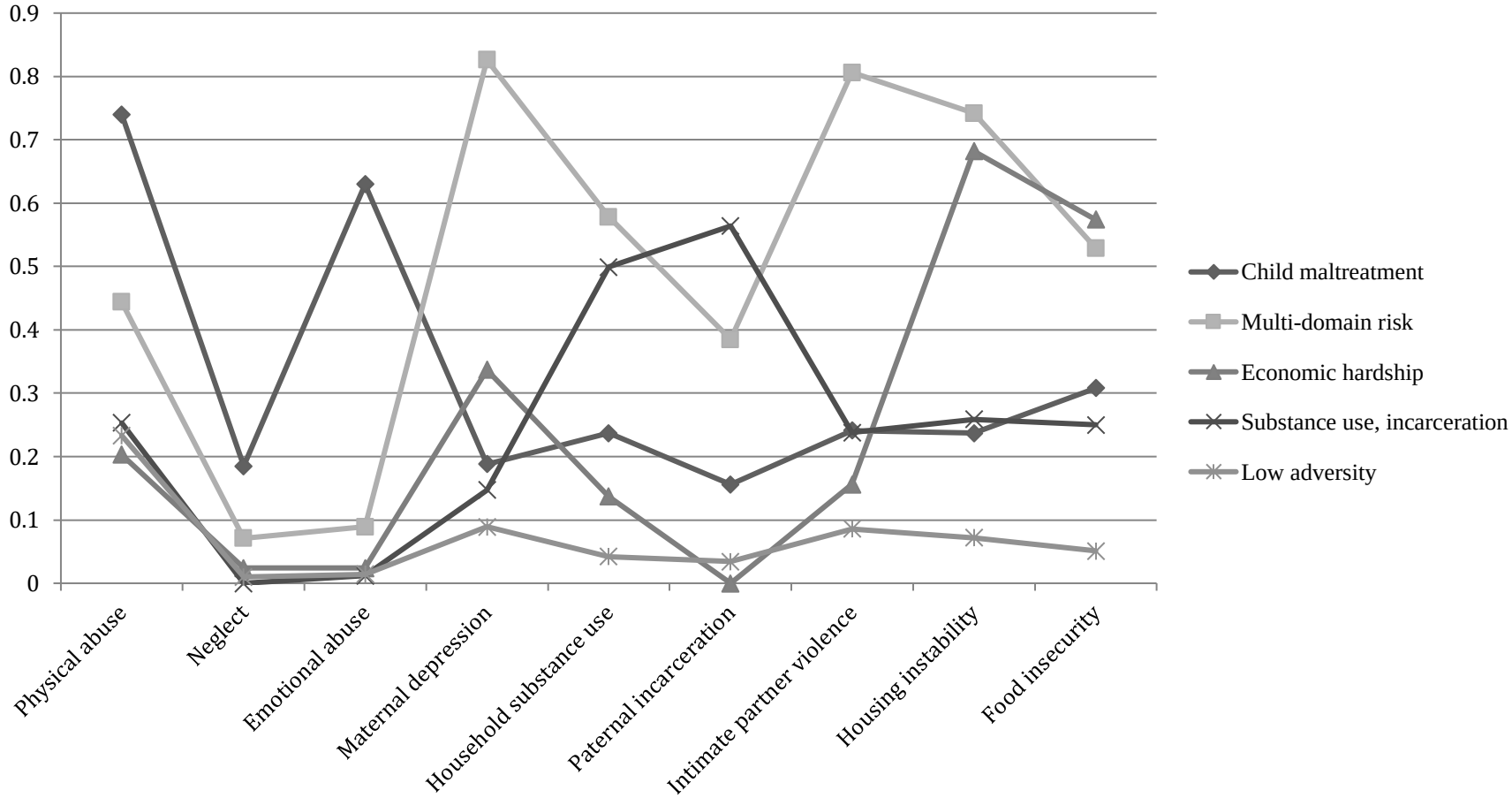

Table 5. Associations between age 5 adversity classes and age 9 behavior problems (N = 2,114)

	Internalizing problems					Externalizing problems				
	Probability	SE	OR	95% CI		Probability	SE	OR	95% CI	
Class 1: Child maltreatment	0.17	0.05	4.13	1.78	9.58	0.14	0.05	3.58	1.39	9.25
Class 2: Multi-domain risk	0.26**	0.06	6.96	3.51	13.77	0.33***	0.06	11.16	5.75	21.67
Class 3: Economic hardship	0.13	0.03	2.97	1.44	6.14	0.12	0.04	3.16	1.36	7.34
Class 4: Substance use, jail	0.10	0.03	2.14	1.00	4.55	0.18	0.04	4.78	2.55	8.93
Class 5: Low adversity*	0.05	0.01	1.00	1.00	1.00	0.04	0.01	1.00	1.00	1.00
Wald chi-square:	$\chi 2$ (df=4, N=2,114) = 28.35, $p < .0001$					$\chi 2$ (df=4, N=2,114) = 38.97, $p < .0001$				

*Class 5 is reference group; **Class 2 probability of internalizing problems significantly greater than class 4 ($X^2_{(df=1)} = 5.79$, $p<.05$); ***Class 2 probability of externalizing problems significantly greater than class 1 ($X^2_{(df=1)} = 5.59$, $p<.05$), class 3 ($X^2_{(df=1)} = 7.57$, $p<.01$), and class 4 ($X^2_{(df=1)} = 4.75$ p<.05).

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CHAPTER 5: STUDY THREE

Cumulative Adversity in Early Childhood, Age 9 Behavior Problems,
and the Role of Father Involvement

Abstract

Research suggests that positive father involvement has positive effects on children's behavioral adjustment, but very few studies have examined father involvement as a protective factor for children exposed to early childhood adversity. The current study focused on a subset of children born to unmarried parents (N = 1,740) from the Fragile Families and Child Wellbeing Study. Our primary aim was to test whether high levels of early father involvement (assessed at ages 1, 3, and 5) moderated the association between early childhood adversity and age 9 internalizing and externalizing behavior problems. Linear regressions provided evidence of moderation. Specifically, high (versus some or none) early father involvement in early childhood was associated with fewer behavior problems, but only under conditions of low to moderate adversity. ACEs scores of 4 or more overwhelmed the protective effects of high early father involvement. Adjusting for proximate (age 9) father involvement neither reduced nor added to the protective effects of high early father involvement. However, among children with some or no early father involvement, high proximate father involvement was associated with fewer behavior problems. Implications for policies to reduce early childhood ACEs and promote father involvement are discussed.

Introduction

The study of resilience has brought attention to a broad range of factors that may promote positive outcomes in contexts of childhood adversity (Luthar, Cicchetti, & Becker, 2000). Promotive or protective factors are individual, familial, and contextual assets and resources that contribute to healthy development (Fergus & Zimmerman, 2005). Many studies have established the relationship between family-level factors such as family cohesion, caregiver attachment and warmth, and low levels of conflict with the caregiver and positive behavioral outcomes among children and adolescents exposed to adverse childhood experiences (ACEs) (Appleyard, Egeland, & Sroufe, 2007; Obradovic, Shaffer, & Masten, 2012). For older at-risk children, parental monitoring has also been associated with positive behavioral outcomes (e.g., less deviant behavior) (Criss et al., 2015).

Research on family-level protective factors has primarily focused on mothers, particularly on their parenting adequacy and relationships with their children (Lamb, 2012). However, social trends over the twentieth century have profoundly changed the role fathers play in shaping children's developmental trajectories (Cabrera, 2010). In response to changes in social trends, several scholars have turned their attention to studying fathers primarily in middle-class, married-parent families (Lamb, 2012). There is an emerging body of qualitative and quantitative research that is more inclusive of low-income fathers, resident and nonresident unmarried fathers, and others whose experiences of fathering may differ markedly from those of the middle-class (Adamsons & Johnson, 2013; Carlson & McLanahan, 2010; Roy & Smith, 2013). These studies provide evidence that engaged fathers in a variety of family contexts have positive effects on children's behavioral adjustment and other aspects of development (Pleck, 2010).

While research points to the potential for fathers to enhance their children's development, few studies have examined father involvement as a protective factor in contexts of early childhood adversity. Utilizing prospective data from the Fragile Families and Child Wellbeing Study (FFCWS), the present study sought to test whether high levels of early father involvement were associated with fewer behavior problems in middle childhood, and/or whether father involvement interacted with early adversity to moderate the association between ACEs and subsequent behavior problems.

Background

Shifts in Fathering and Father Involvement

Several social trends have transformed families in the United States (U.S.), shifting the role fathers either play or are expected to play in their children's development. These trends include higher rates of women participating in the labor force, greater cultural diversity of the U.S. population, increased involvement of fathers among families with married parents, and increased rates of non-marital childbearing leading to a large proportion of fathers who are nonresident or who become nonresident (Carlson & McLanahan, 2010). In the 1950s and 1960s, approximately two-thirds of children (65%) were living in married-parent, male-breadwinner families. By contrast, just over a fifth of children (22%) live in such families presently (Cohen, 2014). Twenty three percent of children live with a single mother, while a third (34%) live in dual-earner married-parent families.

Historically the father's role had been defined by providing economic support, but contemporary fathers play multifaceted roles (Lamb, 2010). They influence their children's lives in diverse ways: by providing discipline and moral guidance; engaging in activities such as leisure and play; offering nurturance and supportive caregiving; ensuring the child's

safety; linking the child to extended family, community members, and other resources; and providing the mother of the child with a range of financial, practical, and emotional support (Carlson & McLanahan, 2010). The degree of involvement and types of roles fathers play in their families vary widely by circumstances and context. For example, qualitative studies suggest that the ways in which low-income and unmarried fathers' negotiate and navigate the father role is shaped (and often constrained) by limited job prospects, disadvantaged neighborhoods, dynamic relationships with children's mothers, and complex interactions with extended kin (Roy & Smith, 2013).

As the literature on father involvement and its association with child development outcomes has grown, more attention has been given to identifying the core components of father involvement. Lamb and colleagues (Lamb, Pleck, Charnov, & Levine, 1985) posited that father involvement incorporates three main elements: 1) engagement, which involves direct interaction between father and child in the form of a variety of activities; 2) accessibility, or availability of the father; and 3) responsibility, which entails arranging for the provision of resources and/or otherwise ensuring the child is cared for. More recently, this conceptualization has been modified to emphasize *positive* engagement activities and fathers' warmth and responsiveness (Pleck, 2010). On the whole, fatherhood researchers caution that father involvement needs to be studied in context to account for the multi-faceted nature of fathering (Lamb, 2010; Pleck, 2010, 2012).

Below are highlights of the literature examining associations between father involvement and behavioral outcomes in childhood and early adolescence, followed by a brief summary of the few studies that have explored whether/how father involvement moderates associations between childhood adversity and children's behavioral adjustment.

Associations Between Father Involvement and Child Behavioral Outcomes

Across different age groups, family forms (e.g., married, single-parent), and father types (e.g., social vs. biological, resident vs. nonresident), various studies have found greater father involvement to be associated with fewer behavior problems. Much of this research has been cross-sectional. For example, in a sample of nearly 1,000 children ages 5 to 18 years residing in married-couple households (Amato & Rivera, 1999), father involvement was assessed with three measures (time spent in positive activities with child, father emotional support, and father-child relationship closeness). Higher levels of involvement, whether the fathers were biological or stepfathers, were significantly associated with fewer child behavior problems, controlling for maternal involvement. Among a sample of children born to unwed parents but living with their mother and either a social or biological father at age 3 (N = 1,350), Bzostek (2008) analyzed associations between resident father involvement and behavior problems. Resident father involvement, measured as frequency of father engagement in positive activities with the child, was associated with fewer behavior problems. While informative, cross-sectional studies are unable to draw conclusions about whether father involvement contributes to better behavioral outcomes. It is possible that children with fewer behavior problems draw greater involvement from fathers (Adamsons & Johnson, 2013).

To more clearly establish the relationship between father involvement and subsequent behavior problems, studies have utilized prospective data. One such study employed data from the National Child Development Study (NCDS), a longitudinal study of children in the United Kingdom (UK), to investigate connections between resident biological and social father involvement at age 7 and behavior problems at age 16 (Flouri & Buchanan, 2003).

Father involvement was measured with four scales pertaining to outings with child, father management of child, father reading to child, and fathers' interest in child's education. Controlling for level of maternal involvement, father involvement was not significantly associated with behavior problems for the sample as a whole. However, high compared to low father involvement at age 7 was associated with fewer age 16 behavior problems for children whose father figure was not their biological father. These findings not only point to the potential specificity of father involvement effects on child behavior (i.e., effects may apply to certain groups but not to others), but also raise the question of whether father involvement needs to reach a certain threshold before it makes a significant impact.

Another prospective study analyzed FFCWS data (Choi & Jackson, 2011) to test associations between nonresident biological father involvement at age 1 and children's externalizing problem behaviors at age 3. The sample was limited to children of single and non-cohabiting Black mothers with household incomes below 300% of the poverty line (N=915). Father involvement was measured by frequency of contact in the past month and fathers' engagement in positive activities with the child. Results did not support direct effects of father involvement. However, more frequent and positive father involvement was indirectly associated with fewer externalizing problem behaviors, mediated by mothers' parenting. Study results suggest that inquiries into father involvement should also account for the role of mothers' positive engagement.

Not all studies have shown associations – whether direct or indirect – between nonresident father involvement and young children's behavior. Analyses of data from the Millennium Cohort Study, a UK-based birth cohort study, assessed nonresident father involvement among 930 young children living in single-mother families (Flouri &

Malmberg, 2012). Father involvement – measured as payment of child support, frequency of contact, and interest in child – was assessed at age 9 months and 3 years. The study found no relationship between father involvement and age 3 behavior problems, perhaps because the father involvement measure was inadequate. In a systematic review of fathering-related longitudinal studies (Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008), positive engagement (i.e., regular participation with child in positive activities) was the component of fathering most often associated with better behavioral outcomes, at least among certain subgroups (e.g., boys) or in specific contexts (e.g., socioeconomic disadvantage). Similarly, a meta-analytic review of studies on nonresident father involvement suggested that the most influential forms of father involvement were involvement in children's activities and high quality of the father-child relationship (Adamsons & Johnson, 2013).

Father Involvement in the Context of Cumulative Adversity

Overall, the literature indicates that positive involvement by resident and nonresident fathers, if measured robustly, promotes child behavioral health in some but not all contexts. Few studies have attended to father involvement in the context of cumulative adversity. More specifically, scant research has considered whether positive father involvement – whether from resident or nonresident fathers – buffers children exposed to ACEs in early childhood from negative outcomes in later childhood. Research suggests that protective (or promotive) factors may impact healthy development in two ways (Ostaszewski & Zimmerman, 2006). First, they may operate in a compensatory manner, such that they reduce the harmful effects of any level of adversity through direct (or main) effects. Second, protective factors may act as moderators that interact with risk factors to buffer children exposed to particular levels of adversity (Vanderbilt-Adriance & Shaw, 2008). Extant literature provides limited insight into

whether father involvement acts in a compensatory and/or buffering manner (or neither) for young children exposed to adversity.

One study that suggested both compensatory and buffering effects of father involvement followed 134 children born to adolescent mothers over the first 10 years of life (Howard, Lefever, Borkowski, & Whitman, 2006). Researchers assessed involvement by biological fathers (mostly nonresident) and whether it moderated the association between maternal risk and children's behavior problems. Consistent (versus infrequent) father involvement, measured as involvement at all early childhood waves and at age 8, was significantly associated with fewer externalizing behaviors at ages 8 and 10. In addition to a main effect, it interacted with maternal risk: children with infrequent father contact and high-risk mothers showed significantly more externalizing behaviors than children with consistent father contact and mothers at any level of risk. Father involvement had no main effect on internalizing problem behaviors, but it moderated the association between maternal risk and behavior. Among children with high-risk mothers, those with consistent father involvement had fewer internalizing behavior problems than children with infrequent father involvement. Although the study was limited by a small sample size, it points to the potential for fathers who remain involved over time to reduce behavior problems among children exposed to high levels of risk.

In contrast, a recent analysis of a subset of FFCWS participants found no evidence that father involvement moderated the association between adversity and behavior problems (Markson, Lamb, & Lösel, 2016). The sample was limited to children whose biological fathers had been incarcerated at some point between the age 3 and age 5 surveys (N=801). The authors assessed ACEs at age 1 and behavior problems at age 9. Two father-related

moderators were assessed at age 3, including mother-perceived emotional support from the child's father and shared responsibility for the child. Authors also tested age 9 mother-child closeness as a moderator. Neither of the age 3 variables was associated with age 9 behavior problems. Mother-child closeness was modestly associated with fewer age 9 behavior problems among children with low levels of ACEs exposure at age 1. The authors posited that protective factors that are temporally closer to outcomes may be more influential than distal factors. In other words, attending to the timing of protective factors is important. It should be noted, however, that father involvement was only considered at one time point. Further, the father-related variables included in the study failed to capture important aspects of positive father involvement such as engagement in child-centered activities and high quality father-child relationships (Carlson, 2006; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008).

Theoretical Framework and Research Questions

While current literature points to positive associations between father involvement and child behavioral outcomes, these associations vary depending on the components of father involvement that are assessed, as well as the timing and consistency of father involvement. Further, few studies have considered the role of father involvement in contexts of early childhood adversity and how early father involvement in this context may be associated with behavioral outcomes in middle childhood. Within the life course framework, human development and adaptation to adversity across all stages of life are understood to be shaped by the interplay of risk and protective factors, but also by the timing of exposure to these factors (Elder, 1998). Further, life course theory views social structure and individual lives as being inextricably linked. For example, some men have access to resources (e.g.,

education, employment) that promote “generative behavior” (Gerson, 1995) such as involved fathering. On the other hand, men who have been marginalized, particularly low-income men of color, are afforded fewer resources and face greater constraints to being involved fathers (Roy, 2014), which may negatively impact their children.

The present study draws on life course theory to examine father involvement in the first five years of life as a protective factor for age 9 behavior problems for children exposed to early childhood adversity. We focused on a subset of the FFCWS sample comprising children born to unmarried parents to specifically explore the effects of involvement by unmarried fathers, who tend to be more disadvantaged than married fathers and whose residential status is likely to change over time (Carlson & McLanahan, 2010). Given the dramatic increase in non-marital childbearing over recent decades (Cohen, 2014), focusing on this subset of families is warranted. Our study addresses the following research questions:

1. Does high father involvement in early childhood (1-5 years) moderate the relationship between early childhood adversity and age 9 behaviors?
2. Does high father involvement at age 9 impact the associations between father involvement in early childhood and age 9 behaviors?

We hypothesized that high levels of father involvement across early childhood would moderate the association between adversity and behavior problems. High levels of father involvement were expected to be associated with fewer behavior problems among children exposed to low to moderate levels of adversity. In other words, it was hypothesized that father involvement and high adversity would demonstrate an “overwhelming risk pattern” of interaction (Li, Nussbaum, & Richards, 2007), such that father involvement would no longer promote behavioral adjustment beyond a certain threshold of adversity. The second research

question was primarily exploratory.

Methods

The current study was a secondary data analysis of FFCWS, a longitudinal birth cohort study of 4,898 children born between 1998 and 2000 (Reichman, Teitler, Garfinkel, & McLanahan, 2001). The FFCWS utilized a multistage stratified random sampling design that oversampled non-marital births. Twenty cities were sampled from all U.S. cities with populations greater than 200,000, and within those cities, hospitals were systematically sampled to increase coverage of births to unmarried parents (Reichman et al., 2001). At baseline, the full cohort included 3,711 non-marital births and 1,187 births to married parents (Reichman et al., 2001). Mothers and fathers who gave informed consent were interviewed within 48 hours of the child's birth, typically at the hospital. Both parents were contacted for subsequent phone-based interviews ("core" interviews) when the focal child was approximately age 1 year (Y1), 3 years (Y3), 5 years (Y5), and 9 years (Y9) (Geller, Jaeger, & Pace, 2015). Of the mothers who participated at baseline, response rates at Y1, Y3, Y5, and Y9 were 90%, 88%, 87%, and 76%, respectively. In-home data were also collected from a subset of respondents at Y3 (n = 3,258), Y5 (n = 2,981), and Y9 (n = 3,630) to survey the person the focal child lived with at least half the time (the primary caregiver [PCG], usually the mother). Further details about the original study methodology are available elsewhere (Geller et al., 2015; Reichman et al., 2001).

We limited our sample to children whose mothers: were unmarried at baseline (n=3,711); participated in all core surveys, one or both of the Y3 and Y5 in-home surveys, and the Y9 child assessment, and; reported living with the child at least half the time at Y9 (n = 1,885). We excluded 56 cases due to incomplete data on the outcome variables, and 32

cases for missing data on early father involvement at more than one of the three early childhood waves. An additional nine cases were excluded due to incomplete data on other parental engagement variables. Forty-nine cases were dropped because they lacked data on all ACEs at one wave. The final analytic sample was thus 1,740. Cases with partial missing data on ACEs were not excluded from analyses; missing responses were coded as zero, or no exposure. At Y1, nine cases (0.52%) were missing data on one ACE. At Y3 and Y5, fewer than 10% of cases were missing data on one or two ACEs. Similar to other researchers analyzing FFCWS data (Carlson, Pilkauskas, Mclanahan, & Brooks-Gunn, 2011; Geller & Franklin, 2014; Pilarz & Hill, 2014; Ryan, Johnson, Rigby, & Brooks-Gunn, 2011), we controlled for raking variables that were used to create the survey weights (e.g., mothers' baseline age, race/ethnicity, and education), rather than apply the survey weights to the analyses.

Measures

Adverse childhood experiences (ACEs). We examined a total of nine risk factors (ACEs). Three risk factors assessed child maltreatment at Y3 and Y5 only (maltreatment data were not collected at Y1): child physical abuse, child emotional abuse, and supervisory neglect. All other ACEs were assessed at Y1, Y3, and Y5. These included maternal depression, household substance use, father incarceration, intimate partner violence (IPV), housing instability, and food insecurity.

Child maltreatment. Three ACEs representing child maltreatment were drawn from items of the Parent-Child Conflict Tactics Scale (CTS) (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) included in waves Y3 and Y5. Following previous FFCWS analyses (Font & Berger, 2015), *physical abuse* was indicated by mother's affirmative response that she or

another primary caregiver (e.g., father, cohabiting partner) hit the child with a belt, stick, or other hard object three or more times in the previous year, or shook the child at any time in the previous year. A dichotomous variable assessed *emotional abuse* based on whether the mother or another primary caregiver reported doing two or more of the following in the previous year: called the child a disparaging name, sworn at the child on three or more occasions, or threatened to send the child away. *Supervisory neglect* was indicated by an affirmative response to either of two items, including whether in the past year the mother had left the child home alone and whether the mother had been too intoxicated from drugs or alcohol to care for the child.

Maternal depression. At each wave beginning at Y1, mothers completed the Major Depression Episode subscale of the Composite International Diagnostic Interview–Short Form (CIDI-SF) (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). The questions of the CIDI-SF were designed to correspond to diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994). Mothers were asked about feelings of depression or being unable to derive pleasure from activities they used to enjoy. Respondents who experienced either of these conditions most of the time, every day, for a 2-week period during the previous year were asked additional questions related to concentration problems, trouble sleeping, feeling tired, changes in weight, thinking about death, and feelings of worthlessness (Kessler et al., 1998). Affirmative responses were summed to construct a score from 0 to 8. Mothers who indicated they were taking medication to treat depression were assigned a score of 8. Each score corresponds to a probability of a depression diagnosis ranging from .0001 to .9083 (Nelson, Kessler, & Mroczek, 2001). Mothers scoring 3 or higher were considered a probable case and

were categorized as experiencing depression at that wave.

Household substance use. To measure household substance use at each wave, mothers responded to questions pertaining to drug and alcohol use in the past 12 months. They were asked, "Was there ever a time when your drinking or being hung over interfered with your work at school, or a job, or at home?" and "Have you sought help/been treated for drug/alcohol problem?" Mothers were also asked if they had used marijuana, cocaine or crack, heroin, hallucinogens, amphetamines, or any prescription drugs (e.g., sedatives, pain medications) without a prescription or for longer /in greater quantities than prescribed. Finally, mothers reported if the biological father and/or (if applicable) current live-in partner "had problems such as keeping a job or getting along with family and friends because of alcohol or drug use." Following Jimenez and colleagues (2016), a positive response to one or more of these questions was categorized as exposure to household substance use.

Paternal incarceration. Y1 father incarceration was measured by baseline and Y1 reports that the child's biological father was in prison. If the father was in prison at the time of one or both interviews, children were categorized as exposed to paternal incarceration at Y1. At Y3 and Y5, mothers reported whether the father had spent time in prison since the last interview.

IPV. Previously validated items were used to measure IPV at each wave (Lloyd, 1997; Sweet, Bumpass, & Call, 1988). Mothers were asked to consider how the focal child's biological father (if in relationship with him) or current partner (if applicable) behaves toward them, answering the following questions: 1) "How often does he slap or kick you?" 2) "How often does he hit you with a fist or object that could hurt you?" 3) "How often does he try to make you have sex or do sexual things you don't want to do?" 4) "Have you and the

biological father or current partner had a physical fight in front of the child since the last interview?" and 5) "Have you been seriously hurt in a fight with the father or current partner since the last interview?" Following Suglia and colleagues (Suglia, Duarte, Chambers, & Boynton-Jarrett, 2012), a response of "sometimes" or "often" (rather than "never") to any of the first three items or an affirmative response to either of the last two items was categorized as an IPV exposure.

Housing instability. Items from the New York City Social Indicators Survey (Meyers & Garfinkel, 1999) and the Survey of Income and Program Participation (SIPP) (U.S. Department of Commerce, 1998) assessed exposure to housing instability. At each wave, mothers were asked if they had faced any of the following problems in the past 12 months because of lack of money: 1) been evicted from home or apartment; 2) moved in with other people; 3) stayed at a shelter, in a vehicle, or in an abandoned building even for one night; or 4) not paid the full amount of rent or mortgage. Mothers were also asked if they had moved residences more often than once per year since the previous interview. Following Geller and Franklin (2014), affirming one or more of these items was considered exposure to housing instability for that time period.

Food insecurity. The measure of *food insecurity* was derived from three SIPP items that asked whether, in the past 12 months, mothers had received free meals, mothers had been hungry but could not afford to buy more food, or their children had been hungry but they could not afford to buy more food. Endorsing one or more of the three items was categorized as exposure to food insecurity (Suglia et al., 2012).

Dichotomous variables (1 = yes, 0 = no) were created for each ACE obtained at the Y1, Y3, and Y5 assessments. A cumulative ACEs score was calculated by summing the

dichotomous variables at all three assessments (except for child maltreatment, taken from two assessments), with possible scores ranging from 0 to 24.

Early father involvement. Study analyses utilized a composite measure of early father involvement that assessed three components: *accessibility*, *positive engagement*, and *shared responsibility* (Lamb et al., 1985; Pleck, 2010). We relied on mothers' reports of early father involvement in order to include a greater number of fathers in the analysis; mothers were more likely than resident and nonresident biological fathers to be interviewed (Carlson, McLanahan, & Brooks-Gunn, 2008). *Accessibility* measured how often the father spent at least one hour with the child in the previous month, with responses ranging from 1 (never) to 5 (every day). If the father had not seen the child more than once in the past month, we assigned a score of 0. Accessibility was measured as average score across the three early childhood waves. If data from one wave were missing, we used the average of the two waves for which data were available. Final scores were standardized to have a mean of 0 and SD of 1.

Positive father engagement was measured at Y1, Y3, and Y5 using mothers' reports of how many days in a typical week fathers engaged in the following five activities with the child: reading stories, telling stories, playing with toys, other playing (e.g., peek-a-boo, playing outside), and singing songs (Carlson et al., 2008). For each activity, responses ranged from 0 to 7 days. The score at each wave was calculated as the mean of the five items, with a summary early positive father engagement measured as the average of the scores at Y1, Y3, and Y5 (or at the two waves for which data were available, if applicable). If the father had not seen the child more than once in the past month, we assigned a score of 0 for that wave. Final scores were standardized to have a mean of 0 and SD of 1.

Shared responsibility was assessed using two items about whether the father shared responsibility for taking care of the child. Questions asked: "How often does father look after child when you need to do things?" and "How often does he take child places s/he needs to go?" Items were scored as "often," "sometimes," "rarely," and "never." Items endorsed as "often" or "sometimes" were scored as 1, for a total potential score at each wave ranging from 0 to 2. Scores were calculated as the mean of the three waves (or at the two waves for which data were available, if applicable), which were then standardized (mean = 0; SD = 1).

To create a composite *total early father involvement* measure, we summed the standardized scores for accessibility, positive engagement, and shared responsibility. The total score was also standardized (mean = 0; SD = 1). Finally, we transformed the total standardized score into a dichotomous variable: children whose fathers scored more than one standard deviation above the mean were categorized *high early father involvement* (= 1; all other levels of involvement = 0).

Outcome variables. *Internalizing and externalizing problem behaviors* were mother-reported at age 9 during the in-home interview. Mothers completed the parent-report form of the Child Behavior Checklist for children 6 to 18 years old (CBCL/6-18) (Achenbach & Rescorla, 2001). The present study utilized the internalizing and externalizing scales of the CBCL, which comprise 32 items and 35 items respectively. Items from the internalizing scale include statements such as, "Child is withdrawn, doesn't get involved with others," and "Child enjoys very little." Sample items from the externalizing scale include, "Child is cruel, bullies, or shows meanness to others," and "Child doesn't seem to feel guilty after misbehaving." Mothers were asked to rate each statement on a 3-point scale (0 = *not true of this child,* 1 = *sometimes or somewhat true,* 2 = *very or often true*). Both scales have

demonstrated satisfactory reliability and validity (Achenbach & Rescorla, 2001). Total scores for each scale were devised by summing item scores (α = .85 for internalizing scale, α = .90 for externalizing scale). Following other researchers using Fragile Families data (Hunt, Slack, & Berger, 2016; Lee & McLanahan, 2015; Turney, 2011), internalizing and externalizing scores were standardized to have a mean of 0 and SD of 1. Results were thus expressed in terms of standard deviation units.

Socio-demographic covariates. Guided by previous studies (Bzostek, 2008; Jimenez et al., 2016; Suglia et al., 2012), we controlled for several baseline socio-demographic characteristics including *mother's level of education* (less than high school, high school, and some college or more (reference)), *mother's race/ethnicity* (non-Hispanic Black, Hispanic, other race/ethnicity, and White non-Hispanic (reference)), *mother's* and *father's age* (in years), *child gender* (1 = male, 0 = female), receipt of public assistance (1 = receipt of public assistance, food stamps, or welfare in past year; 0 = no receipt), and parents' cohabitation status (1 = parents cohabiting; 0 = parents not cohabiting). We also created a categorical variable to represent *father's residential status* (i.e., cohabitation) during the three early childhood waves (0 = father consistently nonresident; 1 = father resident at one or two waves; 2 = father consistently resident at Y1, Y3, and Y5). We separately controlled for father's Y9 residential status.[2]

Parental engagement covariates. Following Carlson and colleagues (2008), we controlled for *early positive mother engagement*, which mirrored the measure of *early positive father engagement* (described above). Scores were averaged across Y1, Y3, and Y5

[2] Father's race/ethnicity and baseline education were highly correlated with the mother's characteristics. When we included these two father characteristics in sensitivity analyses, they showed high variance inflation factors suggesting multicollinearity. Because they did not substantially alter the results or improve the explanatory power of regression models, these variables were excluded from analyses.

and then standardized to have a mean of 0 and standard deviation (SD) of 1. For cases missing data at one wave, the mean score was calculated as the average of the scores at the two available waves. To remain consistent with the early father involvement measure, we dichotomized this variable such that scores greater than one SD above the mean represented *high early positive engagement* (=1; all other scores = 0).

Final models also controlled for *proximate father involvement,* assessed with a composite scale of six child-reported items taken from the 9-year in-home child interview (Carlson, 2006; Jensen & Pace, 2016). Taken together, the items reflect the child-perceived quantity and quality of father involvement, as well as father-child closeness (Carlson, 2006). Among children who had seen their biological father in the past year, items measured: 1) how close the child felt to his/her father; 2) how well father and child talked about things that matter and shared ideas; and the child's perception of whether the father 3) talked over important decisions with the child, 4) spent enough time with the child, 5) missed events or activities that were important to the child, and 6) listened to the child's side of an argument. Items were scored on a Likert scale ranging from 1 ("not very close," "not very well," or "never") to 4 ("extremely close," "extremely well," or "always"), with item 5 being reverse coded. A proximate father involvement score of zero was given to children who had not seen their fathers in the past year. Total proximate father involvement scores were calculated as the mean of the six items (range: 0-4), which we standardized to have a mean of 0 and SD of 1. *Proximate mother involvement* was also included in final models to control for child-perceived involvement of the mother at age 9. Children responded to the same six items regarding their mothers. Since the sample was limited to children who lived with their mothers at least half the time, all had seen their mothers in the past year. Thus items ranged

from 0 (“not very close,” “not very well,” or “never”) to 3 (“extremely close,” “extremely well,” or “always”), rather than 0 to 4 as for fathers. With that exception, scores were calculated and standardized as they were for proximate father involvement. Proximate parental engagement variables were dichotomized to represent *high proximate involvement* (=1; more than one SD above the mean) versus all other levels (=0).

Analyses

Analyses were conducted using SAS statistical software version 9.4. Descriptive statistics of all variables were obtained (see Table 1). We conducted a series of ordinary least squares (OLS) regression models to test whether high early father involvement was directly associated with age 9 behavior problems and/or moderated the association between early ACEs and age 9. Separate models were run for internalizing and externalizing behaviors. In the first step, ACEs, high early father involvement, socio-demographic covariates, and high early positive mother engagement were entered into the model. In step 2 we included an interaction variable (product term of high early father involvement and ACEs) to test for moderation. Finally, to isolate the effects of early versus proximate involvement, we added proximate father involvement and proximate mother involvement as control variables in step 3.

In order to aid the interpretation of moderation results, we stratified the sample into two groups – high early father involvement and some/no early father involvement – and transformed the continuous ACEs variable into a three-level categorical variable: exposure to 0-1 ACE (reference group), 2-3 ACEs, and 4 or more ACEs. We conducted chi-square analyses to identify significant differences in frequencies of predictor variables between the groups. Linear regressions were conducted separately for the two stratified groups to explore

how early father involvement moderated associations between early childhood adversity and age 9 behavior problems.

Results

Descriptive Results

Table 1 displays descriptive statistics for the main study variables. The majority of mothers reported their race/ethnicity as non-Hispanic Black (*n* = 1,032, 59%), while approximately one-quarter reported being Hispanic or other (*n* = 467, 25%), 14% were non-Hispanic White (*n* = 241), and the just over 2% identified as another race or ethnicity (*n* = 40). At baseline, 72% of mothers had a high school education or less (*n* = 1,252) and 79% received some form of public assistance (*n* = 1,369). On average, fathers were slightly older than mothers (at baseline, mothers' mean age = 23.72, fathers' mean age = 26.02). Slightly more than half the children in the sample were male (*n* = 898, 52%). The proportion of mothers who reported cohabiting with the child's biological father at baseline was 47% (*n* = 813). Across the three early childhood waves (Y1-Y5), nearly half of fathers were consistently nonresident (*n* = 686, 49%), one-third were inconsistently resident (*n* = 448, 32%), and 19% were consistently resident (*n* = 265). Summing across the early childhood waves, the mean number of ACEs to which children were exposed was 3.58 (standard deviation = 3.01). Twenty-eight percent of children were exposed to zero or one ACE (*n* = 489), 30% to 2-3 ACEs (*n* = 519), and 42% to four or more ACESs (*n* = 732).

Multivariate Results

Results of OLS regressions to examine direct and/or moderating effects of high early father involvement are presented in Tables 2 (internalizing behaviors) and 3 (externalizing behaviors). Internalizing behaviors were first regressed on high early father involvement,

cumulative early ACEs, socio-demographic covariates, and high early positive mother engagement (step 1). This model showed no significant associations between high early father involvement and internalizing behavior problems. Early ACEs demonstrated a strong positive association with the outcome. For every one unit increase in the number of early childhood ACE exposures there was an associated .07 standard deviation increase in internalizing behaviors ($p<.0001$). Race was the only covariate found to be significantly associated with internalizing behaviors: maternal race of Black compared to White was associated with a .21 standard deviation decrease in internalizing behaviors ($p<.01$).

To test whether high early father involvement moderated the association between early adversity and internalizing behaviors, we added an interaction term in step 2. Early ACEs remained significantly associated with internalizing behaviors scores ($B=0.07$, $p<.0001$). With the addition of the interaction terms, high early father involvement compared to some or no early father involvement became significantly associated with lower internalizing behavior scores at age 9 ($B=-0.22$, $p<.05$). High early father involvement also moderated adversity such that an additional ACE in the context of high early father involvement was associated with a .06 standard deviation increase in internalizing behaviors ($p<.05$). When we further controlled for high proximate involvement of mothers and fathers, the association between ACEs and internalizing behaviors was unchanged. High early father involvement remained significantly associated with lower age 9 internalizing behavior scores ($B=-0.21$, $p<.05$). High early father involvement also continued to moderate early adversity ($B=0.06$, $p<.05$). The relationship between high proximate father involvement and internalizing behaviors approached significance: high father involvement at age 9 was associated with internalizing behavior scores that were lower than some/no proximate father

involvement (B=-0.13, p=.06). In both steps 2 and 3, race remained the only socio-demographic covariate to show a significant association with internalizing behaviors: as in step 1, Black compared to White maternal race was associated with lower internalizing behaviors (B=-0.21, p<.01).

The first linear regression model predicting externalizing behaviors found no association between high early father involvement and the outcomes (see Table 3, Step 1). Early ACEs were strongly associated with externalizing behaviors: each additional adversity contributed a .09 standard deviation increase in externalizing behavior scores (p<.0001). High positive mother engagement was marginally associated with lower externalizing scores (B=-0.10, p<.10). As with internalizing behaviors, race was associated with externalizing behaviors: compared to maternal race of White, children of Hispanic women were predicted to have lower externalizing behavior scores (B=-0.24, p<.01). The association between maternal race of Black and externalizing behaviors approached significance (B=-0.13, p<.10). Unlike for internalizing behaviors, gender contributed to externalizing behaviors: boys were predicted to have externalizing scores that were .22 standard deviation higher than for girls (p<.0001). The association between maternal education status and externalizing behaviors approached significance: being born to a mother with a high school education versus some college or more was associated with a .11 standard deviation increase in externalizing scores (p=.06).

In step 2, high early father involvement was significantly associated with a .19 standard deviation decrease in externalizing scores (p<.05). The interaction between early father involvement and ACEs was nearly significant. The direct association between early ACEs and externalizing problems remained significant (B=0.08, p<.0001). Relationships

between covariates and externalizing behaviors were largely unchanged from step 1. When we added the two proximate parental involvement variables in Model 3, high early father involvement was still associated with lower externalizing scores (B=-0.18, p<.05). Moreover, the interaction between early father involvement and ACEs continued to be marginally significant (B=.04, p=.07). The major difference in step 3 was that high proximate father involvement was associated with lower externalizing scores (B=-0.16, p=<.05). High proximate mother involvement showed no significant association with externalizing behaviors.

Stratified Sample

Because our initial models suggested high early father involvement moderated the association between early adversity and age 9 behavior problems, we stratified the sample into a *high early father involvement* group (n=341) and a *no/some early father involvement* group (n=1,399) to assist in interpreting the moderation.

Bivariate analyses. As displayed in Table 4, Chi-square tests between early father involvement and ACEs exposure (Y1 to Y5) indicated that children whose fathers were highly involved were less likely to be exposed to four or more ACEs, and more likely to be exposed to 0-1 ACE, compared to children whose fathers had no and low involvement with the children ($\chi^2_{(df=2,\ N=1,740)}$ = 82.02, p<.0001). Black mothers were significantly less likely to report high early father involvement with their children ($\chi^2_{(df=3,\ N=1,740)}$ = 18.84, p<.001). Children with high early father involvement were also significantly more likely to have high early positive engagement from mothers ($\chi^2_{(df=1,\ N=1,740)}$ = 75.56, p<.0001), and more likely to report high proximate (age 9) father involvement ($\chi^2_{(df=1,\ N=1,740)}$ = 58.06, p<.0001). Father involvement groups differed significantly by father residential status over time. Fathers

demonstrating high early involvement were more likely than others to be: resident at baseline ($\chi^2_{(df=1,\ N=1,740)} = 71.12$, $p<.0001$), consistently resident at Y1, 3, and 5 ($\chi^2_{(df=2,\ N=1,740)} = 387.15$, $p<.0001$), and resident at Y9 ($\chi^2_{(df=1,\ N=1,740)} = 183.35$, $p<.0001$). There were no significant differences between the groups in terms of child gender, mother's baseline education, or child-reported mother involvement at age 9.

Multivariate analyses. Results of OLS regressions are presented in Table 5. For the high early father involvement group, exposure to 2-3 ACEs compared to the reference group of zero or one ACE was not significantly associated with either internalizing or externalizing behavior problems at age 9. There were strong associations between exposure to four or more ACEs in early childhood (versus the reference group) and behavior problems. This level of ACEs exposure was associated with a .67 standard deviation increase in age 9 internalizing scores ($p<.0001$) and age 9 externalizing scores ($p<.0001$). Among the some or no early father involvement group, exposure to 2-3 ACEs in early childhood (compared to 0-1 ACE) predicted a .22 standard deviation increase in internalizing scores ($p<.01$) and a .20 standard deviation increase in externalizing scores ($p<.01$). Exposure to four or more ACEs was associated with a .53 ($p<.0001$) standard deviation increase in internalizing scores and a .58 standard deviation increase in externalizing scores ($p<.0001$).

Of all the socio-demographic and parental involvement covariates, only gender demonstrated an association with behavior problems among the high early father involvement group: being male was marginally associated with a .19 standard deviation decrease in internalizing scores ($p=.06$). By contrast, in the some/no early father involvement group, several covariates were significantly related to behavior problems. Proximate father involvement was associated with a .16 standard deviation decrease in internalizing scores

(p<.05) and with a .23 standard deviation decrease in externalizing scores (p<.01). Similar to results from the non-stratified sample, race had significant effects on behavior problems for the some/no involvement group. Black compared to White maternal race/ethnicity was associated with lower internalizing (B=-0.22, p<.01) and externalizing scores (B=-0.16, p<.05), and maternal race/ethnicity of Hispanic predicted lower externalizing scores (B=-0.28, p<.01). Gender remained significantly associated with externalizing behaviors, such that being male compared to female was associated with higher scores (B=0.23, p<.0001).

Discussion

The present study utilized prospective data to assess positive father involvement and children's exposure to adversities at three time points in early childhood. Focusing on a subsample of children born to unmarried parents, we examined whether early father involvement by biological fathers impacted child behavioral outcomes at age 9, and in particular whether early father involvement moderated the association between cumulative adversity in early childhood and behavior problems at age 9. We created a robust measure of father involvement that captured father engagement in positive activities, shared responsibility for the child, and time spent with the child in the first five years of life. We further adjusted for child-reported father involvement at age 9, in order to consider consistency of involvement as well as the importance of early versus proximate father involvement in contributing to child outcomes. Although a growing body of research has investigated how father involvement is associated with child outcomes, our study was unique in that it assessed the role of father involvement at multiple time points in the context of cumulative early adversity.

We found that early father involvement was protective of children's later behavioral wellbeing, but only when the level of father involvement was high and only under conditions of low to moderate adversity. In other words, supporting our first hypothesis, the interaction between father involvement and cumulative adversity followed an "overwhelming risk" pattern (Li, Nussbaum, & Richards, 2007; Luthar et al., 2000). High early father involvement reduced the association between early adversity and later behavior problems among children exposed to three or fewer ACEs, but the protective effects of high early father involvement were "overwhelmed" by higher levels of adversity. Li and colleagues (2007) cited similar findings in their cross-sectional study of risk and protective factors among Black youth. Although they did not examine father involvement, the authors assessed two family-related protective factors, family helpfulness and family supportiveness. High levels of these family factors buffered children at low levels of risk, but the effects were attenuated for families living in high-poverty, high-stress neighborhoods. Other research has also found diminishing effects of family-related protective factors in contexts of increasing risk (Ceballo & McLoyd, 2002). Our study extended the literature by demonstrating an overwhelming risk pattern of interaction between early childhood adversity and an understudied family-level factor – father involvement – that resulted in differential effects on behavior problems in middle childhood.

As presented in Table 4, chi-square results showed that children with high early father involvement were less likely than other children to have high ACE exposures, which is unsurprising given that many of the ACEs we measured were related to parental functioning (e.g., substance use, father incarceration, child maltreatment). Only a small number of children with high early father involvement (n = 80) were exposed to 4+ ACEs. For these

children, father involvement was not protective. Their age 9 behavior problems were predicted to be slightly higher compared to children exposed to high adversity with no/some early father involvement. It could be that some highly involved fathers engage in negative behaviors that harm rather than protect their children (e.g., child abuse, substance use). Although our father involvement measure intended to capture positive involvement (e.g., engagement in positive activities), it is possible that the measure did not always discriminate between positive involvement versus any involvement.

The present study further showed that adjusting for proximate (age 9) father involvement did not substantially alter the association between early father involvement and age 9 behavior problems. However, among fathers who were *not* highly involved in early childhood, some of them demonstrated high involvement at age 9. A striking finding in the stratified regression models was that children of these fathers – fathers who showed no/some involvement in early childhood and high involvement at age 9 – demonstrated fewer internalizing and externalizing behavior problems (see Table 5). One plausible explanation is that even if fathers were not consistently and positively involved when their children were young, they could still promote children's behavioral wellbeing by investing in a positive father-child relationship in the early school-age years. Other quantitative studies have also found associations between father-child relationship quality and behavior problems in middle childhood (Cabrera, Cook, McFadden, & Bradley, 2011).

While such findings must be interpreted with caution given that proximate father involvement and the outcome variables were assessed at the same time, qualitative research findings provide valuable insights into processes that shape father involvement over time. Studies of low-income and marginalized men have shown that the early years of fatherhood

may entail focusing on managing and minimizing risk in their own lives (e.g., incarceration, violence), as well as limiting contact with children to avoid putting them in danger (Roy, Palkovitz, & Waters, 2014). Over time, however, low-income men's involvement in their children's lives may become more consistent as men learn from past mistakes and persevere in order to "be there" for their children (Roy et al., 2014). Another insight from qualitative research is that fathers often adjust their involvement in response to mothers' decisions or requests (Roy & Burton, 2007). If their children are in trouble or mothers need greater assistance for other reasons, mothers may reach out and ask fathers to re-engage or become more involved. In such situations, fathers may be motivated to engage because they perceive an opportunity for a "second chance" to turn away from high-risk behaviors and rebuild their identities as fathers (Roy & Lucas, 2006). The present study's results align with such findings from qualitative research, pointing to the dynamic nature of father involvement and the complex reasons fathers may move into and out of children's lives at different times.

Another important finding of this study was that living with the child was not a necessary prerequisite for high father involvement in early childhood, but high early involvement was considerably more common among fathers who were consistently resident between Y1 and Y5. Being resident likely afforded more opportunities and erected fewer barriers for fathers to stay positively engaged. The majority of fathers categorized as being highly involved in early childhood (n = 235, 69%) were resident at all three early childhood waves, and 28% (n = 97) were resident at one or two of the early childhood waves (see Table 4; column percentages not shown). Fewer than 3% of fathers demonstrating high early involvement were consistently nonresident. Approximately 40% of fathers classified as high

early involvement were resident at all waves from baseline to age 9 (total across waves not shown in tables).

It is important to note that while a greater percentage of resident fathers reported higher early father involvement, steady cohabitation in and of itself did not translate into high father involvement. Slightly fewer than half of fathers who were consistently resident from Y1 to Y5 were categorized as highly involved fathers across that time period. Furthermore, multivariate analyses found no significant associations between fathers' residential status and children's behavior problems. Previous studies of father involvement have provided evidence that both resident and nonresident father involvement can promote positive outcomes for children (Adamsons & Johnson, 2013; Bzostek, 2008; Pleck, 2010). We extended this literature by demonstrating that consistently and inconsistently resident fathers could be involved to such an extent that they buffered children from low to moderate levels of early adversity, but consistently resident fathers were the most likely to engage in high levels of involvement.

Findings from the Time, Love, and Cash among Couples with Children project (TLC3), a qualitative study embedded in the larger Fragile Families study, shed further light on the sometimes complex interplay between residential status and father involvement (England & Edin, 2007). Among interviewed couples that were unmarried at the child's birth and not romantically involved four years later, approximately 75% reported some "gatekeeping" by mothers to limit and/ fathers' access to the children (Claessens, 2007). A common reason was the perceived danger posed by the fathers' high-risk lifestyle, a point acknowledged by low-income fathers in other qualitative work (Roy, Palkovitz, & Waters, 2014). Gatekeeping in the TLC3 study was also linked to mothers' re-partnering; particularly

for fathers who had not been in recent contact with the child, the presence of a social father strained the biological parents' relationship and sometimes resulted in low involvement of biological fathers (Claessens, 2007). For other non-cohabiting couples in the study, however, mothers relied on the fathers for childcare and valued the father's role in the child's life.

Among cohabiting couples in the TLC3 study, analyses showed low father involvement among couples that were "plagued with problems" such as abuse, incarceration, drugs, and infidelity (Linnenberg, 2007). The author posited:

> [T]he same issues that make these men poor partners seem to make them poor fathers…They are immature and have serious bad habits…Even when the fathers in these relationships are stably living with their partner and child, they seem unwilling to engage in any kind of care work they do not think of as fun… (Linnenberg, 2007, p. 180)

The TLC3 study illustrated that whether or not biological fathers resided with mother and child, fathers (and mothers) displayed various levels of maturity and health. Similarly, mother-father relationship quality was wide-ranging in both cohabiting and non-cohabiting groups. The present study's results align with these qualitative findings and suggest that, although resident fathers face fewer constraints (e.g., maternal gatekeeping) to maintaining involvement with their children, residential status is just one of an array of factors that play a part in cultivating or constraining father involvement. Better understanding the various individual-, family-, and societal-level factors that encourage positive and consistent father involvement would help in the development of policies and interventions that meet the actual needs of at-risk families.

Limitations

Several limitations to this study should be noted. One is that the analytic sample included only those children whose mothers participated in surveys at all early childhood waves and who completed the Y9 child assessment. Due to non-random attrition, the most disadvantaged families are the most likely to be missing from follow-up surveys (Schwartz-Soicher, Geller, & Garfinkel, 2011). As a result, families and children affected by high cumulative adversity may be underrepresented in the present study, limiting the generalizability of the findings. Relatedly, the analytic sample contained few children exposed to both high early father involvement and high adversity (n = 80). Additional research is needed to better understand the experiences of families in which adversity and father involvement are both high.

Another limitation of the study related to measures of father involvement in early childhood. We relied on mothers' reports of early father involvement because they participated in surveys more consistently than fathers. Ideally, we would have been able to incorporate fathers' perspectives as well. Lastly, although we drew on data reported at multiple time points in early childhood as well as at age 9, these data were summarized into mean scores (i.e., father involvement) or cumulative measures (i.e., ACEs). Because we did not employ a longitudinal design, we were unable to examine how key variables such as father involvement, residential status, child adversity, and child behavior problems interacted with and/or influenced each other over time. We plan to investigate these relationships in subsequent analyses utilizing longitudinal methods.

Implications and Conclusion

In spite of its limitations, this study provides valuable information about the links between father involvement, early childhood adversity, and behavior problems in middle childhood. We found that father involvement interacted with ACEs in early childhood following an "overwhelming risk" pattern, such that high levels of early father involvement reduced the association between early adversity and later behavior problems, but only under conditions of low to moderate ACEs exposure. For children exposed to high levels of adversity, high father involvement did not offset the risk. The cumulative risk literature indicates that the more ACEs to which children are exposed, the less likely it is that *any single protective factor* could adequately offset the consequences of exposure (Larkin, Beckos, & Shields, 2012). It is clear that situations of overwhelming levels of risk require more intensive interventions that provide an array of trauma-informed services, and that also work to strengthen protective factors (and address deficits/needs) within the family and community (Larkin, Felitti, & Anda, 2014). Such interventions would address the cumulative risk while also helping to "accumulate" supports that would ameliorate future risk.

The present study highlights the importance of promoting policies and interventions that cultivate consistent and positive father involvement. Particularly for low-income and marginalized men, policies must address the key issues that get in the way of engaged fathering, among them limited job networks, lack of educational opportunities, and involvement with the criminal justice system. Responsible fatherhood programs that began in the early 1990s were primarily concerned with increasing child support payments and paternity establishment rates (Curran & Abrams, 2000). More comprehensive fatherhood programs have the potential to foster and sustain positive father involvement among low-

income and otherwise disadvantaged men. One important component is staff and peer support, which has been shown to reduce men's experiences of isolation and marginalization (Roy & Dyson, 2010). With appropriate funding and community-based collaboration, networks of organizations could help reduce stigma, negotiate barriers to work, and connect men to resources such as job opportunities, education, housing, and physical and mental health services (Roy, Palkovitz, & Waters, 2014). A collaborative and holistic approach to supporting active fathering could ultimately reduce inequality in opportunities and life chances experienced by disadvantaged men.

Tables

Table 1. Descriptive statistics of analytic sample (un-weighted) (*N* = 1,740)

Characteristic	*Mean* (SD[a])	n (%)
Mother's race/ethnicity		
Non-Hispanic Black		1,032 (59.31)
Hispanic		467 (24.54)
Non-Hispanic White		241 (13.85)
Other		40 (2.30)
Mother's baseline education		
Less than high school		630 (36.21)
High school		622 (35.75)
Some college or more		488 (28.04)
Baseline receipt of public assistance		1,369 (78.68)
Mother's age at baseline	23.72 (5.39)	
Father's age at baseline	26.02 (6.01)	
Child gender		
Female		842 (48.39)
Male		898 (51.61)
Father residential at baseline		813 (46.72)
Father residential status, Y1-5		
Consistently non-resident		686 (49.04)
Sometimes resident		448 (32.02)
Consistently resident		265 (18.94)
Father residential at Y9		612 (35.17)
Cumulative early adverse childhood experiences (range 0-24)	3.58 (3.01)	
0-1 ACE		489 (28.10)
2-3 ACEs		519 (29.83)
4 ACEs		732 (42.07)
Early positive father engagement (unstandardized range: 0-7)	2.10 (1.79)	
Father accessibility (unstandardized range: 0-5)	3.12 (1.81)	
Shared responsibility (unstandardized range: 0-2)	1.02 (0.78)	
Total early father involvement	0.00 (1.00)	
High (standardized, >1 SD above the mean)		341 (19.60)
Some or none (all others)		1,399 (80.40)
Early positive mother engagement (EPME; unstandardized range: 0-7)	4.86 (1.20)	
High (standardized, >1 SD above the mean)		322 (18.51)
Some or none (all others)		1,418 (81.49)
Proximate father involvement (range: 0-4)	2.10 (1.37)	
High (standardized, >1 SD above the mean)		306 (17.59)
Some or none		1,434 (82.41)
Proximate mother involvement (range: 0-3)	2.19 (0.51)	
High (standardized, >1 SD above the mean)		258 (14.83)
Some or none		1,482 (85.17)
Age 9 internalizing behaviors score (standardized range: -0.98-5.64)	0.00 (1.00)	
Age 9 externalizing behaviors score (standardized range: -0.99-4.90)	0.00 (1.00)	

a. SD = standard deviation

Table 2. Results of ordinary least squares regression models: Early father involvement (ages 1-5), early adversity (ages 1-5), and age 9 internalizing problems (N = 1,740)

	Internalizing Problems					
	Step 1		Step 2		Step 3	
	B[a]	SE[b]	*B*	SE	*B*	SE
Intercept	-0.39*	0.16	-0.36*	0.16	-0.35*	0.16
High total early father involvement	-0.07	0.07	-0.22*	0.09	-0.21*	0.09
Cumulative early ACEs[c]	0.07***	0.01	0.07***	0.01	0.07***	0.01
High early positive mother engagement	-0.07	0.06	-0.08	0.06	-0.08	0.06
Interaction: High total early father involvement X ACEs			0.06**	0.02	0.06*	0.02
High proximate (Y9) father involvement					-0.13†	0.07
High proximate (Y9) mother involvement					0.06	0.07
Child gender						
Female[d]						
Male	0.03	0.05	0.03	0.05	0.03	0.05
Mother's race/ethnicity						
White[d]						
Black	-0.21**	0.07	-0.21**	0.07	-0.21**	0.07
Hispanic	-0.03	0.08	-0.03	0.08	-0.02	0.08
Other	0.08	0.17	0.08	0.17	0.08	0.17
Mother's education (BL[e])						
< High school	0.09	0.06	0.09	0.06	0.09	0.06
High school	0.09	0.06	0.09	0.06	0.09	0.06
Some college[d]						
Father residential at BL	-0.02	0.05	-0.02	0.05	-0.01	0.05
Father residential status, Y1-5						
Non-resident[d]						
Sometimes resident	0.04	0.06	0.03	0.06	0.04	0.06
Consistently resident	0.06	0.08	0.05	0.08	0.07	0.08
Father residential at Y9	0.07	0.06	0.07	0.06	0.08	0.06
Mother's age (BL)	0.00	0.01	0.00	0.01	0.00	0.01
Father's age (BL)	0.00	0.01	0.00	0.01	0.00	0.01
Public assistance (BL)	-0.08	0.06	-0.08	0.06	-0.08	0.06
	R^2 = .07		R^2 = .07		R^2 = .07	

a. *B*=beta coefficient; b. SE=standard error; c. ACEs=adverse childhood experiences; d. reference group; e. BL=baseline. † p < .10; *p<.05; **p<.01; *** p<.0001.

Table 3. Results of ordinary least squares regression models: early father involvement (ages 1-5), early adversity (ages 1-5), and age 9 externalizing problems (N = 1,740)

	Externalizing Problems					
	Step 1		Step 2		Step 3	
	B	SE	*B*	SE	*B*	SE
Intercept	-0.30†	0.16	-0.28†	0.16	-0.24	0.16
High total early father involvement	-0.09	0.07	-0.19*	0.09	-0.18*	0.09
Cumulative early ACEs[c]	0.09***	0.01	0.08***	0.01	0.08***	0.01
High early positive mother engagement	-0.10†	0.06	-0.11†	0.06	-0.11†	0.06
Interaction: High total early father involvement X ACEs			0.04†	0.02	0.04†	0.02
High proximate (Y9) father involvement					-0.16*	0.06
High proximate (Y9) mother involvement					-0.01	0.07
Child gender						
Female[d]						
Male	0.22***	0.05	0.22***	0.05	0.21***	0.05
Mother's race/ethnicity						
White[d]						
Black	-0.13†	0.07	-0.13†	0.07	-0.13†	0.07
Hispanic	-0.23**	0.08	-0.24**	0.08	-0.23**	0.08
Other	-0.01	0.16	-0.01	0.16	-0.01	0.16
Mother's education (BL[e])						
< High school	0.07	0.06	0.07	0.06	0.06	0.06
High school	0.11†	0.06	0.11†	0.06	0.11†	0.06
Some college[d]						
Father residential at BL	-0.05	0.05	-0.05	0.05	-0.04	0.05
Father residential status, Y1-5						
Non-resident[d]						
Sometimes resident	0.07	0.06	0.07	0.06	0.07	0.06
Consistently resident	0.05	0.08	0.05	0.08	0.06	0.08
Father residential at Y9	0.04	0.06	0.04	0.06	0.05	0.06
Mother's age (BL)	-0.01	0.01	-0.01	0.01	-0.01	0.01
Father's age (BL)	0.00	0.00	0.00	0.00	0.00	0.00
Public assistance (BL)	0.04	0.06	0.04	0.06	0.04	0.06
	R^2 = .11		R^2 = .11		R^2 = .12	

a. *B*=beta coefficient; b. SE=standard error; c. ACEs=adverse childhood experiences; d. reference group; e. BL=baseline. † p < .10; *p<.05; **p<.01; *** p<.0001.

Table 4. Significant bivariate associations of high early father involvement with independent variables (N = 1,740)

		High early father involvement	
	Total sample	Yes	No
Cumulative adversity (Y1-Y5)	*n* (%)	*n* (row %)	*n* (row %)
0-1 ACE	489 (28.10)	156 (31.90)	333 (68.10)
2-3 ACEs	519 (29.83)	105 (20.23)	414 (79.77)
4 ACEs	732 (42.07)	80 (10.93)	652 (89.07)
		$\chi 2$ (df=2, N=1,740) = 82.02, p < .0001	
Maternal race/ethnicity			
Non-Hispanic Black	1,032 (59.31)	175 (16.96)	857 (83.04)
Hispanic	427 (24.54)	104 (24.36)	323 (75.64)
Non-Hispanic White	241 (13.85)	47 (19.50)	194 (80.50)
Other	40 (2.30)	15 (37.50)	25 (62.50)
		$\chi 2$ (df=3, N=1,740) = 18.84, p < .001	
High early positive mother engagement			
Yes	322 (18.51)	119 (36.96)	203 (63.04)
No	1,418 (81.49)	203 (15.66)	1,196 (84.34)
		$\chi 2$ (df=1, N=1,740) = 75.56, p < .0001	
High proximate (Y9) father involvement			
Yes	306 (17.59)	108 (35.29)	198 (64.71)
No	1,434 (82.41)	233 (16.25)	1,201 (83.75)
		$\chi 2$ (df=1, N=1,740) = 58.06, p < .0001	
Father residential status			
BL[a]: Resident	813 (46.72)	229 (28.17)	584 (71.83)
Nonresident	927 (53.28)	112 (12.08)	815 (87.92)
		$\chi 2$ (df=1, N=1,740) = 71.12, p < .0001	
Y1-Y5:			
Consistently nonresident	695 (39.94)	9 (1.29)	686 (98.71)
Sometimes resident	545 (31.32)	97 (17.80)	448 (82.20)
Consistently resident	500 (28.74)	235 (47.00)	265 (53.00)
		$\chi 2$ (df=2, N=1,740) = 387.15, p < .0001	
Y9: Resident	612 (35.17)	227 (37.09)	385 (62.91)
Nonresident	1,128 (64.83)	114 (10.11)	1,014 (89.89)
		$\chi 2$ (df=1, N=1,740) = 183.35, p < .0001	

a. BL=baseline. Only statistically significant chi-square results shown in table.

Table 5. Results of ordinary least squares regressions: Early adversity (ages 1-5) and age 9 behavior problems stratified by high versus some or no early father involvement (*N*= 1,740)

	High early father involvement		Some/no early father involvement	
	B[a] (SE[b])		*B*[a] (SE[b])	
	Internalizing	Externalizing	Internalizing	Externalizing
Intercept	-0.45 (0.46)	-0.29 (0.43)	-0.47 (0.19)*	-0.27 (0.18)
Cumulative early adversity				
0-1 ACE[c, d]				
2-3 ACEs	0.07 (0.12)	0.08 (0.11)	0.22 (0.07)**	0.20 (0.07)**
≥ 4 ACEs	0.67 (0.13)***	0.67 (0.12)***	0.53 (0.07)***	0.58 (0.07)***
High early positive mother engagement	-0.06 (0.11)	-0.06 (0.10)	-0.06 (0.08)	-0.11 (0.08)
High proximate father involvement	-0.09 (0.11)	-0.03 (0.11)	-0.16 (0.08)*	-0.23 (0.08)**
High proximate mother engagement	0.22 (0.16)	-0.05 (0.14)	0.02 (0.08)	-0.02 (0.08)
Child gender				
Female[c]				
Male	-0.19 (0.10)†	0.15 (0.09)	0.08 (0.05)	0.23 (0.05)***
Mother's race/ethnicity				
White[c]				
Black	-0.21 (0.16)	-0.04 (0.14)	-0.22 (0.08)**	-0.16 (0.08)*
Hispanic	-0.03 (0.16)	-0.16 (0.15)	-0.04 (0.09)	-0.28 (0.09)**
Other	-0.18 (0.27)	-0.22 (0.25)	0.20 (0.21)	0.10 (0.21)
Mother's education (BL[e])				
< High school	0.15 (0.13)	0.18 (0.12)	0.06 (0.08)	0.03 (0.07)
High school	0.17 (0.12)	0.01 (0.11)	0.06 (0.07)	0.13 (0.07)†
[illegible]me college[c]				
Father residential at BL	0.08 (0.12)	0.03 (0.11)	-0.01 (0.06)	-0.03 (0.06)
Father residential status, Y1-5				
Non-resident[d]				
Sometimes resident	0.45 (0.32)	0.17 (0.29)	-0.01 (0.06)	0.05 (0.06)
Consistently resident	0.17 (0.32)	0.06 (0.30)	0.14 (0.09)	0.08 (0.09)
Father residential at Y9	0.09 (0.12)	0.04 (0.11)	0.10 (0.07)	0.08 (0.07)
Mother's age (BL)	-0.01 (0.01)	-0.02 (0.01)	0.01 (0.01)	-0.01 (0.01)
Father's age (BL)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)
Public assistance (BL)	-0.06 (0.13)	0.04 (0.12)	-0.09 (0.07)	0.03 (0.07)
	R^2 = .13	R^2 = .15	R^2 = .07	R^2 = 0.10

a. *B*=beta coefficient; b. SE=standard error; c. reference group; d. ACEs=adverse childhood experiences; e. BL=baseline;
† *p* < .10; **p*<.05; ***p*<.01; *^*p*<.001; *** *p*<.0001.

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CHAPTER 6: CONCLUDING DISCUSSION

Using data from the FFCWS, the three studies comprising this dissertation demonstrate clear associations between ACEs in the first five years of life and internalizing and externalizing behavior problems at age 9. Each study investigated different facets of childhood adversity, including its accumulation, timing, and duration; common ways in which ACEs may cluster together; and contexts in which the negative effects of ACEs may be reduced. Below, I briefly summarize the main contributions of the studies, their limitations and suggestions for future research, and overarching implications for policy and practice.

Contributions

The first study explored the accumulation, timing, and duration of ACEs exposure from ages 1 to 5 years and their associations with behavior problems at age 9. The use of repeated measures of ACEs (collected at ages 1, 3, and 5) allowed for a more robust accounting of the total accumulation of adversities over a period of five years, and further made it possible to adjust for recent exposure to ACEs (measured at age 9) in order to isolate the effects of early versus proximate adversity. The results indicate that cumulative adversity in early childhood has lasting effects on children's behaviors, with higher levels of adversity predicting more behavior problems at age 9. Even after adjusting for behavior problems at age 5 and recent ACEs, children exposed to six or more ACEs by age 5 (compared to 0-1 ACE exposure) had approximately three times the odds of internalizing or externalizing problems at age 9. Although the primary aim of the study was to examine associations between adversity in early childhood and subsequent behavior problems, results caution us not to overlook the role of proximate adversity as exposure to multiple ACEs at age 9 was

also associated with increased odds of behavior problems.

Further, the first study contributed to the under-developed literature on timing and duration of adversity, demonstrating that exposure to intermittent adversity in early childhood was associated with the most behavior problems at age 9. In the fully adjusted models, intermittent adversity predicted a nearly four-fold increase in odds of internalizing problems and a nearly five-fold increase in odds of externalizing problems at age 9, compared to the reference group (no/low-adversity at each early childhood wave). Although not hypothesized, results aligned with other studies' findings that volatile or unpredictable adversity may be more damaging to children's adjustment than persistent (and predictable) adversity, perhaps because it requires children to regularly readjust to changing circumstances (Ackerman, Brown, & Izard, 2004; Dearing, McCartney, & Taylor, 2001).

As an alternative to the cumulative risk approach, the second study employed latent class analysis (LCA) to identify common patterns of ACEs exposure at age 5. Five distinct classes were identified: *child maltreatment, multi-domain risk, economic hardship, substance use/incarceration,* and *low adversity*. Membership in any of the first four classes, which represented exposure to one or more domains of adversity, was associated with higher odds of internalizing and externalizing problems compared to the *low adversity* group. The second study confirmed and added to the findings of a small number of studies examining common patterns of childhood adversity and their associations with child outcomes (Lanier et al., 2017; Lanza, Rhoades, Nix, & Greenberg, 2010; Oliver, Kretschmer, & Maughan, 2014). We found that latent classes demonstrated differential impacts on age 9 behavior problems, and that children in the *multi-domain risk* class, characterized by high probability of exposure to parental mental and behavioral health issues, inter-parental violence, and economic hardship,

fared the worst.

The third study transitioned from a primary focus on ACEs to a focus on whether father involvement in early childhood served as a protective factor and moderated the association between early adversity and later behavior problems. I assessed involvement by resident and nonresident biological fathers who were unmarried at the child's birth. Father involvement across ages 1, 3, and 5 was associated with fewer behavior problems at age 9, but only when the level of father involvement was high and only under conditions of low to moderate adversity. Results suggest that the interaction between father involvement and cumulative adversity followed an "overwhelming risk" pattern (Li, Nussbaum, & Richards, 2007; Luthar et al., 2000), such that protective effects were no longer experienced by children who were exposed to four or more ACEs. Only a small number of children (n=80) were exposed to high father involvement *and* high ACEs in early childhood. In these cases, it is possible that the number of ACEs was high in part because of negative behaviors by the father (e.g., child maltreatment, substance use), suggesting that the father involvement measure may not consistently distinguish between positive (protective) involvement and harmful involvement.

Adjusting for proximate (age 9) father involvement did not substantially alter the association between early father involvement and age 9 behavior problems. However, children whose fathers showed no/some involvement in early childhood but high involvement at age 9 demonstrated fewer internalizing and externalizing behavior problems. Although further research is needed to replicate the finding, it suggests that fathers who were not consistently and positively involved when their children were young could still positively re-engage later and promote children's behavioral wellbeing. The third study's results align

with findings from qualitative research that point to the dynamic nature of father involvement and family relationships more broadly. From a life course perspective, a key takeaway from both studies is the critical importance of considering risk and protective factors over time, anticipating that they will interact in complex ways that are shaped by early experiences and the current context.

Limitations and Suggestions for Future Research

The studies in this dissertation have several limitations. Non-random attrition of FFCWS participants over the course of nine years limits our ability to generalize findings to the population FFCWS was intended to study. The most disadvantaged families are the most likely to be missing from follow-up surveys (Schwartz-Soicher, Geller, & Garfinkel, 2011). As a result, families and children affected by high cumulative adversity may be underrepresented. That being said, each study's sample was diverse and relatively large, allowing each study to provide important insights into the experiences of urban children and their families. Another limitation was my primary reliance on the mother as the sole informant. One exception was the third study, which incorporated child-reported data on the child's perception of their relationship with mother and father. Using multiple informants would have enriched the dissertation and better ensured the reliability of the data.

One overarching limitation of ACEs research is the lack of consistency in how researchers define and operationalize child adversity (McLaughlin, 2016). The ACEs index used in this dissertation was adapted from the original ACE scale from the CDC/Kaiser Permanente ACE study, and from previous research utilizing FFCWS data (Hunt, Slack, & Berger, 2016; Jimenez et al., 2016; Suglia, Duarte, Chambers, & Boynton-Jarrett, 2012). I attempted to capture early childhood family and social risk factors that have been linked with

internalizing and externalizing problems (e.g., Dearing et al., 2006; Font & Berger, 2015; Turney, 2011). However, there is a need for a more consistent definition of childhood adversity that can be used across different studies. Further, the field would be well served by further development and testing of instruments to measure childhood adversity, not just for research purposes, but also for practitioners (e.g., pediatricians, mental health professionals, school personnel) to use as screening tools.

Although the dissertation capitalized on the prospective design of FFCWS and the rich data collected in surveys administered over a period of 9 years, the three studies did not employ more advanced statistical methods (e.g., mixed modeling, latent transition analysis) that might have better captured the time-varying relationships between variables (Jackson, 2015). Future studies using growth curve modeling might offer a valuable extension to the first study in this dissertation, allowing a more detailed examination of the timing, duration, and interplay of adversity and child behavior problems. Building on the second study, latent transition analysis might help in examining how classes of adversity and/or individuals' class membership change over time, and how or whether transitions between classes are associated with behavioral outcomes. Mixed modeling could help extend the findings of the third study, illuminating how father involvement, residential status, child adversity, and child behavior problems interacted with and/or influenced each other over time.

Implications for Policy and Practice

The findings of this dissertation reinforce the significance of early childhood adverse experiences in shaping future health. The results show that various aspects of ACEs (accumulation, timing/duration, how they were configured, and how ACEs interacted with potential resources) were associated with internalizing and externalizing behavior problems

at age 9. As research on ACEs has proliferated over the past two decades, there is growing recognition that "ACE-related mental health, behavioral, and social problems among parents become ACE[s] for the next generation" (Larkin, Shields, & Anda, 2012, p. 286). The costs of this intergenerational transmission of adversity are high.

As awareness of ACEs continues to spread, there are new opportunities to influence a paradigm shift in health-related policies: "The fact that ACE exposure is predictive for the very conditions that are known to drive health care expense, now offers child advocates a chance to change the argument about resource distribution" (Grimes, 2017, p. S18). While research findings on ACEs have influenced the discourse on policies related to the health and wellbeing of individuals and families, much work remains. As family and health scholars we have the tools to recommend, evaluate, and improve policies and practices that will interrupt the accumulation of ACEs across lifetimes and generations. Below, I highlight research-based recommendations for reducing and preventing ACEs.

Expansion of Early Intervention Efforts

This dissertation contributes to the evidence that exposure to adversity in early childhood is harmful to development. An obvious implication is that we must attend to and invest in children's early environments, from the prenatal period to pre-kindergarten (Beckmann, 2017). One evidence-based intervention is the Nurse-Family Partnership (NFP), a home visiting program for low-income and first-time mothers, many of them teen mothers (Olds, 2008). Longitudinal evaluations of NFP have found positive effects including fewer emergency department visits, reductions in child abuse and neglect, less maternal substance use, and fewer mother-reported child behavior problems at the 15-year follow-up (Olds, 2006). Head Start and Early Head Start are examples of interventions designed to mitigate

family and social risks among low-income families by improving children's school-readiness and by connecting families to programming and other resources (Beckmann, 2017). These two-generation programs, which simultaneously provide support to parents and children, have shown effectiveness for young children in families facing significant adversity (Shonkoff, 2007).

Because the above mentioned and similar interventions target at-risk families specifically, they are limited in their ability to create systemic changes that improve overall support for families. Moreover, these programs are subject to budget reductions that impact their already limited reach. Alternatively, policies that provide universal benefits, such as paid family leave, could have more widespread and longer-lasting effects in terms of easing burdens on families and shifting cultural norms. Most industrialized countries have laws that allow an extended leave that is job-protected and at least partially paid (Berger, Hill, & Waldfogel, 2005), and many of them also offer paid paternity leave. The U.S. is one of the only industrialized countries in the world without such a national policy (Addati, Cassirer, & Gilchrist, 2014). There is emerging evidence that paid leave after the birth of a child reduces parental stress, promotes healthier parent-child relationships, increases breastfeeding and immunization rates, and reduces behavior problems of young children (Berger et al., 2005; Isaacs, Healy, & Peters, 2017). Further, evidence from states that have passed paid family leave policies, including California and New Jersey, suggests that disadvantaged families benefit the most; mothers experience less financial hardship when leaving a job to care for a child, and they spend less time looking for work after childbirth (Isaacs et al., 2017). Passage of such policies would provide more support for parents and, perhaps more importantly, signal a cultural shift towards valuing and intentionally caring for families.

Translation of Life Course Theory into Health Care Practice

In spite of growing recognition of the reciprocal influence that parents' and children's wellbeing have on each other, the health care system is primarily individually focused. In addition, even though the mind-body connection has been well established (Muehrer, 2002), the U.S. health care system remains dichotomized between psychological and physical wellbeing. As the ACEs literature makes clear, the complex and varied needs of U.S. families require a coordinated, comprehensive, and integrated approach to health care. One promising policy response is the family-centered medical home (FCMH) model, which has the potential to put into practice several key principles of the life course theory: 1) attending to the health of the whole person, 2) providing care for the whole family over time, and 3) addressing contextual (e.g., social and economic) factors that affect family wellbeing (Cheng & Solomon, 2014).

Although medical providers reportedly agree that having a medical home improves patient care, surveys suggest that many family physicians and pediatricians believe they lack the personnel, time, and skills needed to implement coordinated care (American Academy of Pediatrics, 2016). Pediatricians recognize the benefits of addressing the needs of the whole family, and yet fewer than half of pediatricians report screening for maternal depression (Kerker, Storfer-Isser, Stein, et al., 2016) or inquiring about parental ACEs (Kerker, Storfer-Isser, Szilagyi, et al., 2016). Moreover, one study of pediatric practices found there was no association between having on-site mental health professionals and increased likelihood that pediatricians would identify, treat, or refer children with a common child mental health problem (McCue Horwitz et al., 2016). ACEs research has generated knowledge and awareness, however, a paradigm shift will be needed to break down siloes and encourage

personnel in health care and a host of other sectors to let go of "the way it's always been."

Conclusion

No doubt, there will be barriers to implementing on a large scale the research-supported interventions for combating ACEs. Currently, funding for programs vital to low-income populations is at risk. The future of the ACA is in question, and even under the ACA the health care system is ill-equipped to fund and expand integrated, family-centered care. The fact that there are obstacles, however, does not diminish the urgency of the situation. This dissertation adds to a body of research that stresses the importance of parental mental and behavioral health, safe family relationships, and economic security in cultivating healthy child development. If we choose not to invest in the systems needed to break the chain of adversity, we are ultimately choosing to "pay (more) later" (Grimes, 2017) to maintain a broken system.

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