8-11-2015 12:00 AM

Children's Mental Health over the Early Life Course: The Impact of Economic Resources, Neighborhood Disorder, and Family Processes

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

CHILDREN'S MENTAL HEALTH OVER THE EARLY LIFE COURSE: THE IMPACT OF ECONOMIC RESOURCES, NEIGHBORHOOD DISORDER, AND FAMILY PROCESSES

(Thesis format: Integrated Article)

by

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Graduate Program in Sociology

A thesis submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

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Abstract

Drawing upon a stress process and life course framework, and using data from the Child Supplement of the National Longitudinal Survey of Youth, the three papers presented in this dissertation examine the extent to which economic resources, neighborhood disorder, and family processes influence children's trajectories of mental health.

In the first paper, I empirically construct six categories that represent children with comparable profiles of family income over time: increasing, decreasing, fluctuating, and stability across low-, medium-, and high-income families. The income categories are incorporated in multiple group latent growth curve models to assess the extent to which they initiate and shape children's mental health trajectories from age 4 to 14. Results reveal significant disparities in antisocial behavior and depression/anxiety at age 4 and over time across the income categories.

In the second paper, I use these income categories to examine how stability and change in family income influences trajectories of maternal emotional support and the provision of cognitive stimulation in children's home environments. In subsequent analyses, I examine the extent to which these different economic profiles moderate the relationship between family processes and children's mental health trajectories.

In the third and final paper, I examine the relationship between stability and change in perceived neighborhood disorder and children's trajectories of mental health. I conceptualize perceived neighborhood disorder as a two-part process involving a binary component that distinguishes between children exposed to minimal vs. high levels of disorder, and a continuous component that represents the actual level of disorder for children in the latter category. These two processes capture stability and change in neighborhood disorder over time, and are included in parallel process latent growth models to examine their separate and distinct impact on children's trajectories of mental health.

The results from these papers underscore that the duration and sequencing of socioeconomic status, both at the family and neighborhood level, have important implications for children's mental health and family processes. The results also underscore the complex and dynamic ways family processes influence children's mental health under different economic contexts.

Keywords: Children's Mental Health, Income Trajectories, Neighborhood Disorder, Families Processes, Stress Process, Life Course, Latent Growth Modeling

Acknowledgments

I would like to express my most sincere gratitude to Bill Avison, Andrea Willson, and Piotr Wilk for their support and encouragement, and for being amazing mentors and friends.

Thanks also to my colleagues for the inspiring discussions, friendship, and support while writing this thesis.

Much love and gratitude to Jesse and my parents for their ongoing support, and for encouraging me to follow my dreams.

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Chapter 1

1 Introduction

1.1 Socioeconomic Status and Children's Mental Health

Recent census data indicate that nearly 22 percent of American children under the age of 18 live in poverty (Denavas-Walt et al. 2013). In Canada, the corresponding rate of poverty for children between the ages of 5 and 24 is 11 percent (Statistics Canada 2009). Research shows that these children will experience different patterns of poverty over their lives: some will remain poor, and others will move up the social ladder (Wagmiller et al. 2006; McLeod and Shanahan 1996; Strohschein 2005). Among the children who are not poor, some may drift down the social hierarchy, but it is likely that many will remain affluent throughout their lives.

These different patterns of economic resources have important implications for children's mental health. Research consistently shows that families living in poverty lack access to resources and services, which ultimately contribute to children's mental health problems (Bradley and Corwyn 2002). In contrast, families with greater financial security are able to provide children with enriching home environments and opportunities that promote their well-being and development (Linver et al. 2002). Thus, there is substantial evidence that rates of depression, anxiety, and antisocial behavior are disproportionally higher among children living in poverty, and that increases in economic circumstances are associated with mental health benefits (Duncan, Brooks-Gunn, and Klebanov 1994; McLeod and Shanahan 1996; Strohschein 2005).

In addition, socioeconomic status permeates multiple levels of society, and encompasses the larger environmental context in which children live. For example, poor children are more likely to live in disordered neighborhoods, which increases their exposure to various environmental hazards, including crime, violence, and deteriorating infrastructure (Aneshensel 2010). These neighborhood characteristics may lead children

to feel their safety is compromised, which undermines their mental health and fosters the development of behavioral problems. Increasingly, studies demonstrate that children experience different patterns of exposure to neighborhood disorder throughout their lives. Some will relocate to more affluent neighborhoods and others will not. These different residential histories also have important consequences for children's mental health (Wheaton and Clarke 2003; Kling et al. 2007).

Given the consistent link between children's well-being and their economic circumstances, whether at the family- or neighborhood-level, a wide body of literature focuses on identifying the mechanisms through which socioeconomic status influences children's outcomes. In particular, studies indicate that economic circumstances influence children's mental health indirectly through family processes, such as the quality of the home environment and parenting behaviors (Conger et al. 2010). Furthermore, an emerging body of literature suggests that children's varying economic profiles over time may have important implications for family processes and their impact on children's mental health (Wills et al. 1995; Mistry et al. 2004).

Over the past two decades, the theoretical and methodological advances in research on socioeconomic status and children's well-being have been considerable. In particular, a growing number of studies situate the relationship between socioeconomic status and children's mental health within a stress process and life course framework (Avison 2010). Also working from this perspective, there has been a substantial increase in the amount of research that considers the extent to which neighborhood-level socioeconomic status influences children's mental health (Wheaton and Clarke 2003). These studies focus on long-term patterns of continuity and change over time, and how these different temporal patterns in economic disadvantage impact the progression of children's trajectories of mental health. Furthermore, the family stress and investment models have been developed to better understand the direct and indirect effects of socioeconomic status on children's mental health (Conger et al. 2010).

My dissertation incorporates stress process theory within a life course framework to better understand the link between family- and neighborhood-level socioeconomic status and children's mental health. In particular, I focus on conceptualizing and measuring stability and change in family income and neighborhood disorder, and assessing their distinct impact on children's trajectories of mental health over the early life course. Drawing upon the family stress and investment models, I also examine the extent to which stability and change in socioeconomic status is associated with the quality of parent-child relationships and children's home environments, and whether different economic contexts influence the relationship between these family processes and children's mental health.

1.2 Theoretical Frameworks

The stress process model posits that disparities in psychological distress emerge out of social structural inequalities, with individuals in more disadvantaged positions being exposed to a greater amount of stressors that undermine mental health (Pearlin 1989). When integrated within a life course framework, the stress process model emphasizes that exposure to stress over time may vary in relation to changes in social status (Pearlin et al. 2005). In particular, a life course perspective emphasizes that the timing, duration, and sequencing of stressful events have important implications for their impact of individual mental health and well-being. For example, Pearlin (1989) distinguished between chronic stressors, such as long-term economic disadvantage, and life events, which are more episodic in nature. In this regard, previous research demonstrates that persistent poverty is more detrimental to children's development than intermittent periods of poverty (McLeod and Shanahan 1996).

A stress process and life course framework has also been used to understand the link between neighborhood disorder and mental health (Wheaton and Clarke 2003). This line of research emphasizes that social inequality operates within and across various levels of society, and that environmental contexts may be a significant source of stress in children's lives (Aneshensel 2010). Furthermore, research demonstrates that the timing,

duration, and sequencing of neighborhood disorder influence the way it is experienced and its impact on children. Similar to economic disadvantage, persistent exposure to neighborhood disorder has a more pronounced impact than short-term exposure (Schonberg and Shaw 2007), and relocation to a more affluent neighborhood is associated with improved mental health (Kling et al. 2007). Finally, research also demonstrates that exposure to neighborhood disorder in childhood has an enduring impact on mental health over the life course (Wheaton and Clarke 2003).

The family stress and family investment models draw attention to the pathways through which socioeconomic status influences children's mental health (Conger et al. 2010). These conceptual models point to family processes as key factors that account for the relationship between socioeconomic status and children's mental health, and contend that supportive and nurturing parenting, along with the provision of stimulating experiences, promote children's cognitive and emotional well-being. Whereas the family stress model emphasizes the role of family processes in the lives of economically disadvantaged children, the family investment model provides the framework for understanding the role of family processes for children with greater economic resources. More recently, the family stress and investment models have been integrated to better understand the mental health of children with different profiles of economic resources throughout their lives (Yeung et al. 2002; Gershoff et al 2007).

1.3 Methodological Considerations

The growing interest in long-term processes that generate mental health disparities in children has led to substantial improvements in the way in which socioeconomic status at the family- and neighborhood-level is conceptualized and measured, particularly as it relates to stability and change over the course of children's lives. Recognizing the limitations of cross-sectional research for understanding these processes, an increasing number of studies draw upon panel data and use longitudinal techniques to understand the interdependent relationship between socioeconomic status and children's mental health that unfolds over time.

In particular, there are numerous studies that use the Child Supplement of the National Longitudinal Survey of Youth (NLSY-CS; Centre for Human Resource Research 2009) to explore the link between economic inequality and children's mental health, both at the family-level (McLeod and Shanahan 1996; Strohschein 2005) and the neighborhood-level (Chase-Lansdale et al. 1997). This nationally representative sample of mothers and their children is a rich source of data on family income, perceived neighborhood disorder, children's mental health problems, and family processes, including the quality of children's home environments and maternal emotional support. All three papers presented in this dissertation use data from NLSY-CS.

In addition, the growing awareness that the impact of economic disadvantage and neighborhood disorder on children's mental health varies in relation to when and how long it is experienced have led researchers to develop a variety of methodological techniques that capture the dynamic character of these constructs (Wagmiller et al. 2006; McLeod and Shanahan 1996; Strohschein 2005). My dissertation contributes to these methodological advancements by demonstrating innovative approaches to measuring stability and change in family income and perceived neighborhood disorder. In addition, I advance previous research through the use latent growth curve modeling, which provides an opportunity to demonstrate the extent to which temporal patterns in economic circumstances and exposure to neighborhood disorder initiate and shape children's mental health problems as they age, rather than only at a single point in time.

1.4 Overview of the Dissertation

In the second chapter of my dissertation, I provide a detailed description of the NLSY-CS, which focuses on the composition of the sample, missing data and attrition over the course of the survey, and the procedures used to select cases for inclusion in the analyses. I also provide a general discussion of latent growth curve modeling that is relevant to all three papers in my dissertation. The purpose of the methodology chapter is to provide the reader with a clear and comprehensive overview of the data and analytical

techniques used in my dissertation, and to avoid repeating this information in all three papers.

The first empirical paper in this dissertation focuses on the relationship between temporal patterns in family income and children's mental health. In particular, I construct six categories that represent children with comparable profiles of family income over time: increasing, decreasing, fluctuating, and stability across low-, medium-, and high-income families. The income categories are incorporated in multiple group latent growth curve models to assess the extent to which they initiate and shape children's mental health trajectories from age 4 to 14. Results reveal significant disparities in antisocial behavior and depression/anxiety at age 4 and over time across the income categories, which sets the stage for the second paper in this dissertation.

In the second paper of my dissertation, I extend the first paper in two ways. First, using the categories that represent children's profiles of family income over the early life course, and multiple group latent growth modeling, I examine how stability and change in family income influences trajectories of maternal emotional support and the provision of cognitive stimulation in children's home environments. In subsequent analyses, I examine whether the relationship between family processes and children's mental health trajectories varies across the different income categories. The results underscore the complex and dynamic ways family processes influence children's mental health in different economic contexts.

In the third and final paper of my dissertation, I consider the extent to which stability and change in perceived neighborhood disorder is associated with children's trajectories of mental health. I conceptualize perceived neighborhood disorder as a two-part process involving a binary component that distinguishes between children exposed to minimal vs. high levels of disorder, and a continuous component that represents the actual level of disorder for children in the latter category. Theoretically, these two processes have a highly meaningful interpretation: the binary component captures stability in children's exposure to neighborhood disorder over time, whereas the

continuous component captures change in exposure to neighborhood disorder over time. These two processes are included in parallel process latent growth models to examine their separate and distinct impact on children's trajectories of mental health. The results emphasize that the timing and duration of perceived neighborhood disorder has important consequences for children's mental health.

The final chapter of my dissertation synthesizes the results from all three papers, identifying their strengths and contributions to the literature on children's mental health. Although I present limitations that are specific to each paper in their respective chapters, I also discuss limitations that are relevant to all three papers in the concluding chapter. Finally, I suggest opportunities for future research that build on the results from these papers.

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Chapter 2

2 Data and Methodology

2.1 National Longitudinal Survey of Youth – Child Supplement

The National Longitudinal Survey of Youth (NLSY79) consists of a nationally representative sample of 12,686 men and women who were interviewed annually since 1979, and biennially after 1994 (Centre for Human Resource Research 2009). At the initial interview, these men and women were between the ages of 14 and 22. Beginning in 1986, the Child Supplement of the National Longitudinal Survey of Youth (NLSY-CS) was initiated to follow children born to women who participated in the NLSY79. From 1986 to 2010, 11,504 children were interviewed biennially across 13 measurement occasions. Children were eligible to participate in the NLSY-CS from birth until 14 years of age. Thus, the NLSY-CS sample is continuously changing with children entering and subsequently leaving the survey at various measurement occasions. At the initial interview, the children were between 0 and 23 years of age, and as of 2010, the children ranged in age from 0 to 38. Starting in 1994, a separate survey for children aged 15 and over was introduced, which by 2010, consisted of 6,102 young adults. The data from the NLSY79 and NLSY-CS were merged by linking the mothers to their children using a common ID variable.

The NLSY79 mothers were between the ages of 21 and 29 in 1986, and over 95% had reached the end of their childbearing years by 2010 (Center for Human Resource Research 2009). The heterogeneity of the child sample has increased over the course of the NLSY-CS. For example, whereas a large proportion of children were born to adolescent mothers in the early survey years, as of 2010, 89% of the NLSY-CS sample consisted of children born to women over the age of 20. The socioeconomic composition of the sample reflects this shift in mother's age at childbirth, with increasing numbers of children being born in middle-class households over time. Therefore, the NLSY-CS is not a nationally representative sample of American children; rather, the sample is representative of the children born to the original cohort of NLSY79 women.

2.2 Missing Data

Missing data in the NLSY-CS is from various sources: non-response to specific items in a given survey year, sample attrition over time, and the discontinuation of specific oversamples due to budget constraints. To the extent that non-respondents and attritors are more or less likely to have particular attributes or traits related to a given variable, the value of this variable based only on respondent data might differ from that based on the total sample (Allison 2002). In the following discussion, I explain how and when I address problems with missing data in the NLSY-CS.

2.2.1 Item non-response

With respect to item non-response, latent growth curve modeling addresses missing data in complex samples through Maximum Likelihood estimation with robust standard errors (Muthén and Muthén 2012). Maximum likelihood is an iterative procedure whereby information on all available data is used to estimate growth parameters that "maximize" the probability of obtaining the observed frequencies from the sample data (Allison 2002). In every successive iteration, a random term is incorporated to adjust for any underestimation of the variances that may occur in standard imputation approaches. Furthermore, the standard errors are computed with a sandwich estimator to adjust for the non-independence of observations due to the presence of siblings in the dataset (White 1982).

2.2.2 Attrition

With respect to attrition, the NLSY79 and NLSY-CS have retained a large proportion of respondents over time (Aughinbaugh 2004). For example, prior to 1986, 2 percent of women in the NLSY79 were lost to attrition. These women have higher rates of early marriage and pregnancy. By 2000, approximately 17 percent of women were lost to attrition. Women who participated continuously in the survey have higher household incomes, but do not differ from women who missed one or more interviews with respect

to marital status, number of children, educational attainment, or the frequency of poverty. Among mothers who were interviewed from 1986 to 2000, 5 to 10 percent of their children were not assessed. Children who never missed a survey round have higher scores on the Peabody Pictorial Vocabulary Test (PPVT). However, compared to children who missed one or more interviews, children who participated continuously in the survey have similar scores on the Behavioral Problems Index (BPI), and do not differ with respect to household income from birth to age 3, mother's education, employment, or marital status.

Nonrandom attrition may introduce bias in longitudinal studies because those who discontinue participation may be more disadvantaged. As a result, it may appear that mental health improves over time because the sample is composed of individuals who are doing relatively well. Thus, the analyses may underestimate the relationship between socioeconomic status and children's mental health trajectories. Given that women who attrite prior to 1986 were more likely to be young mothers, attrition prior to the introduction of the child supplement may be more likely to bias estimates than attrition that occurs afterward. However, Aughinbaugh (2004) concludes that because there are relatively few children who attrite over the course of the NLSY-CS, and because the effect of income and maternal employment on BPI and PPVT scores does not differ between children who never missed an interview and those who attrite, the impact of attrition over the course of the NLSY-CS is likely very modest.

Finally, the original NLSY cohort included an oversample of economically disadvantaged Caucasians (N=1,327) that was discontinued in 1990, and a military oversample (n=418) that was discontinued in 1984. In 2000, 38% of an African-American and Hispanic oversample (N=584) included in the Child Supplement were dropped, but later restored in 2002. These oversamples are not included in the analyses.

2.2.3 Sample Weights

The U.S. Census Bureau provides an automated computation procedure that allows users to create a custom set of weights for longitudinal analyses. Children who

were not interviewed in a given survey year are assigned a weight of zero. For interviewed children, their weight corresponds to their mother's weight multiplied by the number of children her child represents. The latter is determined by the number of children who were known to have missed an interview, along with an estimate of the number of children born to mothers who attrite from the study. This estimate is based on the number and ages of children reported by mothers of the same race who were interviewed in the survey year in which the attrited mother was last interviewed. Given that the composition of NLSY-CS changes over time as children enter and leave the study, the U.S. Census Bureau suggests that users should exercise caution when comparing weighted estimates across survey years. Therefore, I performed the analyses with and without sampling weights, and only modest differences were observed in the results. All descriptive analyses were weighted to adjust for the over representation of minority children in the sample as well as attrition that occurred over the course of the NLSY-CS. However, the latent growth models were not weighted because the sampling weights are a function of independent variables included in the models, such as race, thereby producing unbiased coefficients and standard errors (Winship and Radbill 1994).

2.3 Selecting Cases for Inclusion in the Analyses for Papers 1 and 2

Table 2.1 (Appendix) illustrates the structure of the NLSY-CS data from 1986 to 2010 by children's birth cohort. The information in the table represents children's age at each measurement occasion, and the bold entries in the shaded rows denote children who were included in the current analyses. The "x" indicates that children were not assessed in a given survey year. Inclusion of a child in the analyses is based on a combination of wave of assessment and birth year. Given that children were eligible for the mental health assessments between the ages of 4 and 14, and to ensure that children had the potential to complete all survey rounds in which they were eligible between 1986 and 2010 (i.e. at ages 4, 6, 8, 10, 12, and 14), the analyses were restricted to children born every other year between 1982 and 1996. Only children with at least three waves of data were included in the analyses, resulting in a sample size of 2,680.

Given that children entered the study in different years, and given that there is age heterogeneity within each measurement occasion, the data were restructured using a synthetic cohort approach so that chronological age represents the metric of time instead of wave of assessment (Bollen and Curran 2006). Age heterogeneity within study waves can introduce bias in latent growth curve models because the estimated growth parameters at each time point may vary across cohorts (Mehta and West 2000). By pooling children together into specific age groups so that they are the same age at the first and all subsequent measurement occasions, a common developmental trajectory can be estimated. Table 2.2 (Appendix) illustrates the restructured data, with the columns now representing children's age, and the information in the table representing the survey years. The bold entries in the shaded rows denote the waves of assessment that correspond to children's age for a specific cohort. It is these measurement occasions that were included in the analyses.

2.4 Latent Growth Curve Modeling

I use latent growth curve modeling in all three of the papers presented in this dissertation (Bollen and Curran 2006). In this type of analysis, a linear trajectory is defined by a latent intercept and slope that represent the underlying growth process across the observations points. The intercept is interpreted as the average starting value or point of origin. The slope is interpreted as the average rate of change for every unit increase in time. Non-linear trajectories are modeled with the inclusion of a squared time variable. Latent growth curve models also include a disturbance at each time point that represents individual variation around the mean values of the growth parameters. The measurement part of the model, which demonstrates how the intercept, slope, and quadratic growth parameters are estimated, is expressed as follows:

$$y_{it} = \eta_{0i} + \eta_{1i}x_t + \eta_{2i}x_t^2 + \varepsilon_{ti}$$

where the subscript i represents individuals and the subscript t represents time scores. Thus, y represents the outcome in terms of a trajectory for individual i at time t, η_{0i} the

random intercept specific to individual i, η_{1i} the random slope specific to individual i, η_{2i} a random quadratic term specific to individual i, x_t and x_t^2 the time variables, and ε_{ti} the disturbance that is distinct to individual i at time t. In the structural part of the model, the intercepts and slopes of the measurement model are treated as dependent variables to be predicted by covariates. The intercept, slope, and quadratic equations are expressed as follows:

$$\eta_{0i} = \alpha_0 + \gamma_0 w_i + \zeta_{0i}$$
$$\eta_{1i} = \alpha_1 + \gamma_1 w_i + \zeta_{1i}$$
$$\eta_{2i} = \alpha_2 + \gamma_2 w_i + \zeta_{2i}$$

In the intercept equation, η_{0i} is predicted by the mean intercept across all cases α_0, a time-invariant covariate w_i, and a disturbance ζ_{0i}. In the slope equation, η_{1i} is predicted by the mean slope across all cases α_1, a time-invariant covariate w_i, and a disturbance ζ_{1i}. In the quadratic equation, η_{2i} is predicted by the mean quadratic term across all cases α_2, a time-invariant covariate w_i, and a disturbance ζ_{2i}. To include time-varying covariates, the measurement part of the model is expressed as follows:

$$y_{it} = \eta_{0i} + \eta_{1i} x_t + \eta_{2i} x_t^2 + k_t w_{ti} + \varepsilon_{ti}$$

where $k_t w_{ti}$ denotes the influence of time on the covariate w for individual i. The structural part of the model remains the same because the time-varying covariates vary across time, not individuals.

2.5 Testing for Cohort Effects

After restructuring the data, the first step in the analyses involved testing for cohort effects to determine whether it is appropriate to assume that children in a given age group are similar despite being born to different cohorts (Bollen and Curran 2006). The "age by cohort interaction effect" may present a threat to valid inference as a result of differences across cohorts with respect to demographic background and historical

influences (Mehta and West 2000; Miyazaki and Raudenbush 2000). To the extent that such age-cohort effects are present in the data, the estimated growth parameters would reflect the combined influence of within-individual and between-individual differences in change over time.

Multiple group analyses were used to assess whether trajectories of depression and antisocial behavior differed as a function of birth cohort. In this type of analysis, a separate trajectory is estimated for each cohort, and the trajectories are compared to determine if they are significantly different (Miyazaki and Raudenbush 2000). Two models were estimated: one in which the intercepts, residual variances and covariances were free to be estimated, and another nested model in which they were constrained to be equal. The first model implies that the cohorts follow different trajectories, whereas the second model implies that trajectories are similar across cohorts. The models were then compared using the Satorra-Bentler scaled chi-square difference test, which divides the chi-square statistic by a scaling correction to account for non-normality and non-independence (Satorra and Bentler 1999). A significant chi-square difference value indicates that imposing restrictions to the comparison model would result in a reduction of the model fit.

Results revealed (tables not presented, but available upon request) that trajectories of antisocial behavior are similar from 1982 to 1986, but begin to vary from 1988 onward. Furthermore, trajectories of depression/anxiety differed between the 1982 and 1986, 1988, and 1992 survey years. Given that trajectories of antisocial behavior and depression/anxiety vary significantly across cohorts, I performed the analyses with and without a variable for children's year of birth to determine if the results would differ. No significant differences were observed. Accordingly, it is unlikely that cohort effects influence the analyses presented in the papers.

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Chapter 3

3 Stability and Change in Economic Resources and Children's Trajectories of Mental Health over the Early Life Course

3.1 Introduction

Children's location in the socioeconomic hierarchy has important implications for their mental health and well-being. As children move through the social structure over time, experiencing improvements and decreases in socioeconomic status, the extent of their exposure to various social and financial resources has both immediate and enduring consequences for their emotional development. Whereas affluence offers children short- and long-term mental health benefits, studies demonstrate that children living in impoverished conditions are at increased risk for early onset of various psychopathologies, including depression, anxiety, and behavioral problems (Duncan et al. 1994; McLeod and Shanahan 1996). Early onset of mental health problems has important consequences for the recurrence and remission of symptoms over the life course. For example, adolescent-onset depression is associated with rates of recurrence among adults ranging from 40-70% (Rutter et al. 2006), yet the mechanisms through which this process operates are not well understood. Furthermore, there is some indication that children's mental health may improve in relation to increases in economic circumstances (Dearing, McCartney, Taylor 2001; Strohschein 2005); however, we know very little about how long-term patterns in socioeconomic status influence children's mental health over the early life course.

There is some indication that early onset of mental illness itself initiates and shapes continuity in trajectories over the life course (Rutter et al. 2006). This line of research contends that early adversity produces enduring changes in children's physiology that undermines their psychological development. Research from a life course and stress process framework, however, suggests that early life circumstances also influence the extent of future stress exposure (Pearlin et al. 2005). For example,

individuals who experience poverty in childhood are at increased risk for continued economic hardship over time, a process referred to in life course studies as cumulative disadvantage (Wickrama et al. 2005). Thus, continuity in mental health problems that originate in childhood may reflect an ongoing and interdependent relationship between socioeconomic adversity and psychological functioning over the life course. In addition, variation in poverty experiences and changes in economic status may alter mental health trajectories.

This study draws upon data from the Child Supplement of the National Longitudinal Survey of Youth (NLSY-CS; Centre for Human Resource Research 2009). This nationally representative sample of mothers and their children is frequently used to examine the relationship between economic resources and children's outcomes. In particular, McLeod and Shanahan's (1996) seminal research on poverty and children's mental health spawned numerous studies that sought to extend their findings, both conceptually and methodologically (Moore et al. 2002; Strohschein 2005). I contribute to this body of literature by assessing the relationship between trajectories of family income and trajectories of mental health with the goal of illustrating how stability and change in economic resources relates to the developmental course of children's mental health over the early life course.

3.2 Literature Review

3.2.1 Theoretical Perspective

The link between childhood socioeconomic status and mental health has long been of interest in the social sciences and, more recently, has received considerable attention from life course scholars (Luo and Waite 2005; Najman et al. 2010). This approach draws our attention to patterns of continuity and change that unfold over time, and treats poverty and mental health as dynamic processes rather than static constructs (McDonough and Berglund 2003). Adding a temporal dimension to socioeconomic status emphasizes the duration and sequencing of exposure to poverty, and highlights variation

in the experience and consequences of economic disadvantage. Studies demonstrate substantial heterogeneity in children's exposure to economic disadvantage over time: no economic disadvantage; increasing economic disadvantage; decreasing economic disadvantage; continuous economic disadvantage; and movement in and out of economic disadvantage (McLeod and Shanahan 1996; Moore et al. 2002; Wagmiller et al. 2006). The relationship between poverty and children's mental health may vary in relation to when and how long it is experienced, but temporal patterns in exposure to poverty have only recently been considered in the empirical literature.

A life course perspective also considers patterns of stability and change in mental health over time. In particular, children's mental health can be conceptualized with respect to continuity and discontinuity in symptomatology over time. The impact of poverty on children's mental health may subside in response to improvements in economic conditions (Strohschein 2005), may continue to escalate alongside declining economic conditions (Luo and Waite 2002), or they may persist over time despite improvement in economic conditions (McDonough and Berglund 2003). A life course perspective thus emphasizes that variation in exposure to economic disadvantage may influence the onset of children's mental health problems and the progression of their symptoms over time.

In this way, a life course perspective can improve our understanding of the dynamic relationship between socioeconomic status and mental health. The experience and consequences of poverty are not uniform across individuals or time, yet economic disadvantage is typically operationalized in a way that ignores this diversity (Wagmiller et al. 2006). For example, in a review of the literature on poverty and children's outcomes, Brooks-Gunn and Duncan (1997) highlight the limitations of measuring economic circumstances based on household income observed at a single measurement occasion. Individuals with the same income at the time of interview may have very different poverty histories that influence the risk for mental health problems. Thus, this approach may underestimate the impact of poverty on children depending on the point in time in which income is measured. As the authors conclude, the impact of economic

disadvantage on children's outcomes is more pronounced in studies that consider the duration of poverty compared to studies in which poverty is assessed at a single observation point.

In this regard, Wagmiller et al. (2006) highlight various approaches that have been developed to capture individual heterogeneity in exposure to poverty, yet they also ignore important differences in the experience and consequences of economic disadvantage. For example, "permanent poverty measures," which represent a family's average household income over a given time period, obscure fluctuations in income over time, and do not examine the length of time in which children are exposed to poverty. Alternatively, "cumulative poverty measures" represent the length of time or the number of years that define children's experience of poverty. However, this approach makes it difficult to differentiate between improving and declining economic circumstances.

Although the duration and sequencing of economic disadvantage are relevant to the experience of poverty and children's mental health, to date, few studies consider these temporal patterns simultaneously. In this study, I empirically construct income categories that represent children with comparable profiles of economic resources over time. These categories are defined by mean household income level over time, amount of inter-individual variation in income over time, and the direction of change in income over time. This approach has the potential to differentiate between stability and change by identifying transitions in children's economic conditions. Furthermore, the categories distinguish between children in low-, medium-, and high- income families, thus capture the experiences of children located in various positions across the income distribution. Incorporating the income categories in multiple group latent growth curve models provides an important opportunity to understand how these temporal patterns of family income initiate and shape children's mental health trajectories.

3.2.2. Duration and Sequencing of Economic Circumstances

Studies that consider the duration of poverty emphasize that continuous exposure to economic deprivation over time is more detrimental than temporary poverty followed by periods of relief (Duncan et al. 1994; Luo and Waite 2005). Using three waves of data from the NLSY-CS, McLeod and Shanahan (1996) demonstrate that children exposed to long-term poverty have levels of antisocial behavior that increase at a greater rate than children exposed to intermittent poverty. This study uses a cumulative poverty measure to assess the number of poverty spells children have experienced. Two limitations are inherent in this approach: 1) a dichotomous poverty measure obscures the experiences of children who are exposed to economic disadvantage, but fall just above the poverty line; and 2) cumulative poverty measures do not adequately distinguish between improving and declining economic conditions. Similarly, Hao and Matsueda (2006) use 6 waves of data from the NLYS-CS to estimate the impact of a cumulative poverty measure on children's mental health. They report that early and long-term exposure to poverty has a negative impact on children's mental health, but only consider outcomes at a single observation point rather than over time. Furthermore, using nine waves of data from the NSLY-CS, D'Onofrio et al. (2009) find that low income throughout childhood is associated with conduct problems in boys. The authors average family income over time, thus are unable to capture changes in economic circumstances, and also only consider outcomes at a single point in time.

Restoring financial stability reduces exposure to stressors associated with economic hardship, which in turn may minimize symptoms of psychological distress and improve well-being (Vogt Yuan 2008; Yeung et al. 2002). In contrast, declining economic circumstances may initiate mental health problems. In this regard, research also considers how socioeconomic mobility over the life course generates health disparities. For example, using data from the NLSY-CS, Strohschein (2005) finds that children experience a decline in antisocial behavior in relation to improving economic circumstances. Similarly, Luo and Waite (2005) observe that individuals who experience improvement in economic circumstances report better adult health compared to their

counterparts who experience ongoing poverty over the life course. Furthermore, individuals who experience decreases in economic circumstances report worse health in adulthood compared to individuals exposed to persistently high socioeconomic status. Accordingly, upward mobility may offset the impact of poverty in childhood, whereas downward mobility may reduce the benefits of high socioeconomic status in childhood. The authors also find that movement out of poverty is associated with greater health advantages than persistently high socioeconomic status. This is consistent with previous studies that demonstrate income increases have greater health benefits for children who are initially poor, but have very little impact on children who start off in an advantaged position (Dearing et al. 2001). Luo and Waite determine upward and downward mobility by comparing socioeconomic status in childhood and adulthood, and only consider health outcomes at a single point in time. Accordingly, the relationship between long-term processes of stability and change in income and the development of mental health problems over time requires additional research.

Using three waves of data from the NLSY-CS, Moore and colleagues (2002) demonstrate that children who are continuous recipients of welfare are similar to children who are never exposed to economic disadvantage. It may be that low-income families become accustomed to living in poverty and adjust their spending patterns accordingly, thus are relatively unaffected by financial strain. In contrast, the authors demonstrate that transitions in and out of poverty may have the greatest negative influence on children's outcomes. Moore et al. (2002) assess economic instability for families receiving welfare; yet, it may be that fluctuating circumstances have consequences for children situated in various locations across the income continuum. In addition, the extent to which income instability influences the developmental course of mental health problems, rather than at a single point in time, is unclear.

3.2.3. Children's Mental Health

Previous research documents differences in the time of onset and the shape of developmental trajectories for children's depression/anxiety and antisocial behavior. For

example, in a study of the normative development of internalizing and externalizing behaviors from childhood to late adolescence, Bongers et al. (2003) observe that symptoms of depression and anxiety are generally lowest in childhood, peak in adolescence, and begin to stabilize thereafter. In contrast, the authors find that normative trajectories vary for different dimensions of antisocial behavior. In particular, aggression follows a linear trajectory, with problem behaviors steadily declining from childhood to adolescence. In contrast, delinquent behavior follows a curvilinear trajectory: symptoms are high in childhood, begin to decrease in adolescence, and subsequently increase again in young adulthood.

3.2.4. Maternal Characteristics

Educational attainment is strongly associated with occupational status and household income. Furthermore, parental education may play an important role in children's well-being independently of income (Conger and Donnellan 2007). For example, better-educated parents have traits and attributes, such as more knowledge about parenting practices, and better communication and problem-solving skills, that promote optimal development in children. Thus, research assessing the association between economic disadvantage and children's mental health outcomes must consider parental education as an important determinant of both income and mental health trajectories.

Children living with a single parent often experience a decrease in economic resources following divorce (Amato 2010). Furthermore, research demonstrates that single mothers experiencing considerable financial strain are at increased risk for depressive disorders (Avison et al. 2007). Maternal depression may compromise the quality of parent-child relationships and expose children to harsh and inconsistent discipline, all of which undermine mental health (Carlson and Corcoran 2001). In this way, family structure is strongly associated with both household income and children's well-being, and constitutes an important control in studies analyzing the association between economic disadvantage and children's mental health.

3.2.5. Research Questions

In summary, a life course perspective draws our attention to long-term patterns of stability and change and elucidates the interdependent relationship between economic conditions and mental health that unfolds over time. Although previous research examines the association between temporal patterns in family income and children's outcomes at a single point in time, few studies to date have used analytical techniques that examine the extent to which these income patterns influence the developmental course of children's mental health. This study incorporates empirically constructed income categories in multiple group latent growth curve models. This approach considers the duration and sequencing of children's economic circumstances, and how these temporal patterns influence children's trajectories of mental health. Within this framework, this study addresses the following questions:

1) To what extent do increases, decreases, and fluctuations in economic circumstances, and stable economic circumstances across low-, middle-, and high- income families influence children's mental health trajectories?

2) Does the impact of these temporal patterns in family income on children's mental health trajectories vary for antisocial behavior and depression/anxiety?

3.3 Data and Methods

3.3.1 Sample

The National Longitudinal Survey of Youth (NLSY79) consists of a nationally representative sample of 12,686 men and women who were between the ages of 14 and 22 at their initial interview in 1979 (Centre for Human Resource Research 2009). Beginning in 1986, the Child Supplement of the National Longitudinal Survey of Youth (NLSY-CS) was initiated to follow children born to women who participated in the

NLSY79. From 1986 to 2010, 11,504 children were interviewed biennially across 13 measurement occasions.

Inclusion of a child in the analyses was based on a combination of wave of assessment and birth year. Given that children were eligible for the mental health assessments between the ages of 4 and 14, and to ensure that children had the potential to complete all survey rounds in which they were eligible between 1986 and 2010 (i.e. at ages 4, 6, 8, 10, 12, and 14), the analyses were restricted to children born every other year between 1982 and 1996. Only children with at least three waves of valid data were included in the analyses, resulting in a sample size of 2,680.

The data were restructured using a synthetic cohort approach so that chronological age represents the metric of time instead of wave of assessment (Bollen and Curran 2006; Mehta and West 2000). This approach pools children together into specific age groups, thereby allowing a common developmental trajectory to be estimated across children from age 4 to age 14.

3.3.2 Measures

Children's Mental Health – The Behavioral Problems Index (BPI; Peterson and Zill 1986) consists of 28 questions designed to measure six dimensions of children's mental health, two of which were considered in the current analyses: antisocial behavior and anxiety/depression. Items for the antisocial behavior scale include: "1) cheats or tells lies, 2) bullies or is cruel/mean to others, 3) does not seem to feel sorry after misbehaving, 4) breaks things deliberately". Items for the anxious/depressed scale include: "1) has sudden changes in mood or feeling, 2) feels/complains no one loves him/her, 3) is too fearful or anxious, 4) feels worthless or inferior, 5) is unhappy, sad, or depressed". The BPI was administered to children between the ages of 4 and 14, and mothers reported on the frequency of children's behavior problems using a three-point scale: 0) "not true," 1) "sometimes true," and 2) "often true". Items were summed to create a score ranging from 0-8 for antisocial behavior, and 0-10 for depression and

anxiety. Higher values represent greater levels of antisocial behavior and depression/anxiety. Reliability coefficients ranged across the 13 waves of data from .56 to .65 for the antisocial behavior items, and from .65 to .73 for the anxiety and depression items. The estimated reliabilities are consistent with other studies using the depression and antisocial behavior subscales (McLeod and Shanahan 1996; Strohschein 2005).

Income categories – Mothers reported total net family income in the calendar year prior to each wave of assessment. They reported income received from a variety of sources, including employment wages, farm and military income, unemployment compensation, and government assistance programs. The original codes allowed for very extreme values for the 1992 and 1996 survey years. To better align the income distributions for these two years with all other years, the maximum income coded for any respondent was capped at $100,001 in 1992 and $160,085 in 1996. These coding decisions eliminated large annual variations in total net family income that were artifacts of outlying values. Income was recoded in thousands of dollars, and also adjusted for inflation in 2010 dollars.

My operationalization of family income considers stability across low-, medium-, and high-income families, the amount of inter-individual variation in income over time, and the direction of change in income over time. The categories that represent temporal patterns in family income from age 4 to age 14 were developed in a two-part process. First, mean income values across all survey years were categorized as low, medium, or high based on the income quintiles estimated in the NLSY-CS. With the exception of the highest quintile, which is slightly lower, all of the income quintiles in the NLSY-CS closely resemble those observed in the 2010 U.S. Census (DeNavas-Walt et al. 2011). Next, using these income quintiles, 3 categories were constructed that represent stability in economic circumstances across low-, medium-, and high-income families. For example, if a child was in the lowest income quintile at age 4, and income level did not change across the measurement occasions, they were classified in the low-stable category. Second, movement across these categories was used to construct the increasing, decreasing, and fluctuating income categories. More specifically, if family income level

increased from low to medium or medium to high, and did not subsequently decrease, children were classified in the increasing category. If family income decreased from high to medium or medium to low, and did not increase again, children were categorized in the decreasing category. Furthermore, if family income fluctuated across the low-, medium-, and high-income groups over time, children were categorized in the fluctuating category. Table 3.1 presents the mean income levels and their respective standard deviations from age 4 to age 14 for each income category. The income categories are graphed in terms of trajectories in Figure 3.1.

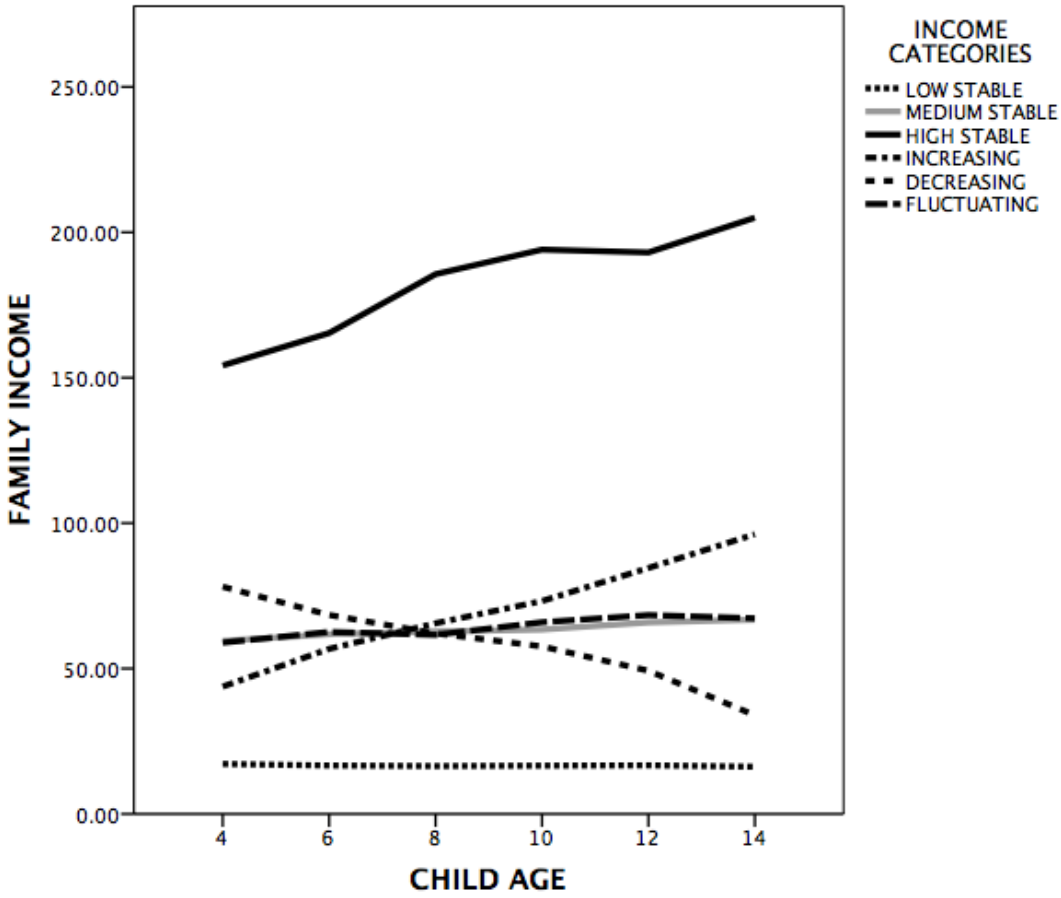
Table 3.1 Mean Income Levels (thousands of dollars) from Age 4 to Age 14 for each Income Category (n=2,680)

		Child Age in Years					
		4	**6**	**8**	**10**	**12**	**14**
Low Stable (n=616)	$\bar{X}$ (S.D.)	17.19 (9.39)	16.65 (9.11)	16.46 (9.37)	16.59 (9.62)	16.71 (9.86)	16.24 (10.34)
Medium Stable (n=327)	$\bar{X}$ (S.D.)	59.48 (11.99)	61.81 (12.42)	62.74 (13.19)	63.40 (12.21)	65.85 (12.87)	66.82 (12.85)
High Stable (n=221)	$\bar{X}$ (S.D.)	154.23 (73.22)	165.36 (87.19)	185.61 (108.52)	194.05 (110.43)	193.08 (105.94)	205.02 (116.47)
Increasing (n=524)	$\bar{X}$ (S.D.)	43.79 (26.09)	56.76 (38.33)	65.57 (48.95)	73.20 (51.61)	84.57 (59.67)	96.16 (65.45)
Decreasing (n=240)	$\bar{X}$ (S.D.)	78.13 (44.89)	68.41 (56.76)	62.09 (57.97)	57.61 (64.23)	49.24 (44.17)	33.93 (22.47)
Fluctuating (n=752)	$\bar{X}$ (S.D.)	58.91 (41.88)	62.58 (50.91)	61.57 (48.64)	65.92 (56.12)	68.38 (63.78)	67.27 (58.65)

Control variables – Two time-varying variables were included in the analyses: mothers' education and marital status. At each wave of assessment, mothers reported on the highest grade they had completed since their last interview. Responses ranged from no schooling to 8 or more years of post-secondary education. I recoded the highest grade completed score to create a binary variable representing individuals with a high school diploma or less (0) and at least some post-secondary education (1). Mothers were also asked about their marital status at each measurement occasion. Response categories

included: never married, married, separated, divorced, and widowed. The categories were collapsed to create a binary variable (0/1) representing women with and without a spouse. In addition, I controlled for the following time-invariant variables: the child's sex (0 = males; 1 = females), and the child's race (non-Black/non-Hispanic = 0; Hispanic or Black = 1).

Figure 3.1 Growth Plots of the Income Categories



3.3.3 Analytical Models

I used multiple group latent growth curve modeling in MPLUS version 7.2 (Muthén and Muthén 2012) to estimate the relationship between stability and change in family income and children's trajectories of mental health (Bollen and Curran 2006). In this type of analysis, separate trajectories of mental health are simultaneously estimated

for each income category. Each group in the analyses has distinct growth parameters and disturbance terms, which demonstrates how trajectories of mental health vary as a function of membership in one of the income categories. Furthermore, the trajectories of mental health can be compared to determine if they are significantly different.

In the first step of the analyses, I computed baseline growth models for depression/anxiety and antisocial behavior to assess the shape and fit of the trajectories in accordance with established norms for the development of internalizing and externalizing behaviors from childhood to late adolescence (Bongers et al. 2003). Furthermore, I computed separate growth models for depression/anxiety and antisocial behavior for each income category to assess the extent to which the functional form of the trajectories and variation in their growth parameters differed across the income categories. For example, whether the trajectories of mental health are linear or non-linear, and whether children vary in their initial levels of mental health problems and in the development of their mental health problems over time, may differ across the income categories.

In the second step of the analyses, I estimated multiple group latent growth models to examine the extent to which children's trajectories of mental health vary across the categories that represent heterogeneity in trajectories of family income from age 4 to age 14. Next, I compared the intercept, slope, and quadratic growth parameters of each trajectory using the Wald test of parameter constraints to determine if they are significantly different.

All of the above models control for racial background and the child's sex. In addition, maternal education and marital status were added to the models to determine whether they influence the mental health growth parameters, and only modest differences were observed. Furthermore, in some of the income groups there was minimal inter-individual variation in maternal education and marital status over time, making these variables highly correlated from one observation point to the next. Given that inclusion of maternal education and marital status in the analyses did not significantly alter the results, and given that their inclusion led to estimation problems, they were removed from

subsequent analyses. All covariates were grandmean centered to facilitate interpretation of the growth parameters. Finally, all models included a sandwich estimator to adjust for non-independence of observations due to the presence of siblings in the dataset (White 1982).

3.4 Model Building Results

To evaluate the shape and fit of children's trajectories of mental health, a series of nested growth models was estimated that differed in the number of growth parameters (i.e. linear vs. quadratic) and whether they were modeled as random or fixed effects. The models were compared using the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). With respect to antisocial behavior, a quadratic model demonstrated better fit than a linear model as demonstrated by the lower RMSEA, and higher CFI and TLI values (linear model: RMSEA = 0.031, CFI = 0.980, TLI = 0.978; quadratic model: RMSEA=0.023, CFI = 0.992, TLI = 0.988). The fit of depression/anxiety was also improved by including a quadratic term (linear model: RMSEA = 0.04, CFI = 0.965, TLI = 0.960; quadratic model: RMSEA=0.021, CFI = 0.993, TLI = 0.990).

In addition, a series of nested growth models was estimated to compare the functional form of the trajectories of mental health across the income categories. For each income category, antisocial behavior and depression/anxiety were modeled with a quadratic term. With respect to antisocial behavior, the model fit was improved in the high stable and fluctuating income categories by fixing the variance of the quadratic term. For depression/anxiety, the model fit was improved in the low stable and decreasing income categories by fixing the variance of the quadratic term. More specifically, the variance of the quadratic growth parameters in these categories was zero and not statistically significant. Furthermore, when allowing the variance of the quadratic term to be random in these categories, the latent variable covariance matrix was not positive definite and the fit statistics could not be computed. The models demonstrated good fit after fixing the variance of the quadratic terms for these income categories (antisocial

behavior: RMSEA = 0.021, CFI = 0.993, TLI = 0.990; depression/anxiety: RMSEA = 0.03, CFI = 0.985, TLI = 0.979).

3.5 Results

3.5.1 Descriptive Statistics

Table 3.2 presents descriptive statistics for children's mental health outcomes, family income, maternal education, and family structure from the time the child was age 4 to age 14. Mean levels of antisocial behavior decrease with age from 1.24 to 0.98, whereas depression/anxiety increases with age from 1.25 to 1.90. Average family income levels increase with age from $66,440 to $83,370. As children age, the proportion of mothers with some post-secondary education increases from 45.1 percent to 51.6 percent, whereas the percentage of married mothers decreases from 78.3 percent to 70.7 percent. On average, mothers are 26.36 years of age when they give birth to their child, and the range is between 17 and 39 years. The sample is heterogeneous with respect to racial background, with 45 percent of respondents identifying as Hispanic or African American. The proportion of male (49.4%) and female (50.6%) children in the sample is similar.

Table 3.2 Descriptive Statistics of Children's Mental Health Outcomes and Mothers' Income (thousands of dollars), Education, and Marital Status (n=2,680)

		Child Age in Years					
		4	**6**	**8**	**10**	**12**	**14**
Antisocial Behavior	$\bar{X}$	1.24	1.11	1.09	0.97	0.95	0.98
	(S.D.)	(1.33)	(1.29)	(1.33)	(1.29)	(1.29)	(1.41)
Depression/Anxiety	$\bar{X}$	1.25	1.35	1.67	1.79	1.87	1.90
	(S.D.)	(1.36)	(1.46)	(1.68)	(1.81)	(1.83)	(1.95)
Family Income	$\bar{X}$	66.44	71.50	74.76	77.62	81.34	83.37
	(S.D.)	(55.22)	(64.67)	(71.75)	(76.03)	(78.55)	(82.09)
Education							
High School or Less	%	54.9	53.8	51.2	50.3	49.1	48.4
Some Post-Secondary	%	45.1	46.2	48.8	49.7	50.9	51.6
Family Structure							
Not Married	%	21.7	24.2	26.3	27.3	28.6	29.3
Married	%	78.3	75.8	73.7	72.7	71.4	70.7

Note: All descriptive statistics are weighted to correct for attrition and the oversampling of African American and Hispanic children.

3.5.2 Baseline Growth Models of Antisocial Behavior and Depression/Anxiety

Results from the growth models for antisocial behavior and depression/anxiety are presented in Table 3.3. In general, symptoms of antisocial behavior decrease with the child's age, whereas depression/anxiety increases. More specifically, children's mean level of antisocial behavior at age 4 is 1.324, and decreases by 0.067 every two-years. Children's mean level of depression/anxiety at age 4 is 1.277, and increases by 0.118 every two-years. Furthermore, the quadratic growth parameter is significant for both mental health outcomes, suggesting that symptoms stabilize with age. Finally, as demonstrated by the lower portion of Table 3.3, the variance of the growth parameters are significant; thus, children vary in their initial levels of antisocial behavior and depression/anxiety at age 4 and in their rates of change from age 4 to age 14.

Table 3.3 Baseline Growth Models of Antisocial Behavior and Depression/Anxiety (n=2,680)

	Antisocial Behavior	**Depression/Anxiety**
Intercept (S.E.)	1.324***	1.277***
	(0.032)	(0.034)
Slope (S.E.)	-0.067***	0.118***
	(0.011)	(0.013)
Quadratic (S.E.)	0.004***	-0.005***
	(0.001)	(0.001)
Variances		
Intercept (S.E.)	0.811***	0.815***
	(0.091)	(0.117)
Slope (S.E.)	0.029*	0.062**
	(0.013)	(0.021)
Quadratic (S.E.)	0.000*	0.000*
	(0.000)	(0.000)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

3.5.3 *Multiple Group Latent Growth Models*

Antisocial Behavior

Table 3.4 presents the results from the multiple group growth models for antisocial behavior, and Figure 3.2 graphs the results in terms of trajectories. Results reveal that children in the low-stable income category exhibit significantly higher levels of antisocial behavior at age 4 compared to their counterparts in all the other income categories, and this difference is maintained over time. In contrast, children in the high-stable income group demonstrate significantly lower levels of antisocial behavior at age 4 compared to their counterparts in the other income groups, except children with decreasing incomes. Furthermore, the quadratic term is significantly lower in the high-stable group compared to the low- and medium-stable groups. For example, whereas children who are exposed to persistently low or medium levels of income over time demonstrate a modest increase in antisocial behavior in early adolescence, children who are exposed to persistently high levels of income continue to demonstrate a steady decrease in symptoms. Among children in the medium-stable income group, antisocial behavior is significantly lower at age 4 compared to children in the low-stable group, but significantly higher than children in the high-stable and decreasing groups. Furthermore, levels of antisocial behavior decrease at a significantly greater rate among children in the medium-stable group compared to their counterparts in the decreasing group. With respect to children in the increasing, decreasing, and fluctuating income groups, levels of antisocial behavior are not statistically different at age 4 or over time. Finally, the lower portion of Table 3.4 demonstrates the amount of variation in initial levels of antisocial behavior and in rates of change over time. With the exception of the decreasing group, children demonstrate significant variation in initial levels of antisocial behavior at age 4. Furthermore, with the exception of the middle-stable and fluctuating groups, variation in rates of change as children age (slope and quadratic terms) is not statistically significant. This suggests that, when considering stability and change in trajectories of family income, much of the variation in children's symptoms of antisocial behavior as they age is explained.

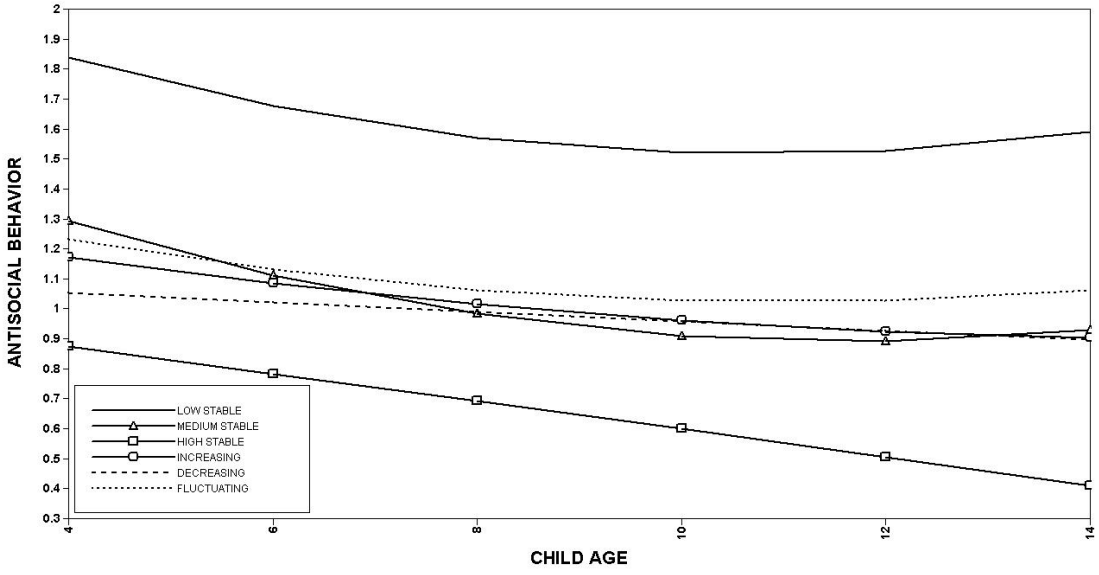
Table 3.4 Trajectories of Antisocial Behavior by each Income Category (n=2,680)

	Income Categories					
	Low Stable	**Medium Stable**	**High Stable**	**Increasing**	**Decreasing**	**Fluctuating**
Means						
Intercept	1.839*** b,c,d,e,f	1.293*** a,c,e	0.873*** a,b,d,f	1.173*** a,c	1.054*** a,b	1.234*** a,c
Slope	-0.095**	-0.105*** e	-0.045	-0.047*	-0.017*** b	-0.060***
Quadratic	0.007** c	0.007** c	0.00 a,b	0.002	0.00	0.004**
Residual Variances						
Intercept	0.994***	0.585***	0.602***	0.934***	0.379	0.869***
Slope	0.046	0.048	0.001	0.034	0.042	0.008***
Quadratic	0.00	0.00*	fixed	0.00	0.00	fixed

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

Notes: A = significantly different from low stable; B = significantly different from medium stable; C = significantly different from high stable; D = significantly different from increasing; E = significantly different from decreasing; F = significantly different from fluctuating

Figure 3.2 Trajectories of Antisocial Behavior by each Income Category



Depression/Anxiety

Table 3.5 presents the results from the multiple group growth models for depression/anxiety, and Figure 3.3 graphs the results in terms of trajectories. Results reveal that children in the low-stable income category exhibit significantly higher levels of depression/anxiety at age 4 compared to their counterparts in all the other income categories, and this difference is maintained over time. In contrast, children in the high-stable income group demonstrate significantly lower symptoms of depression/anxiety at age 4 compared to children in the other income categories. No other significant differences are observed in initial levels of depression/anxiety or in rates of change over time across the income categories. Furthermore, as demonstrated in the lower portion of Table 3.5, children vary significantly in their initial levels of depression/anxiety across all of the income categories. There is also statistically significant variation in the slopes of depression/anxiety in the low-stable, increasing, and fluctuating groups, and significant variation in the quadratic term for the high-stable and increasing groups.

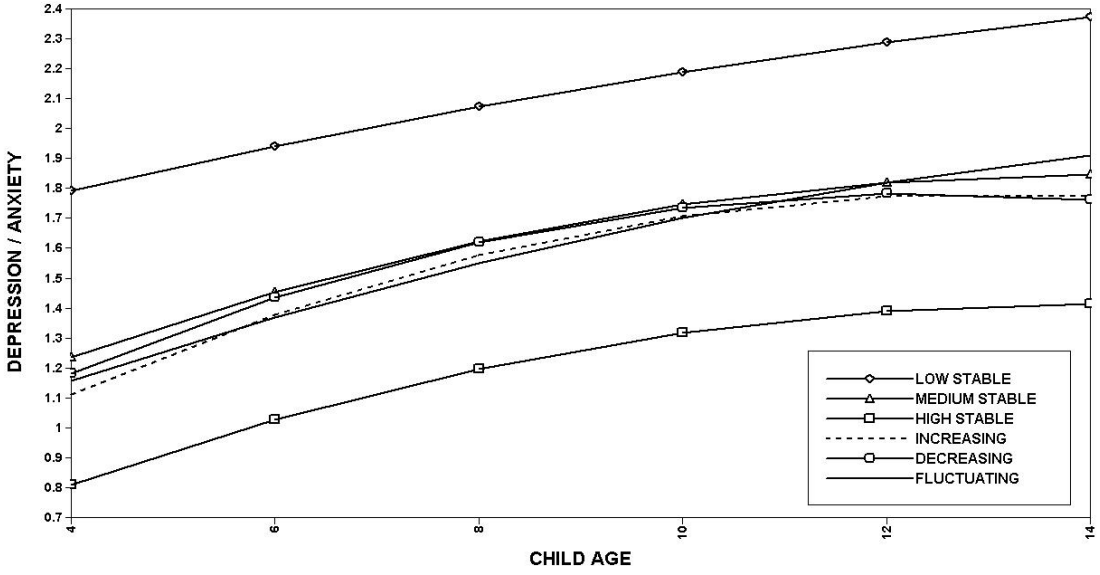
Table 3.5 Trajectories of Depression/Anxiety by each Income Category (n=2,680)

	Income Categories					
	Low Stable	**Medium Stable**	**High Stable**	**Increasing**	**Decreasing**	**Fluctuating**
Means						
Intercept	1.791*** b,c,d,e,f	1.235*** a,c	0.810*** a,b,d,e,f	1.110*** a,c	1.182*** a,c	1.157*** a,c
Slope	0.079**	0.121***	0.121***	0.150***	0.143***	0.113***
Quadratic	-0.002	-0.006*	-0.006	-0.008**	-0.009*	-0.004
Residual Variances						
Intercept	0.973***	0.961***	0.442**	0.873***	0.867***	0.861***
Slope	0.018***	0.054	0.066	0.116**	0.013	0.083**
Quadratic	fixed	0.00	0.001*	0.001**	fixed	0.000

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

Notes: A = significantly different from low stable; B = significantly different from medium stable; C = significantly different from high stable; D = significantly different from increasing; E = significantly different from decreasing; F = significantly different from fluctuating

Figure 3.3 Trajectories of Depression/Anxiety by each Income Category



3.6 Discussion

The objectives of this paper were to examine the extent to which stability and change in family income initiate and shape children's mental health trajectories. This study advances previous research through the use of multiple group latent growth curve models that incorporate empirically constructed income categories that represent children with comparable profiles of family income over time. This approach has the advantage of simultaneously assessing the duration and sequencing of children's economic circumstances, and how these temporal patterns in family income influence the developmental course of children's antisocial behavior and depression/anxiety. Furthermore, the income categories focus on children from low-, medium-, and high-income families, and thus shed light on the experiences of children situated in various locations across the income distribution.

The results from this paper extend findings reported by previous studies using the NLSY-CS (McLeod and Shanahan 1996; Strohschein 2005) by demonstrating the extent to which trajectories of antisocial behavior and depression/anxiety vary as a function of

stability and change in family income. For example, the multiple group analyses that consider temporal patterns in family income emphasize that the duration and sequencing of economic disadvantage is critical for understanding the development of children's mental health problems. For example, the results suggest that children who are exposed to early poverty that persists over time exhibit significantly higher levels of antisocial behavior and depression/anxiety compared to their counterparts in the other income categories. Likewise, children who experience persistently high levels of income over time demonstrate significantly lower levels of antisocial behavior and depression/anxiety. In addition, children who are exposed to ongoing economic disadvantage exhibit an increase in antisocial behavior in early adolescence, whereas children with continuously high levels of family income demonstrate a steady decrease in symptoms with age. Thus, the results from this paper support previous research that contends the impact of economic disadvantage on children's mental health is more pronounced when the duration of economic circumstances is considered (Brooks-Gunn and Duncan 1997).

Although the results suggest that the most pronounced disparities in mental health problems are between children with persistently high and low family income, they also draw attention to the experiences of middle-income families, and families who experience a drop in economic circumstances over time. The study period of the NLSY-CS (1986-2010) corresponds with a period of widespread economic growth in the United States (National Bureau of Economic Research 2014). Prior to the recession in late 2007, the median family income in the U.S. increased at a steady rate (DeNavas-Walt, Proctor, and Smith 2013). Accordingly, middle-income families that experienced stable economic circumstances, and families that experienced decreasing incomes, were not able to benefit from the economic growth that occurred over this time period, which may have compromised children's mental health. Whereas children in the medium-stable group exhibit higher levels of antisocial behavior and depression/anxiety at age 4 compared to their counterparts in the high-stable income group, they experienced a significantly greater reduction in antisocial behavior over time compared to children in the decreasing income group. Decreasing economic conditions may be particularly stressful to children. In particular, financial strain may increase psychological distress among parents, which

may compromise parent-child relationships, and impede their ability to invest in the quality of their children's home environments (Conger and Donnelan 2007). Furthermore, whereas children who are exposed to persistently high levels of income over time experience a steady decline in antisocial behavior, children in the medium-stable group exhibit a modest increase in adolescence. Future research needs to consider the experiences of middle-income families, and families with declining economic resources, so that we can improve our understanding of the dynamics that influence children's mental health problems.

The results also support an emerging body of research regarding the effects of income instability (Moore et al. 2002; Moore et al. 2009; Hill et al. 2013). For example, children who experience fluctuating economic circumstances exhibit higher levels of antisocial behavior and depression/anxiety at age 4 compared to their counterparts in the high-stable group, and this difference is maintained over time. It may be that fluctuating economic circumstances expose children to intermittent periods of economic deprivation. The stresses associated with income instability may expose children to inconsistent parenting behaviors, changing environmental conditions, and unpredictable daily routines, all of which may have negative consequences for children's well-being (Moore et al. 2002). Hill and colleagues (2013) note that income instability may affect children's mental health indirectly through the conditions that precipitate income change. Thus, additional research is needed to understand the source of income instability, whether it is anticipated or not, and the extent to which children's outcomes may vary as a function of these differences.

In contrast with previous research (Dearing et al. 2001; Luo and Waite 2002), the results from this paper suggest that increases in economic circumstances are not associated with mental health benefits for children. At age 4, children in the increasing group have significantly lower incomes relative to their counterparts in the high-stable group, but higher incomes than children in the low-stable group. Although these children experience an improvement in economic circumstances over time, their mental health trajectories never approximate those observed among children with persistently high

incomes. Low socioeconomic status in early life is particularly detrimental to children's well-being, and previous research indicates that the effects persist over time despite subsequent improvement in economic conditions later in life (McDonough and Berglund 2003; Strohschein 2005). In addition, the family stress model stipulates that low-income influences children's mental health indirectly through their parents' psychological functioning, which consequently interferes with family processes, particularly the quality of parent-child relationships (Conger et al. 2010). If maternal well-being and compromised parenting are not resolved by improvement in economic conditions, the influence of early poverty may persist over time indirectly through family processes (McLeod and Shanahan 1996). Finally, previous research suggests that income increases have a more pronounced impact on children exposed to economic adversity (Dearing et al. 2001). In the current study, children in the increasing group are in a more advantageous position compared their counterparts in the low-stable group, thus it may be that improving economic circumstances do not benefit these children because they were never exposed to severe economic deprivation.

3.7 Limitations

The family stress model stipulates that low-income influences children's mental health indirectly through their parents' psychological functioning, which consequently interferes with family processes, particularly the quality of parent-child relationships (Conger and Donnellan 2007). The NLSY-CS includes maternal mental health at ages 40 and 50 through a self-report measure of life-time psychiatric diagnoses, which is inadequate for use in the current analyses. Given the implications of maternal psychopathology for children's mental health, additional research is needed that examines the extent to which family processes mediate the relationship between stability and change in family income and children's outcomes.

3.8 Conclusion

This study advances previous research by constructing income categories that represent children with comparable profiles of family income over the early life course, and incorporating them in multiple group latent growth models to examine how they initiate and shape children's trajectories of antisocial behavior and depression/anxiety. In many respects, the results support a stress process and life course perspective by demonstrating the ongoing and parallel relationship between economic disadvantage and children's mental health that unfolds over time.

Indeed, the analyses emphasize the long-term consequences of early and stable economic disadvantage for children's mental health problems. These findings were consistent for antisocial behavior and depression/anxiety. The continued escalation of depression/anxiety and antisocial behavior among children who experience ongoing poverty may be particularly detrimental for outcomes in adulthood. Given the link between early and ongoing poverty and continuity in mental health problems over the life course, the results from this paper highlight the need for early interventions to prevent to progression of children's symptomatology.

The results from this paper also highlight the experiences of children in middle-income families, and children who drift down the social hierarchy over time. In particular, children in middle-income families that were exposed to stable economic circumstances over time had elevated mental health symptoms compared to their counterparts with persistently high incomes over time, yet they demonstrated a greater reduction in symptoms over time compared to children with decreasing incomes. Furthermore, the current study also contributes to an emerging literature on income instability (Moore et al. 2009; Hill et al. 2013). While previous research has examined the link between income instability and children's behavioral problems at a single point in time (Moore et al. 2002), to my knowledge, this is the first study to examine the extent to which fluctuating economic circumstances influence the course of children's depression/anxiety and antisocial behavior trajectories. Thus, by considering the

experiences of children situated in various locations across the income distribution, the findings from this paper redefine the circumstances that increase the risk for children's mental health problems.

Finally, the results from this paper also demonstrate the need to view children's mental health from a stress process and life course framework (Avison 2010). Identifying risks for early onset of mental health problems and continuity in symptoms over time is critical for developing policies aimed at minimizing health disparities that are rooted in childhood disadvantage.

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Chapter 4

4 Stability and Change in Economic Resources and Family Processes and Their Impact on Children's Trajectories of Mental Health

4.1 Introduction

The link between socioeconomic status and children's mental health is well established. Research consistently demonstrates that economic hardship and income instability undermine children's well-being (McLeod and Shanahan 1996; Moore et al. 2002; Strohschein 2005), and that affluence promotes children's cognitive and emotional development (Yeung et al. 2002; Gershoff et al. 2007). Furthermore, an emerging body of literature from a life course perspective draws our attention to patterns of stability and change in socioeconomic status over time, and demonstrates that the experience and consequences of economic disadvantage vary in relation to when and how long it is experienced (Wagmiller et al. 2006).

Recent research efforts have involved explaining the mechanisms or mediating pathways through which socioeconomic status influences children's outcomes, and the extent to which these processes may vary for children with different profiles of economic resources (Bradley and Corwyn 2002). For example, a large body of research emphasizes the role of family processes, particularly characteristics of the home environment and parent-child interactions, as key factors that account for the relationship between socioeconomic status and children's well-being (Conger et al. 2010). In addition, there is some indication that the impact of family processes on children's mental health is more pronounced for children at the lower end of the income distribution (Wills et al. 1995; Mistry et al. 2004).

Viewed from a life course perspective, the role of family processes in children's mental health draws attention to the linked lives of parents and children (Moen and

Erickson 1995). This conceptual model emphasizes the intricate connections between parents and children that unfold over time. Just as financial stress experienced by parents can spill over into children's lives, parents can provide children with the emotional support and experiences they need to thrive under various economic circumstances.

In the first paper of my dissertation I find significant disparities in mental health trajectories between children with different profiles of economic resources from age 4 to age 14. In particular, I empirically constructed categories that represent children with similar patterns of family income over time: increasing, decreasing, fluctuating, and stability across low-, medium-, and high-income families. Using multiple group latent growth models, I examined the extent to which these different patterns of family income influence children's trajectories of mental health. In the current paper, I extend this research in two ways. First, I examine the extent to which stability and change in family income influence trajectories of maternal emotional support and the provision of cognitively stimulating materials in the home environment. Second, I examine whether different temporal patterns in family income influence the relationship between trajectories of family processes and children's trajectories of mental health.

4.2 Literature Review

4.2.1 Theoretical Perspective

Two major theoretical perspectives inform research on the relationship between socioeconomic status and children's development: the "family stress model" and the "family investment model" (Conger and Donnellan 2007). These conceptual models provide the framework and related empirical designs for understanding how socioeconomic inequalities translate into mental health disparities. The "family stress model" (FSM) posits that economic hardship influences children's mental health indirectly through the quality of parent-child relationships. The model consists of a series of hypothesized pathways that begins with the negative impact of financial hardship on parents' psychological functioning. Next, parental mental health problems increases

conflict between parents and disrupts parenting practices, which in turn undermine children's well-being (McLeod and Shanahan 1993; Conger et al. 1994; Yeung et al. 2002). By contrast, the "family investment model" (FIM) focuses on the benefits children receive in families with greater economic resources. For example, socioeconomic advantage allows parents to invest in their children's educational success, and to provide children with optimal home environments that foster cognitive and emotional development (Bradley and Corwyn 2002).

Both the FSM and FIM highlight the critical role of parenting behaviors in children's development. In particular, the models stipulate that economic stress may undermine parent-child relationships, and that economic advantage may promote supportive parenting and the quality of children's home environments. The models therefore imply that parenting and characteristics of the home environment may mediate or moderate the association between socioeconomic status and children's mental health (Conger and Donnelan 2007). Whereas mediators point to the pathways through which economic circumstances influence children's mental health, moderators draw our attention to factors that influence the strength and direction of the relationship (Baron and Kenny 1986; Grant et al. 2006).

For example, there is ample evidence that parenting behaviors mediate the association between socioeconomic status and children's mental health outcomes (Conger et al 1994; Yeung et al. 2002; Gershoff et al. 2007). In addition, although studies show that stimulating home environments (i.e. provision of educational materials and toys) more strongly mediate the relationship between income and children's cognitive development, there is also some indication that learning environments mediate the relationship between income and children's mental health outcomes. For example, Linver and colleagues (2002) demonstrate that improvement in economic circumstances is associated with increases in the provision of cognitively stimulating materials, which in turn reduced children's behavioral problems.

Moreover, Conger and colleagues (2002) highlight a series of studies using data from the Iowa Youth and Families Project that find the quality of parent-child relationships moderates the association between economic adversity and children's outcomes. In particular, parents and other family members who expressed warmth and support were able to buffer the impact of financial stress on children's emotional and behavioral problems. It may also be that providing children with a stimulating learning environment moderates the association between economic disadvantage and children's well-being. In other words, family processes, such as parenting behaviors and characteristics of the home environment, may be protective factors that counteract the influence of economic adversity on children.

The theoretical framework of resilience often informs studies exploring moderators as protective factors (Knitzer and Perry 2009; Luthar 2006). Within the context of the FSM, resilience is defined "…as a process where there are interactions between risks and protective factors relative to a specified outcome" (Patterson 2002:352). This underscores the complex and dynamic ways in which parenting behaviors influence children's well-being. For example, protective factors may have a direct impact on children's emotions and behavior under various circumstances, independently of economic disadvantage. In contrast, supportive and nurturing parenting may buffer the impact of economic disadvantage. That is, protective factors may only promote well-being under circumstances that are known to have a negative impact on children.

Within the FIM and FSM frameworks, mediators and moderators provide a greater understanding of the link between socioeconomic status and children's mental health outcomes. Mediators and moderators are interrelated and in the context of mediation, characteristics of parents, children, and their environments may function as moderators. In this regard, an emerging body of literature underscores the salience of the economic contexts in which the pathways specified in the FSM and FIM operate, a process referred to as moderated-mediation (Bradley and Corwyn 2002). In particular,

studies demonstrate that socioeconomic status itself may moderate the link between family processes and children's emotional and behavioral outcomes.

For example, in a longitudinal study following children's development from birth to 36 months of age, Mistry and colleagues (2004) report that the association between family processes and children's mental health outcomes is greater for families experiencing more severe financial disadvantage. In particular, the authors show that the impact of income on maternal warmth is reduced as families experience an improvement in economic circumstances. Moreover, parenting mediates the association between income and children's mental health, but more strongly for families living in poverty. In addition, Wills et al. (1995) demonstrate that supportive parenting mediates the association between parental education and children's substance use, and that children from low socioeconomic backgrounds derive more benefits from high-quality parent-child interactions.

Although both studies use structural equation modeling to assess the direct and indirect relationship between socioeconomic status and children's outcomes, they use different methodological approaches to test for moderated-mediation. Mistry et al. (2004) center their income-to-needs variable at the poverty-threshold, thereby allowing the authors to compare the mediating role of parenting between families living in poverty versus those who do not. In contrast, Wills et al. (1995) use multiple group analyses to examine whether parenting has a stronger impact on children from low- vs. high- income families. Multiple group analyses examine the extent to which the strength and direction of relationships vary as a function of group membership, thus have much potential to improve our understanding of moderating processes (Grant et al. 2006). To date, however, additional research is needed to examine the extent to which stability and change in economic circumstances influence supportive parenting and the quality of the home environment, as well as the relationship between these family processes and children's mental health. In addition, both of the above studies only consider children's outcomes at a single point in time as opposed to how they unfold over the early life course.

4.2.2 Duration and Sequencing of Economic Circumstances, Family Processes, and Their Impact on Children's Mental Health

Although it is well established that financial hardship undermines parenting practices and the quality of the home environment (Conger et al. 2010), few studies consider the extent to which parent-child relationships and the provision of cognitive stimulation fluctuate over time in relation to changes in socioeconomic status. Viewed from a life course perspective, the role of family processes in the relationship between economic disadvantage and children's mental health may vary as a function of the duration of economic disadvantage and income instability.

For example, McLeod and Shanahan (1993) analyze data from the Child Supplement of the National Longitudinal Survey of Youth, and find that temporary poverty increases uninvolved and punitive parenting behaviors, particularly spanking, which in turn undermine children's mental health. Contrary to what would be expected, persistent poverty decreases punitive parenting behaviors. Thus, although persistent poverty has a direct negative impact on children's mental health, parenting practices do not mediate this relationship. According to McLeod and Shanahan, recent poverty is more stressful to parents, but as parents adjust to poverty over time, the occurrence of physical punishment decreases.

There is also some indication that family processes mediate the relationship between income instability and children's well-being. For example, Yeung et al. (2002) examine the extent to which stable and fluctuating economic circumstances influence children's behavioral problems indirectly through the quality of parent-child relationships. The authors find that income instability undermines mothers' mental health, which in turn is associated with increases in harsh parenting practices, and higher levels of behavioral problems in children.

These studies provide preliminary evidence that poverty duration and income instability have important implications for the family processes that influence children's mental health. Additional research is needed to examine how stability and change in

economic circumstances influence positive and supportive parenting as well as the quality of children's learning environments. Furthermore, much of the research has focused on children living in poverty, thus the experiences of children living middle- and high-income families warrant more attention.

4.2.3 Research Questions

In summary, the FSM and FIM perspectives demonstrate the critical role of parenting and characteristics of the home environment for children's emotional and behavioral outcomes. Furthermore, integrating the two perspectives highlights the complex and dynamic ways in which family processes influence children located in various positions across the income distribution. This study uses multiple group latent growth models to examine whether stability and change in family income is associated with emotionally supportive parenting and the provision of cognitively stimulating experiences. It also examines whether stability and change in family income moderates the association between these family processes and children's trajectories of mental health. Working within this framework, I address the following questions:

1) To what extent do increases, decreases, and fluctuations in economic circumstances, and stable economic circumstances across low-, middle-, and high- income families influence trajectories of emotional support and cognitive stimulation?

2) To what extent do these temporal patterns in family income influence the relationship between trajectories of family processes and children's trajectories of mental health? Does this relationship vary for cognitive stimulation and emotional support?

4.3 Data and Methods

4.3.1 Sample

The National Longitudinal Survey of Youth (NLSY79) consists of a nationally representative sample of 12,686 men and women who were between the ages of 14 and 22 at their initial interview in 1979 (Centre for Human Resource Research 2009). Beginning in 1986, the Child Supplement of the National Longitudinal Survey of Youth (NLSY-CS) was initiated to follow children born to women who participated in the NLSY79. From 1986 to 2010, 11,504 children were interviewed biennially across 13 measurement occasions. The analyses in this paper are based on 2,680 children between the ages of 4 and 14. Additional information about the sample can be found in paper 1 and Chapter 2.

4.3.2 Measures

Children's Mental Health – The Behavioral Problems Index (BPI; Peterson and Zill 1986) consists of 28 questions designed to measure six dimensions of children's mental health, two of which were considered in the current analyses: antisocial behavior and anxiety/depression. Items for the antisocial behavior scale include: "1) cheats or tells lies, 2) bullies or is cruel/mean to others, 3) does not seem to feel sorry after misbehaving, 4) breaks things deliberately". Items for the anxious/depressed scale include: "1) has sudden changes in mood or feeling, 2) feels/complains no one loves him/her, 3) is too fearful or anxious, 4) feels worthless or inferior, 5) is unhappy, sad, or depressed". The BPI was administered to children between the ages of 4 and 14, and mothers reported on the frequency of children's behavior problems using a three-point scale: 0) "not true," 1) "sometimes true," and 2) "often true". Items were summed to create a score ranging from 0-8 for antisocial behavior, and 0-10 for depression and anxiety. Higher values represent greater levels of antisocial behavior and depression/anxiety. Reliability coefficients ranged across the 13 waves of data from .56 to .65 for the antisocial behavior items, and from .65 to .73 for the anxiety and depression items. The estimated reliabilities are consistent with other studies using the depression and antisocial behavior subscales (McLeod and Shanahan 1996; Strohschein 2005).

Emotional Support and Cognitive Stimulation – The short form of the Home Observation for Measurement of the Environment inventory (HOME-SF; Caldwell and Bradley 1984) was administered to mothers at each survey occasion between 1986 and 2010 to assess the extent of cognitive stimulation and emotional support in the family setting. The HOME-SF consists of four components that align with children's age: under 3 years of age, between 3 and 5 years of age, between 6 and 9 years age, and 10 years of age or more. The number of questions and their content varies across the age groups. Furthermore, subscores for emotional support and cognitive stimulation were computed using different items from the HOME-SF. For example, among children under 3 years of age, sample questions for the cognitive stimulation score include: "how often do you get a chance to read to child" and "how many, if any, push or pull toys does child have". Sample questions for the emotional support score include: "How often does child eat a meal with you and his/her father/father figure" and "About how many times, if any, have you had to spank child in the past week". In contrast, cognitive stimulation was assessed among children who are 10 years of age or older by asking mothers to answer the following sample questions: "is there a musical instrument that child can use here in the home" and "does child get special lessons or belong to any organization that encourages activities such as sports, music, art, dance, drama, etc.". In terms of emotional support, sample questions include: "how often is child expected to do routine chores" and "how many times in the past week have you had to spank child".

The procedures for constructing the emotional support and cognitive stimulation subscores are outlined in the documentation for the NLSY-CS (Centre for Human Resource Research 2009). The original HOME-SF variables provided by the NLSY-CS were first dichotomized if they were continuous, and then summed to create the two subscales. For example, if a child under 3 years of age has one or more push/pull toys they were given a score of 1 on the cognitive stimulation scale, otherwise they were given a score of 0. Likewise, if a child of any age is spanked more than once per week, they were assigned a score of 0 on the emotional support scale, and a score of 1 otherwise. Given that the number and content of the HOME-SF items vary across the different age groups, the subscales were age-standardized, and have a mean of 100 and a standard

deviation of 15. Higher scores represent better quality home environments. The HOME-SF and its subscales have been demonstrated to be valid and reliable across a range of demographic populations and socioeconomic contexts (Mott 2004).

Income categories - Mothers reported total net family income in the calendar year prior to each wave of assessment. To capture stability and change in family income, 6 income categories were constructed that reflect the mean level of income over time, the amount of variation in income over time, and the direction of change in income over time. They represent children with similar patterns of family income over time: increasing, decreasing, fluctuating, and stability across low-, medium-, and high-income families. Additional details regarding the procedure used to construct the income categories can be found in Chapter 3.

Race and Child Sex: I controlled for the following time-invariant variables: the child's sex (0 = males; 1 = females) and the child's race (non-Black/non-Hispanic = 0; Hispanic or Black = 1).

4.3.3 Analytical Models

I used multiple group latent growth curve modeling in MPLUS version 7.2 (Muthén and Muthén 2012) to examine the extent to which stability and change in family income influences trajectories of maternal emotional support and the provision of cognitively stimulating materials in the home environment, and the relationship between these family processes and children's trajectories of mental health. Additional details about latent growth modeling can be found in the Chapter 2. In the multiple group analyses, separate trajectories of emotional support and cognitive stimulation were simultaneously estimated for each income category. In subsequent analyses, the relationship between these family processes and children's mental health was simultaneously examined within each income category. Each group in the analyses has distinct growth parameters and disturbance terms, which demonstrates how trajectories of

family processes, and the relationship between family processes and children's mental health, vary in relation to stability and change in family income as children age.

In the first step of the analyses, I computed baseline growth models for depression/anxiety, antisocial behavior, emotional support, and cognitive stimulation to assess the shape and fit of their trajectories. In addition, I estimated separate growth models for each of these variables across all of the income categories to assess the extent to which the functional form of their trajectories and variation in their growth parameters differed as a function of stability and change in family income. For example, whether the trajectories of emotional support are linear or non-linear, and whether levels of emotional support vary across children at age 4 and over time, may differ from one income category to another. Furthermore, I compared the growth parameters of each family process trajectory using the Wald test of parameter constraints to determine if they are significantly different.

In the second step of the analyses, I used multiple group parallel process growth modeling to examine the extent to which the relationship between children's trajectories of mental health and trajectories of family processes varied across the income categories. Parallel process models simultaneously estimate two growth curve models and the relationships between their intercepts and slopes. For example, the intercept and slope of depression/anxiety were regressed on the intercept and slope of emotional support to assess whether emotional support and children's mental health at age 4 and subsequent improvements in emotional support and children's mental health are interdependent. In addition, the slope of depression/anxiety was regressed on the intercept of emotional support to examine whether levels of emotional support at age 4 are associated with the development of mental health problems as children age. These analyses were repeated for antisocial behavior and cognitive stimulation.

All of the above models control for racial background and the child's sex. All covariates were grandmean centered to facilitate interpretation of the growth parameters.

Finally, all models included a sandwich estimator to adjust for non-independence of observations due to the presence of siblings in the dataset (White 1982).

4.4 Model Building Results

In Chapter 3, I provide details on the procedure used to assess the functional form of the trajectories of mental health for all children and across the income categories. Results from the model building procedures suggested that children's antisocial behavior and depression/anxiety trajectories were non-linear. However, the linear models also demonstrated good fit (antisocial behavior: RMSEA = 0.031, CFI = 0.980, TLI = 0.978; depression/anxiety: RMSEA = 0.040, CFI = 0.965, TLI = 0.960). Furthermore, the quadratic growth parameters of antisocial behavior and depression/anxiety were close to or equaled zero. Therefore, in the interest of model parsimony, and consistent with guidelines suggesting that models with fewer growth parameters are often appropriate even when change over time is actually more dynamic (Singer and Willett 2003), the mental health outcomes were modeled as linear trajectories.

To evaluate the shape and fit of the trajectories of emotional support and cognitive stimulation, a series of nested growth models was estimated that differed in the number of growth parameters (i.e. linear vs. quadratic) and whether they were modeled as random or fixed effects. With respect to emotional support, both linear and quadratic models demonstrated good fit (linear: RMSEA = 0.034, CFI = 0.979, TLI = 0.978; quadratic: RMSEA = 0.02, CFI = 0.995, TLI = 0.993). For cognitive stimulation, a linear model had good fit and a quadratic model had adequate fit (linear: RMSEA = 0.062, CFI = 0.961, TLI = 0.960; quadratic: RMSEA = 0.046, CFI = 0.984, TLI = 0.978). In addition, a series of nested growth models was estimated to compare the functional form of the trajectories of emotional support and cognitive stimulation across the income categories. Results for emotional support indicate that linear and quadratic models fit the data well (linear: RMSEA = 0.04; CFI = 0.958; TLI = 0.956; quadratic: RMSEA = 0.021; CFI = 0.991; TLI = 0.988). However, with the exception of the medium-stable group, none of the quadratic growth parameters was significant. In terms of cognitive

stimulation, a linear model had good fit and a quadratic model had adequate fit (linear: RMSEA = 0.064, CFI = 0.947, TLI = 0.944; quadratic: RMSEA = 0.049, CFI = 0.977, TLI = 0.968). However, the quadratic growth parameter was not significant in the low-stable, medium-stable, and increasing income categories. Therefore, the family processes were modeled as linear trajectories in an effort to construct a more parsimonious model.

Results from the multiple group parallel process models that examine the relationship between antisocial behavior and the family processes suggest that the model fit was improved by fixing the variance of the slope of antisocial behavior in the high-stable category. More specifically, the variance of the antisocial behavior slope in this category was close to zero and not statistically significant. Furthermore, when allowing the variance of the slope to be random, the latent variable covariance matrix was not positive definite. Both multiple group parallel process models for antisocial behavior demonstrated good fit (cognitive stimulation: RMSEA = 0.043, CFI = 0.945, TLI = 0.945; emotional support: RMSEA = 0.038; CFI = 0.942, TLI = 0.941). All variances were free to be estimated in the multiple group parallel process models for depression/anxiety and the family processes. Both models for depression/anxiety fit the data well (cognitive stimulation: RMSEA = 0.048, CFI = 0.929, TLI = 0.929; emotional support: RMSEA = 0.039, CFI = 0.935, TLI = 0.934).

4.5 Results

4.5.1 Descriptive Statistics

Table 4.1 presents descriptive statistics for children's mental health outcomes, family income, and the family process variables. On average, children experience a decrease in antisocial behavior with age, and an increase in depressive/anxious symptoms. Mean levels of family income increase from $66,440 when children are 4 years of age to $83,370 when they are 14 years of age. The provision of cognitive stimulation decreases slightly as children age from 97.02 to 95.25, whereas levels of emotional support remain relatively stable. With respect to racial background, the sample

represents children who identify as White (55%) and as Hispanic or African American (45%). Furthermore, the sample consists of roughly the same proportion of male (49.9%) and female (50.6%) children.

Table 4.1 Descriptive Statistics of Children's Mental Health Outcomes, Home Environment, and Family Income (thousands of dollars)

		Child Age in Years					
		4	**6**	**8**	**10**	**12**	**14**
Antisocial Behavior	$\bar{X}$	1.24	1.11	1.09	0.97	0.95	0.98
	(S.D.)	(1.33)	(1.29)	(1.33)	(1.29)	(1.29)	(1.41)
Depression	$\bar{X}$	1.25	1.35	1.67	1.79	1.87	1.90
	(S.D.)	(1.36)	(1.46)	(1.68)	(1.81)	(1.83)	(1.95)
Family Income	$\bar{X}$	66.44	71.50	74.76	77.62	81.34	83.37
	(S.D.)	(55.22)	(64.67)	(71.75)	(76.03)	(78.55)	(82.09)
Cognitive Stimulation	$\bar{X}$	97.02	97.67	97.63	99.05	98.74	95.25
	(S.D.)	(16.90)	(16.03)	(16.08)	(15.34)	(15.59)	(16.18)
Emotional Support	$\bar{X}$	97.64	97.95	97.59	98.73	98.61	97.31
	(S.D.)	(16.14)	(16.11)	(16.33)	(15.78)	(15.82)	(15.84)

Note: All descriptive statistics are weighted to correct for attrition and the oversampling of African American and Hispanic children.

4.5.2 Baseline Models of Mental Health and Family Processes

Table 4.2 presents the results from the baseline growth models for the two mental health outcomes and the two family processes. The mean level of antisocial behavior when children are 4 years of age is 1.246, and it decreases by 0.023 for every unit change in the time variable, which corresponds to two years. Children's mean level of depression/anxiety at age 4 is 1.361, and increases by 0.064 every two-years. When children are 4 years of age, the mean standard score of cognitive stimulation is 97.467, whereas it is 97.635 for emotional support. The rate of change in both family processes as children age is not significant. Finally, the lower portion of Table 4.2 demonstrates that the variance of all growth parameters is significant. This indicates that there is significant variation in initial levels of both mental health outcomes and both family processes, and in their rates of change over time.

Table 4.2 Baseline Models of Antisocial Behavior, Depression/Anxiety, Cognitive Stimulation, and Emotional Support

	Antisocial Behavior (n=2,680)	**Depression/ Anxiety (n=2,680)**	**Cognitive Stimulation (n=2,645)**	**Emotional Support (n=2,638)**
Means				
Intercept (S.E.)	1.246*** (0.028)	1.361*** (0.032)	97.467*** (0.342)	97.635*** (0.328)
Slope (S.E.)	-0.023*** (0.003)	0.064*** (0.005)	-0.013 (0.037)	0.015 (0.042)
Residual Variances				
Intercept (S.E.)	0.944*** (0.061)	1.073*** (0.074)	133.04*** (7.597)	103.37*** (7.044)
Slope (S.E.)	0.008*** (0.001)	0.018*** (0.002)	0.830*** (0.096)	1.287*** (0.132)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

4.5.3 Trajectories of Family Processes across each Income Category

Results from the multiple group latent growth models for cognitive stimulation and emotional support are presented in Tables 4.3 and 4.4. Furthermore, the results are graphed in terms of trajectories in Figures 4.1 and 4.2. With respect to cognitive stimulation, Table 4.3 and Figure 4.1 demonstrates that, with the exception of the fluctuating group, levels of cognitive stimulation are significantly different for each income category when children are 4 years of age. In particular, the most pronounced difference is observed between the low-stable and high-stable groups. For example, children in the low-stable income category are exposed to significantly lower levels of cognitive stimulation at age 4 compared to their counterparts in all the other income categories. In contrast, levels of cognitive stimulation when children are 4 years of age are significantly greater in the high-stable category compared to the other income groups. Furthermore, the results suggest that children in the high-stable group are exposed to significantly greater increases in cognitive stimulation with age compared to all of the other income categories, except the low stable group. However, children in the medium-stable group experience a significantly greater decrease in cognitive stimulation with age compared to their counterparts in the low-stable, high-stable, and increasing groups.

Finally, the lower portion of Table 4.3 suggests that there is significant variation in initial levels and rates of change in cognitive stimulation across all of the income categories, except the high-stable and decreasing groups.

Table 4.3 Trajectories of Cognitive Stimulation by each Income Category

	Income Categories					
	Low Stable (n=607)	**Medium Stable (n=321)**	**High Stable (n=214)**	**Increasing (n=519)**	**Decreasing (n=237)**	**Fluctuating (n=747)**
Means						
Intercept	86.873*** b,c,d,e,f	102.436*** a,c,d,e,f	106.95*** a,b,d,e,f	100.214*** a,b,c,e	97.781*** a,b,c,d	99.184*** a,b,c
Slope	0.053 b	-0.207** a,c,d	0.287** b,d,e,f	0.065 b,c	-0.077 c	-0.105 c
Residual Variances						
Intercept	168.15***	86.267***	25.292**	94.355***	110.604***	112.205***
Slope	1.146***	0.816***	0.240	0.861***	0.586	0.717***

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

Notes: A = significantly different from low stable; B = significantly different from medium stable; C = significantly different from high stable; D = significantly different from increasing; E = significantly different from decreasing; F = significantly different from fluctuating

Figure 4.1 Trajectories of Cognitive Stimulation by each Income Category

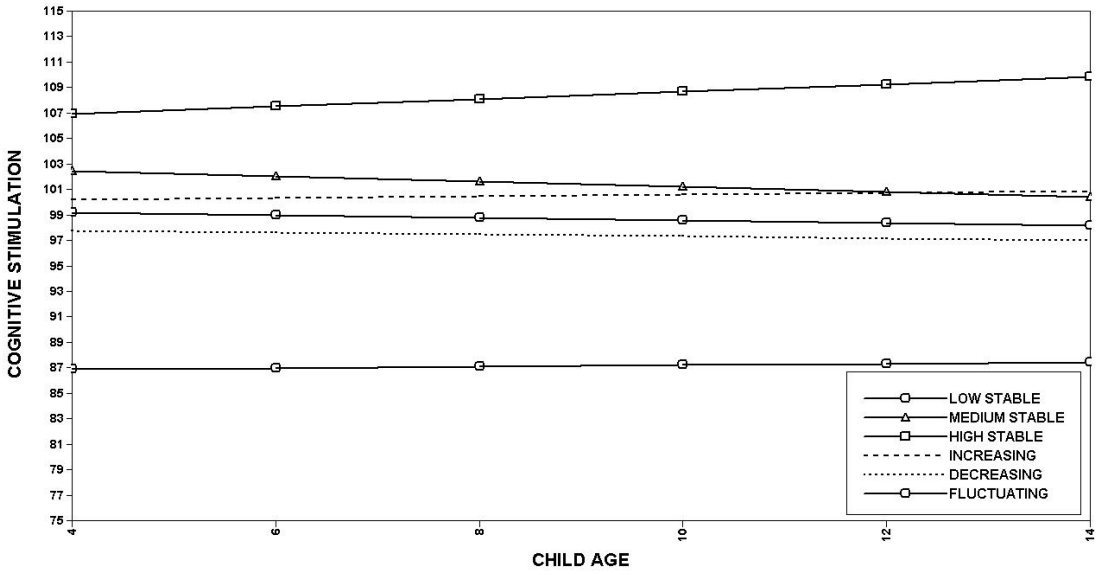


Table 4.4 and Figure 4.2 present results for trajectories of emotional support. With the exception of the fluctuating, increasing, and decreasing groups, there are significant differences in initial levels of emotional support between all of the income categories. Similar to cognitive stimulation, children in the low-stable category are exposed to significantly lower levels of emotional support at age 4, and children in the high-stable category are exposed to significantly higher levels of emotional support at age 4, compared to their counterparts in the other income categories. Furthermore, children in the decreasing category experience a significantly greater reduction in emotional support with age compared to their counterparts in the other income groups. Finally, there is significant variation in initial levels and rates of change in emotional support in all of the income categories, except the high-stable group.

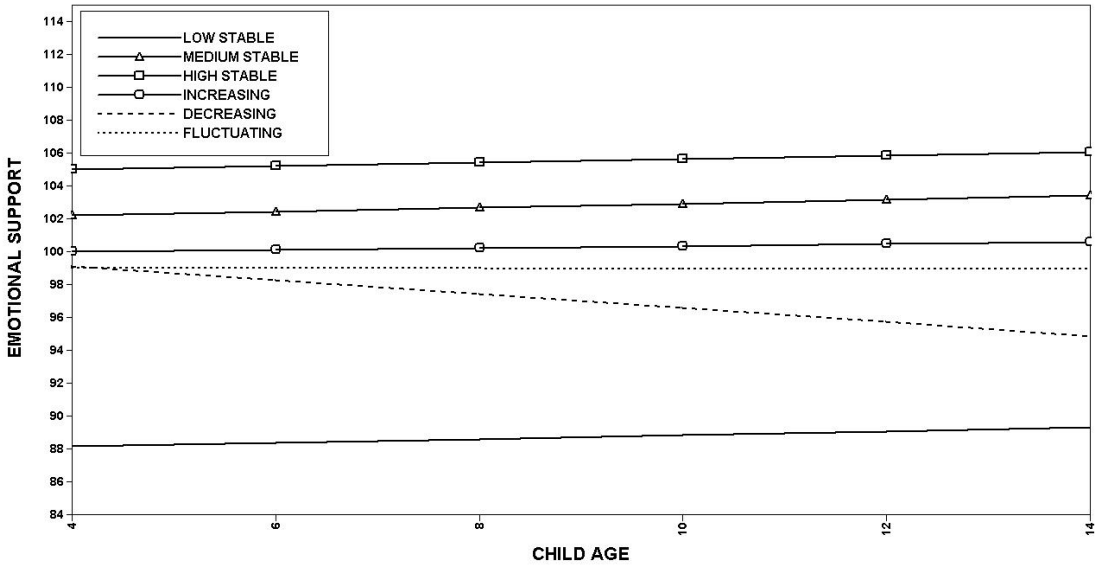
Table 4.4 Trajectories of Emotional Support by each Income Category

	Income Categories					
	Low Stable (n=602)	**Medium Stable (n=319)**	**High Stable (n=213)**	**Increasing (n=520)**	**Decreasing (n=236)**	**Fluctuating (n=748)**
Means						
Intercept	88.137*** b,c,d,e,f	102.196*** a,c,d,e,f	104.977*** a,b,d,e,f	99.991*** a,b,c	99.121*** a,b,c	99.017*** a,b,c
Slope	0.115 d	0.120 d	0.110 d	0.058 d	-0.425** a,b,c,d,f	-0.008 d
Residual Variances						
Intercept	109.138***	86.301***	49.487**	75.280***	68.971***	94.011***
Slope	1.604***	1.668***	0.401	1.066***	1.125**	1.213***

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

Notes: A = significantly different from low stable; B = significantly different from medium stable; C = significantly different from high stable; D = significantly different from increasing; E = significantly different from decreasing; F = significantly different from fluctuating

Figure 4.2 Trajectories of Emotional Support by each Income Category



4.5.4 Multiple Group Parallel Process Growth Models

Results from the multiple group parallel process models that examine the extent to which stability and change in family income influences the relationship between children's trajectories of mental health and the trajectories of family processes are presented in Tables 4.5, 4.6, 4.7, and 4.8. In terms of the relationship between antisocial behavior and cognitive stimulation, results suggest that the provision of cognitively stimulating materials in the home environment has a significant impact on children's initial levels of antisocial behavior in all of the income groups, except the high-stable category. In addition, there is a significant negative relationship between cognitive stimulation and antisocial behavior as children age in the high-stable (β = -0.033; $p \leq .05$), and fluctuating groups (β = -0.041; $p \leq .01$). Among children in the medium-stable group, there is a significant and positive association between initial levels of cognitive stimulation and the rate of change in children's antisocial behavior as they age (β = 0.003; $p \leq .01$).

Table 4.5 Multiple Group Parallel Process Models of Cognitive Stimulation and Antisocial Behavior

	Antisocial Behavior	
	Means	
	Intercept (S.E.)	Slope (S.E.)
Low Stable (n=616)		
Intercept (S.E.)	-0.018** (0.007)	0.000 (0.001)
Slope (S.E.)		-0.125 (0.086)
Medium Stable (n=327)		
Intercept (S.E.)	-0.040*** (0.008)	0.003** (0.001)
Slope (S.E.)		-0.03 (0.016)
High Stable (n=221)		
Intercept (S.E.)	-0.024 (0.020)	0.001 (0.002)
Slope (S.E.)		-0.033* (0.015)
Increasing (n=524)		
Intercept (S.E.)	-0.031*** (0.008)	0.000 (0.001)
Slope (S.E.)		-0.021 (0.014)
Decreasing (n=240)		
Intercept (S.E.)	-0.026* (0.011)	0.000 (0.001)
Slope (S.E.)		-0.031 (0.031)
Fluctuating (n=752)		
Intercept (S.E.)	-0.027*** (0.006)	0.000 (0.001)
Slope (S.E.)		-0.041** (0.014)

*$p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 4.6 presents the results from the multiple group parallel process models for antisocial behavior and emotional support. Across all of the income categories, children exposed to greater amounts of emotional support at age 4 exhibit lower levels of antisocial behavior. In addition, children in the low-stable group experience an additional reduction in antisocial behavior as they age (β = -0.058; $p \leq .05$) for every unit increase in emotional support.

Table 4.6 Multiple Group Parallel Process Models of Emotional Support and Antisocial Behavior

	Antisocial Behavior	
	Means	
	Intercept (S.E.)	Slope (S.E.)
Low Stable (n=616)		
Intercept (S.E.)	-0.023* (0.01)	-0.001 (0.001)
Slope (S.E.)		-0.058* (0.03)
Medium Stable (n=327)		
Intercept (S.E.)	-0.059*** (0.013)	0.002 (0.002)
Slope (S.E.)		-0.011 (0.012)
High Stable (n=221)		
Intercept (S.E.)	-0.065** (0.24)	0.004 (0.003)
Slope (S.E.)		-0.021 (0.023)
Increasing (n=524)		
Intercept (S.E.)	-0.049*** (0.010)	0.00 (0.001)
Slope (S.E.)		0.003 (0.013)
Decreasing (n=240)		
Intercept (S.E.)	-0.040** (0.016)	0.000 (0.002)
Slope (S.E.)		-0.017 (0.023)
Fluctuating (n=752)		
Intercept (S.E.)	-0.037*** (0.008)	0.000 (0.001)
Slope (S.E.)		-0.024 (0.013)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

The relationship between trajectories of cognitive stimulation and trajectories of depression/anxiety across the income categories is presented in Table 4.7. Results indicate that there is a significant and negative relationship between the provision of cognitively stimulating materials and children's levels of depression/anxiety at age 4 in the increasing (β = -0.021; p ≤ .01) and fluctuating (β = -0.014; p ≤ .01) groups. In addition, for every unit increase in cognitive stimulation, children in the low-stable (β = -0.235; p ≤ .0) increasing (β = -0.048; p ≤ .01) and fluctuating (β = -0.051; p ≤ .01) groups experience an additional reduction in depression/anxiety as they age.

Table 4.7 Multiple Group Parallel Process Models of Cognitive Stimulation and Depression/Anxiety

	Depression/Anxiety	
	Means	
	Intercept (S.E.)	Slope (S.E.)
Low Stable (n=616)		
Intercept (S.E.)	-0.012 (0.007)	-0.001 (0.001)
Slope (S.E.)		-0.235* (0.109)
Medium Stable (n=327)		
Intercept (S.E.)	-0.011 (0.011)	-0.001 (0.001)
Slope (S.E.)		-0.027 (0.023)
High Stable (n=221)		
Intercept (S.E.)	0.008 (0.015)	-0.001 (0.002)
Slope (S.E.)		-0.068 (0.043)
Increasing (n=524)		
Intercept (S.E.)	-0.021** (0.008)	-0.001 (0.001)
Slope (S.E.)		-0.048** (0.02)
Decreasing (n=240)		
Intercept (S.E.)	-0.012 (0.012)	-0.002 (0.001)
Slope (S.E.)		-0.082 (0.059)
Fluctuating (n=752)		
Intercept (S.E.)	-0.014* (0.006)	0.000 (0.002)
Slope (S.E.)		-0.051** (0.021)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

Table 4.8 presents the results from the multiple group parallel process models that examine the relationship between trajectories of emotional support and trajectories of depression/anxiety. Results indicate that, at age 4, children in the medium-stable (β = -0.034; p ≤ .05), increasing (β = -0.039; p ≤ .001), and fluctuating (β = -0.029; p ≤ .001) groups exhibit lower levels of depression/anxiety for every unit increase in emotional support. Among children in the low-stable group, every unit increase in emotional support is associated with a reduction in depression/anxiety (β = -0.07; p ≤ .05) as children age.

Table 4.8 Multiple Group Parallel Process Models of Emotional Support and Depression/Anxiety

	Depression/Anxiety	
	Means	
	Intercept (S.E.)	Slope (S.E.)
Low Stable (n=616)		
Intercept (S.E.)	-0.012 (0.011)	-0.001 (0.002)
Slope (S.E.)		-0.07* (0.035)
Medium Stable (n=327)		
Intercept (S.E.)	-0.034* (0.015)	-0.004 (0.002)
Slope (S.E.)		-0.028 (0.02)
High Stable (n=221)		
Intercept (S.E.)	0.015 (0.016)	-0.004 (0.003)
Slope (S.E.)		0.146 (0.108)
Increasing (n=524)		
Intercept (S.E.)	-0.039*** (0.011)	-0.001 (0.002)
Slope (S.E.)		-0.005 (0.021)
Decreasing (n=240)		
Intercept (S.E.)	-0.018 (0.019)	-0.004 (0.003)
Slope (S.E.)		-0.062 (0.033)
Fluctuating (n=752)		
Intercept (S.E.)	-0.029*** (0.008)	-0.001 (0.001)
Slope (S.E.)		-0.007 (0.020)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

4.6 Discussion

The purpose of this paper was to examine the extent to which stability and change in family income influences trajectories of emotional support and cognitive stimulation, as well as the relationship between these family processes and children's mental health. The findings suggest that family processes and socioeconomic status have an interdependent and parallel relationship that unfolds over time. Furthermore, by integrating the FSM and FIM frameworks, the results from this paper highlight the salience of the economic context in which family processes are related to children's trajectories of antisocial behavior and depression/anxiety.

Consistent with the FSM and FIM, the provision of cognitive stimulation and emotional support in early life is greater among children from high-income families compared to their lower status counterparts (Conger and Donnellan 2007). In addition, the results from the current paper highlight how the pathways stipulated in the FIM and FSM operate over time. For example, children in families with persistently high levels of family income are exposed to increasing amounts of cognitive stimulation over time, whereas children with deteriorating family income experience a corresponding decrease in emotional support. From a FSM perspective, financial strain reduces the quality of parent-relationships because parents must focus on meeting more immediate needs, such as providing adequate food and housing for their children (Conger et al. 2010). Furthermore, children in the medium-stable group experience a greater decrease in cognitive stimulation with age compared to their counterparts with increasing incomes and persistently high incomes. As such, the results from this paper also demonstrate the importance of considering the experiences of middle-income families, and families that experience a drop in economic circumstances over time. As discussed in the first paper of my dissertation, the time frame of the NLSY-CS (1986-2010) corresponds with a period of widespread economic growth in the United States (National Bureau of Economic Research 2014). Thus, families that did not experience an improvement in economic circumstances during this period may have been in a particularly disadvantageous position, which may have increased parental stress and compromised the quality of children's home environments.

The results from the current paper also demonstrate the extent to which stability and change in socioeconomic status moderates the association between trajectories of family processes and children's trajectories of mental health. When children are 4 years of age, cognitive stimulation and emotional support are associated with mental health benefits among children in most of the income categories, highlighting the importance of positive parent-child relationships and high-quality home environments in early life for children located in various positions across the income distribution. Not only does high-quality parenting in early life offer immediate benefits to children, but it also continues to

influence children's well-being throughout childhood and as they enter adolescence (Conger and Conger 2002).

Furthermore, cognitive stimulation and emotional support have distinct impacts on children's mental health over time. For example, emotional support has a more pronounced impact on children who are exposed to long-term economic adversity, even though these children experience the lowest levels of emotional support at age 4 and over time. As the results from my first paper demonstrate, children who live with ongoing economic disadvantage also exhibit the greatest amount of mental health problems. Thus, the results from the current paper suggest that emotional support may buffer the impact of economic disadvantage on children's antisocial behavior and depression/anxiety. This is consistent with a resilience and FSM framework (Patterson 2002). That is, emotional support influences children's well-being, but more strongly under conditions of risk. Thus, the findings are suggestive of moderated-mediation, and support an emerging body of literature that contends children in more disadvantageous positions derive a greater benefit from positive parent-child relationships (Wills et al. 1995; Mistry et al. 2004).

The results from this paper also extend the FSM by demonstrating that stimulating learning experiences influence children's mental health under conditions of economic disadvantage and income instability. For example, cognitive stimulation was associated with reduced antisocial behavior and depression/anxiety among children in the low-stable and fluctuating categories. Accordingly, just as warm and supportive parent-child relationships buffer the impact of low-income on children's mental health, the results suggest that enriching learning opportunities may also offer mental health benefits to economically disadvantaged children. Income instability may expose families to intermittent periods of poverty and uncertainty, which may be stressful to parents and their children. Although there is some indication that income instability undermines parenting and children's behavioral problems (Yeung et al. 2002), the role of fluctuating economic circumstances in the mediated pathways hypothesized in the FSM requires additional research.

In addition, consistent with an investment perspective, cognitive stimulation may also have a more pronounced impact among children with more advantageous backgrounds. In particular, in addition to being exposed to the greatest amounts of cognitive stimulation, children with persistently high levels of family income derive greater benefits from stimulating experiences than their counterparts in more disadvantageous positions. These results can also be extended to children who see an improvement in economic circumstances over time. Thus, in addition to providing support for the FIM, the results underscore the importance of including children from high-income families in mental health research. It may be that the processes that lead to better mental health among children with greater economic resources are also relevant for children at the lower end of the income distribution.

Finally, the results from this paper contribute to our understanding of the linked lives of parents and children (Moen and Erickson 1995). In particular, the results underscore the ways in which the economic experiences of parents permeate into the family setting to impact parent-child interactions and the quality of the home environment over the short and long term. Furthermore, not only is there a link between stability and change in economic circumstances and family processes, these temporal patterns in income have important implications for the way in which family processes impact children's mental health. Indeed, positive parenting and stimulating experiences influence children under various economic contexts, which emphasizes their role as protective factors in the lives of low-income children, and the way in which families with greater economic resources can invest in their children's emotional development.

4.7 Conclusion

This paper contributes to the literature on children's mental health by integrating the FSM and FIM perspectives to better understand how stability and change in family income influences the provision of emotional support and cognitively stimulating experiences, as well as their impact on children's antisocial behavior and depression/anxiety. By considering the FIM and FSM simultaneously, this paper

underscores the complex and dynamic ways that family processes influence children's mental health in various economic contexts.

The results from this paper extend the FSM and FIM by demonstrating the interdependent relationship between trajectories of family income and trajectories of family processes. For example, whereas children with continuously high levels of family income experience an increase in cognitive stimulation with age, children with deteriorating economic circumstances experience a corresponding decrease in emotional support with age. Furthermore, the results suggest that emotional support plays a stronger role in the FSM by buffering the impact of economic disadvantage on children's mental health. In contrast, cognitive stimulation influences children's well-being within the context of the FSM and FIM. In particular, cognitively stimulating experiences were associated with mental health benefits for children who are exposed to long term economic disadvantage, income instability, and persistently high levels of income. Thus, this study demonstrates the distinct ways different family processes influence children's mental health, and how this influence is shaped by stability and change in family income.

Finally, although this paper examines the extent to which socioeconomic context moderates the association between family processes and children's mental health, it does not test the direct and indirect effects hypothesized in the FIM and FSM, nor does it explicitly test more moderated-mediation. Additional research is needed to examine whether these mediating pathways vary as a function of stability and change in family income.

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Chapter 5

5 Stability and Change in Perceived Neighborhood Disorder and Children's Trajectories of Mental Health

5.1 Introduction

The neighborhoods in which children live and grow have important influences on their well-being. As a key social context in children's lives, neighborhoods are characterized by various advantages and disadvantages that impact the onset and development of children's trajectories of mental health. In particular, children exposed to neighborhood disorder are at increased risk for depression, anxiety, and behavioral problems (Aneshensel 2010), and there is some evidence that these mental health problems may persist over the life course (Wheaton and Clarke 2003; Wickrama and Noh 2010).

An emerging body of literature draws our attention to the potential pathways through which early neighborhood disorder continues to influence children's mental health over time (Wheaton and Clarke 2003). For example, it may be that exposure to neighborhood stress in early life initiates children's mental health problems, which then persist over time. In contrast, providing that exposure to neighborhood disorder is stable over time, past neighborhood disorder may influence current mental health indirectly through current neighborhood disorder. Research from a stress process and life course framework, however, suggests that the long-term impact of early contextual influences may reflect an ongoing and interdependent relationship between neighborhood disorder and children's trajectories of mental health (Pearlin et al. 2005). In addition, changes in neighborhood disorder may alter trajectories of mental health.

Using data from the Child Supplement of the National Longitudinal Survey of Youth (NLSY-CS; Centre for Human Resources Research 2009), I examine the relationship between maternal reports of perceived neighborhood disorder trajectories and children's mental health trajectories with the goal of illustrating how stability and

change in the perception of neighborhood disadvantage relates to the development of children's mental health problems over the early life course.

5.2 Literature Review

5.2.1 Theoretical Perspective

Research from a stress process framework conceptualizes deprived neighborhoods as "contextual social inequality" that may generate stress at the meso-level of society (Aneshensel 2010). Children spend a large proportion of their time in the communities in which they live; thus, disadvantaged neighborhoods may be considered to be a source of "chronic ambient stress" (Pearlin 1989; Aneshensel and Sucoff 1996). In other words, neighborhoods constitute a persistent and pervasive environmental stressor that children are not able to easily escape (Wheaton 1997).

Although the majority of studies on neighborhood context consider "objective" measures of disorder, such as crime rates or the percentage of residents below the poverty level, researchers have also underscored the salience of "subjective" measures of neighborhood disorganization (Aneshensel and Succoff 1996; Christie-Mizell et al. 2003; Booth et al. 2012). For example, disordered neighborhoods are characterized by social and physical problems that are observable and perceived to pose a threat to the safety of the neighborhood's residents (Ross and Mirowski 1999). Social disorder refers to the actions of people, such as loitering, drug use, and violence. In contrast, physical disorder refers to the condition of the neighborhood's infrastructure, such as abandoned buildings abandoned, litter, and vandalism.

Much of the research on neighborhood context is based on cross-sectional data. As a result, this research only considers the consequences of residential adversity at a single occasion over the life course, which obscures differences in the duration and timing of neighborhood disorder, and also assumes residential contexts are static and unchanging (Clarke et al. 2014; Wheaton and Clarke 2003). A life course perspective

emphasizes temporal patterns in neighborhood exposure that unfold over time, and how these diverse residential histories explain variation in mental health outcomes. For example, some children are born in disadvantaged neighborhoods and continue to reside there into adulthood, whereas other children may move to more affluent neighborhoods. Furthermore, neighborhoods may be transformed over time through revitalization efforts that improve employment rates and the quality of services and institutions available to its residents. Thus, although children may be living in similar neighborhoods at the time of interview, they may have different residential histories that influence the risk for negative mental health outcomes. This may introduce bias in cross sectional research depending on the point in time in which neighborhood characteristics are assessed.

Wheaton and Clarke (2003) highlight two approaches that have been used to address concerns related to the timing and duration of neighborhood context. First, a "lagged specification of context" involves comparing the influence of neighborhood disorder between two different age groups (Brooks-Gunn et al. 1993). This approach captures the timing of exposure, but duration and transitions in residential context are not assessed. Second, "average measures of context" represent the combined impact of neighborhood exposure over a given period of time (Duncan et al. 1994; Ginther et al. 2000). Although this approach effectively estimates duration in a particular context, it does not differentiate between exposure occurring earlier or later in the life course. Furthermore, this approach assumes that residential contexts do not change with the passage of time. Thus, transitions in neighborhood context, which may occur as a result of residential mobility or improvement in neighborhood conditions, are not assessed.

A life course and stress process framework emphasizes long term processes of stability and change in neighborhood context, and the extent to which the consequences of neighborhood disorder vary in relation to when and how long it is experienced. Few studies, however, examine the timing, duration, and sequencing of neighborhood disorder simultaneously. In this paper, I consider a methodological approach that has the potential to improve our understanding of neighborhood disorder as a dynamic process. In particular, I conceptualize perceived neighborhood disorder as a two-part process that

unfolds over time (Olsen and Schafer 2001). This two-part process consists of a binary component that distinguishes between children exposed to minimal vs. high levels of neighborhood disorder, and a continuous component that represents the actual level of neighborhood disorder for children in the latter category. Theoretically, these separate processes have a highly meaningful interpretation: the binary component captures stability in children's exposure to neighborhood disorder, whereas the continuous component captures change in level of neighborhood disorder over time. These two processes are included in parallel process latent growth models to examine their separate and distinct impact on children's trajectories of mental health. These models differentiate between children's initial exposure to neighborhood disorder when they are between the ages of 4 and 6 and the extent of their exposure over time, and provide an opportunity to compare the mental health profiles of children with different patterns of exposure to neighborhood disorder, particularly with respect to stability and change.

5.2.2 Duration, Timing, and Sequencing of Neighborhood Disorder

With regard to timing, research suggests that young children are particularly susceptible to neighborhood adversity because childhood is a formative stage for cognitive, emotional, and behavioral development (Brooks-Gunn et al. 1993). Yet, adolescents are more likely to spend time in their neighborhood independently from their parents, to build relationships with peers in their communities, and to have a heightened awareness of their residential context. Thus, the impact of neighborhood disadvantage may be more apparent in adolescence. Despite the theoretical motivation to distinguish between earlier and later residential exposure, the extent to which the timing of neighborhood disorder influences children's mental health requires additional research. In this regard, Chase-Lansdale and colleagues (1997) compare two periods of childhood - preschool-age and school-age – and find that neighborhood influences are stronger on children entering elementary school as a result of greater exposure to residential influences. The authors employ a "lagged specification of context" approach, which obscures the duration of exposure and changes in neighborhood context. Wheaton and Clarke (2003) overcome these limitations by using a multilevel model that considers both

past and current contexts as well as past and current mental health. The authors find that early neighborhood disadvantage has negative consequences that persist over time to affect adult mental health net of the impact of initial mental health problems and neighborhood disadvantage experienced in adulthood. Given that mental health outcomes are only examined at a single point in time, the interdependent relationship between trajectories of neighborhood disadvantage and children's trajectories of mental health remains to be examined.

Studies that consider the duration of neighborhood disorder suggest that persistent exposure to disadvantaged contexts is more detrimental than short-term exposure. For example, Clarke et al. (2014) show that the likelihood for poor health status and mortality increases in relation to the amount of time spent in adverse residential locations. Clampet-Lundquist and Massey (2008) find that employment rates and earnings increased, while social assistance decreased, proportionately in relation to the amount of time individuals spent in neighborhoods with low poverty levels. Both of these studies use "average measures of context" defined by the length of time spent in a particular neighborhood context, which obscures changes in neighborhood conditions over time. In this regard, Schonberg and Shaw (2007) use growth mixture modeling to examine the relationship between trajectories of neighborhood socioeconomic status and trajectories of conduct problems. The trajectories emphasize the timing, duration, and sequencing of neighborhood context and conduct problems. The authors find that continuous exposure to neighborhoods characterized by high levels of poverty is associated with chronic conduct problems in male children. Additional research is needed to determine whether the duration of neighborhood disadvantage influences a greater range of mental health outcomes in children.

Individuals move in and out of neighborhoods over the life course, and upward residential mobility may be associated with improved mental health, whereas downward mobility may deteriorate mental health. Data from government sponsored relocation programs have been used to assess the benefits of moving from a disadvantaged to more affluent neighborhood (Clampet-Lundquist and Massey 2008). As part of the Moving to

Opportunity project, individuals living in public housing were randomly selected to relocate to neighborhoods where fewer than 10% of residents fell below the poverty line. Compared to individuals whose residential situation did not change, relocation to a neighborhood with less poverty was associated with improved mental health in adults and young girls (Kling et al. 2007). The benefits were particularly pronounced among individuals who did not subsequently return to a disadvantaged neighborhood, suggesting that the duration of neighborhood exposure is associated with better outcomes. Data from the Project on Human Development in Chicago Neighborhoods has also been used to examine the association between residential mobility and mental health outcomes. For example, Dupéré et al. (2012) find that adolescents moving out of a neighborhood in which they perceive high levels of violence and low social cohesion report improved self-efficacy, and in turn, a reduction in depressive symptomatology. Moreover, Leventhal and Brooks-Gunn (2011) find that the likelihood of boys engaging in violent behavior increased alongside increasing neighborhood poverty. The above studies measure residential mobility as the difference in neighborhood context between two time points, which obscures long-term processes of stability and change in neighborhood context. Accordingly, additional research is needed to assess the relative impact of stable and changing neighborhood conditions over time on children's mental health.

In summary, a life course perspective emphasizes that timing, duration, and change explain variation in the consequences of neighborhood disorder. Although studies have considered the influence of stability and change in neighborhood context on children's outcomes at a single point in time, additional research is needed that examines the extent to which temporal patterns in neighborhood disorder influence the developmental course of children's outcomes over time. In addition, a greater range of outcomes needs to be explored, particularly with respect to children's mental health.

5.2.3 Individual-level Characteristics: Socioeconomic Status and Racial Background

Given the correlation between residential location and individual-level characteristics, such as socioeconomic status and race, studies on neighborhood disorder

have emphasized the need to control for individual-level variables that are linked to both neighborhood context and children's mental health (Aneshensel 2010). In particular, it may be that families with low socioeconomic status and visible minorities are more likely to live in disadvantaged neighborhoods, which may introduce selection bias in studies assessing contextual influences and children's mental health. This implies that the consequences of neighborhood disorder for children's mental health may result from the attributes of individuals who live in disadvantaged neighborhoods, and more importantly the attributes of children's parents. In this regard, whereas some studies show that neighborhood disorder continues to be an important determinant of mental health outcomes over and above the impact of individual-level characteristics such as low income (Wight et al. 2006; Kubzansky et al. 2005), others demonstrate that individual characteristics account for the association between neighborhood disorder and mental health (Propper et al. 2005; Wainwright and Surtees 2004).

As a result of racial and ethnic segregation, minority populations are disproportionately exposed to stressors associated with neighborhood disorder. For example, there is some indication that African Americans are more likely to report negative appraisals of their neighborhood than other non-minorities (Christie-Mizell et al. 2003). This may be because neighborhoods with a high concentration of minorities are characterized by high rates of poverty. Some research suggests that residence in neighborhoods composed of a high percentage of ethnic minorities undermines health and well-being (Williams and Collins 2001). Yet, studies also indicate that living in neighborhoods with individuals of a similar ethnic background fosters the development of social networks, which in turn is associated with health benefits (Robert and Ruel 2006). Furthermore, research demonstrates that African Americans are less likely to experience residential mobility, and therefore, live in disadvantaged neighborhoods for longer periods of time over the life course than their non-minority counterparts (Timberlake 2007). Given the link between neighborhood context, socioeconomic status, and race, studies assessing the relationship between neighborhood disadvantage and children's mental health must control for individual socioeconomic status and racial background.

5.2.4 Research Questions

In conclusion, the relationship between disordered neighborhoods and mental health is well established, but additional research is needed that considers stability and change in exposure to neighborhood conditions. Using data from the Child Supplement of the National Longitudinal Survey of Youth, and two-part latent growth modeling, this study examines how different residential histories explain variation in children's mental health outcomes over time. In particular, I conceptualize perceived neighborhood disadvantage as a dynamic process involving both stability and change, and examine the extent to which these distinct processes initiate and shape children's trajectories of mental health. Within this framework, this study addresses the following questions:

1) Do children who experience persistently low levels of perceived neighborhood disorder over time have better trajectories of mental health than children who are exposed to persistently high levels of perceived neighborhood disorder?

2) Among children who experience high levels of perceived neighborhood disorder, to what extent are increases in the level of neighborhood disorder associated with children's trajectories of mental health?

3) Does the relationship between these temporal patterns in perceived neighborhood disorder and children's mental health trajectories persist after controlling for family income?

4) Does the relationship between these temporal patterns in perceived neighborhood disorder and children's mental health trajectories vary for depression/anxiety and antisocial behavior?

5.3 Data and Methods

5.3.1 Sample

The National Longitudinal Survey of Youth (NLSY79) consists of a nationally representative sample of 12,686 men and women who were between the ages of 14 and 22 at their initial interview in 1979 (Centre for Human Resource Research 2009). Beginning in 1986, the Child Supplement of the National Longitudinal Survey of Youth (NLSY-CS) was initiated to follow children born to women who participated in the NLSY79. From 1986 to 2010, 11,504 children were interviewed biennially across 13 measurement occasions. Additional information on the sample can be found in Chapter 2.

In order to maximize the sample, inclusion of a child in the analyses was based on a combination of wave of assessment and birth year. Given that the neighborhood environment questions were asked between 1992 and 2000, and given that children's mental health was assessed between the ages of 4 and 14, only children born in 1986, 1987, and 1988 were included in the analyses. This ensures that children had the potential to complete all survey rounds in which they were eligible between 1992 and 2000. Children were between the ages of 4 and 6 in 1992, and between the ages of 12 and 14 in 2000. Only children with at least three waves of valid data were included in the analyses, resulting in a total sample size of 1,000[1].

5.3.2 Measures

Children's Mental Health: The Behavioral Problems Index (BPI; Peterson and Zill 1986) consists of 28 questions designed to measure six dimensions of children's mental health, two of which were considered in the current analyses: antisocial behavior and anxiety/depression. Items for the antisocial behavior scale include: "1) cheats or tells lies, 2) bullies or is cruel/mean to others, 3) does not seem to feel sorry after misbehaving, 4) breaks things deliberately". Items for the anxious/depressed scale include: "1) has sudden changes in mood or feeling, 2) feels/complains no one loves

him/her, 3) is too fearful or anxious, 4) feels worthless or inferior, 5) is unhappy, sad, or depressed". The BPI was administered to children between the ages of 4 and 14, and mothers reported on the frequency of children's behavior problems using a three-point scale: 0) "not true," 1) "sometimes true," and 2) "often true". Items were summed to create a score ranging from 0-8 for antisocial behavior, and 0-10 for depression and anxiety. Higher values represent greater levels of antisocial behavior and depression/anxiety. Reliability coefficients ranged across the 5 waves of data from .62 to .64 for the antisocial behavior items, and from .70 to .73 for the anxiety and depression items. The estimated reliabilities are consistent with other studies using the depression and antisocial behavior subscales (McLeod and Shanahan 1996; Strohschein 2005).

Perceived Neighborhood Disorder: Between 1992 and 2000, mothers were asked how they perceive the quality of their neighborhood environment. Using a 3-point scale ranging from "this is not a problem at all" (0), "this is somewhat a problem" (1), and "this is a big problem" (2), mothers were asked to rate the extent to which the following issues were a problem in their neighborhood: "people don't have enough respect for rules and laws"; "abandoned or run-down buildings"; "crime and violence"; "not enough police protection"; "not enough public transportation"; "too many parents who don't supervise their children"; "lots of people who can't find jobs"; "people don't care what goes on in neighborhood".

Principle components factor analysis was used to determine if the eight neighborhood items represent a single underlying measure of neighborhood disorder. With the exception of "not enough public transportation", all of the items had factor loadings that exceeded .60. Accordingly, the neighborhood disorder measure was constructed without the public transportation item. Responses were summed to create a score ranging from 0-14, with higher scores indicating mothers perceive greater levels of neighborhood disorder. Reliability coefficients for the neighborhood items ranged from .85 to .86 across the 5 waves of data.

I conceptualized perceived neighborhood disorder as a two-part process involving a binary component that distinguishes between minimal levels of neighborhood disorder (0) and high levels of neighborhood disorder (1), and a continuous component that represents the actual level of perceived neighborhood disorder for children in the latter category. With respect to the binary component, children with a score of 3 or less on the neighborhood disadvantage measure were considered to have experienced minimal levels of disadvantage. The cut point was determined using growth mixture modeling, the results of which are presented below. The new continuous variable was log transformed to correct for skewness. Children who are exposed to minimal levels of neighborhood disorder are missing on the continuous neighborhood component. The binary component captures stability in children's exposure to neighborhood disorder over time, whereas the continuous component captures changes in the level of neighborhood disorder over time. Additional details on the procedure for constructing the two processes are discussed in further detail below.

Family Income: Mothers reported total net family income in the calendar year prior to each wave of assessment. They reported income received from a variety of sources, including employment wages, farm and military income, unemployment compensation, and government assistance programs. The original codes allowed for very extreme values for the 1992 and 1996 survey years. To better align the income distributions for these two years with all other years, the maximum income coded for any respondent was capped at $100,001 in 1992 and $160,085 in 1996. These coding decisions eliminated large annual variations in total net family income that were artifacts of outlying values. Income was recoded in thousands of dollars, and also adjusted for inflation in 2000 dollars.

Missing data on family income ranged from 8% to 19% across the 5 survey years. To avoid losing observations for these cases, missing income values were imputed with the average income value from adjacent survey years. For example, if income was missing in 1994, it was replaced with the average of income in 1992 and 1996. After the imputation, the amount of missing data on income ranged from 2% to 7% across the

survey years. This strategy is frequently used to replace missing income values in the NLSY and NLSY-CS (Baum and Ruhm 2009; Kowaleski-Jones and Duncan 2002).

Race and Child Sex: Mothers were asked to identify their racial background. This variable designates mothers and children as "Non-Black/Non-Hispanic" (0), "Black" (1), or "Hispanic" (2). Additionally, mothers were asked to identify their children as male (0) or female (1).

5.3.3 Analytical Models

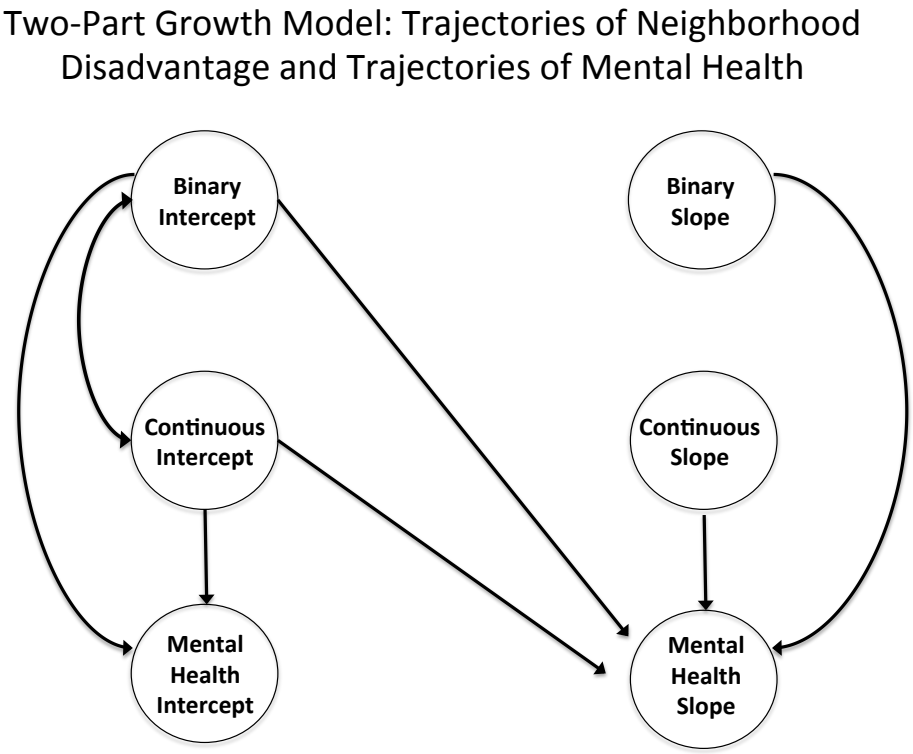
Two-part latent growth models (Olsen and Shafer 2001) were estimated in MPLUS version 7.2 (Muthén and Muthén 2012) to assess the relationship between trajectories of perceived neighborhood disorder and children's trajectories of mental health. In the latent growth modeling framework, trajectories are defined by a latent intercept and slope that represent the underlying growth process across the observations points. The intercept is interpreted as the average starting value when children are between 4 and 6 years of age. The slope is interpreted as the average rate of change from age 4 to 14 for every unit increase in the time variable, which corresponds to one survey year. Latent growth curve models also include a disturbance at each time point that represents individual variation around the mean values of the growth parameters.

Neighborhood disorder can be conceived of as a semicontinuous variable with a floor effect, defined by a lower bound and a continuously distributed upper bound. In two-part growth modeling, the original distribution of neighborhood disorder is decomposed into two processes: a binary component that distinguishes between the probability of experiencing minimal vs. high levels of neighborhood disorder, and a continuous component that represents the actual level of perceived neighborhood disorder for children in the latter category. These two processes are distinct and may initiate and shape children's trajectories of mental health in different ways.

In addition, the two processes themselves may be associated. For example, the probability of experiencing high levels of neighborhood disorder on one occasion may influence the level of neighborhood disorder on another occasion. Failure to include this correlation may introduce bias in two-part growth models (Olsen and Shafer 2001). Each process was first modeled separately in baseline growth models to assess their functional form and fit. Then, the two processes were modeled together to examine correlations between the growth parameters.

Next, I computed baseline growth models for depression/anxiety and antisocial behavior to assess the shape and fit of the trajectories in accordance with established norms for the development of internalizing and externalizing behaviors from childhood to late adolescence (Bongers et al. 2003). Then, the binary and continuous neighborhood processes were included in two separate parallel process latent growth models (one for antisocial behavior and another for depression/anxiety) along with the mental health outcomes. More specifically, the growth parameters of depression/anxiety and antisocial behavior were regressed on the growth parameters of the binary and continuous neighborhood processes to examine the association between trajectories of neighborhood disadvantage and trajectories of children's mental health. Figure 5.1 depicts the full model. The double-headed arrow represents the covariance between the growth parameters of the binary and continuous neighborhood processes, and the single-headed arrows represent the growth parameters of the mental health outcomes being regressed on the growth parameters of the neighborhood processes. All models included race and the child's sex as time-invariant covariates. Subsequent models were estimated with family income as a time-varying variable to determine if the relationships between neighborhood disadvantage and children's mental health persist after controlling for individual-level characteristics. All covariates were grand-mean centered to facilitate interpretation of the growth parameters. The models also included a sandwich estimator to adjust for non-independence of observations due to the presence of siblings in the dataset (White 1982).

Figure 5.1 Two-Part Parallel Process Latent Growth Model



5.4 Model Building Results

Growth mixture modeling (GMM) was used to determine the cut-point that defines the binary component of neighborhood disorder (Muthén and Muthén 2012). GMM is an exploratory technique that groups children into distinct classes based on similarities in their exposure their neighborhood disadvantage. Each class has a distinct intercept and slope that represent differences in initial exposure to neighborhood disorder, and the extent of change in exposure over time, respectively. Results from a two-class model suggest that children may follow two patterns of exposure to neighborhood disorder: 1) initially low levels of neighborhood disorder that decrease slightly over time, and 2) initially high levels of neighborhood disorder that persist over time. Among children in the low category, mean levels of neighborhood disorder start at 2.398 and decrease by 0.05 over time. With respect to children in the persistently high category,

mean levels of neighborhood disorder start at 7.567, but the slope is not significant, suggesting very little change in exposure over time. Using information derived from these analyses, a cut-point of 3 was used to distinguish between the minimal and high levels that make up the binary component of neighborhood disorder.

Baseline growth models for the binary and continuous components of neighborhood disorder were estimated to determine the functional form of the two processes and whether or not their growth parameters were random. For example, the neighborhood processes may follow a linear or non-linear trajectory, and children may or may not vary in their initial exposure to neighborhood disorder and in their exposure over time. A series of nested growth models was estimated that differed in the number of growth parameters (i.e. linear vs. quadratic) and whether they were modeled as random or fixed effects. In terms of the binary neighborhood process, models with increasing numbers of growth parameters were compared using a chi-square difference test based on loglikelihood values and correction factors to adjust for the complex survey design, whereas the Bayesian Information Criterion (BIC) was used to test if a growth factor was random. This approach is similar to the one used by Petras and colleagues (2010). A linear model with an intercept and slope was compared to a model that included a quadratic term and the difference was not significant ($\Delta X^2=6.03$, $p > .10$), suggesting that a non-linear model does not improve the model fit. Furthermore, while the variance of the intercept and slope was significant, the covariance between the intercept and slope was non-significant. When fixing the covariance of the intercept and slope to zero, BIC decreased from 5307 to 5303, suggesting that the covariance of the intercept and slope of the binary process is best modeled as fixed. This suggests that the initial probability of experiencing high levels of neighborhood disadvantage does not influence the probability of experiencing high levels of disadvantage over time.

With respect to the continuous neighborhood process, the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) were used to compare models with increasing numbers of growth factors and whether or not they were random. Comparing linear and quadratic models where all

growth parameters were random, the quadratic model had the lowest RMSEA, and highest CFI and TLI (linear model: RMSEA = 0.026, CFI = 0.976, TLI = 0.976; quadratic model: RMSEA=0.01, CFI = 0.998, TLI = 0.996). The models were computed with and without a quadratic term for the continuous neighborhood component, and no differences were observed in the results. Therefore, in the interest of model parsimony, the continuous neighborhood component was modeled as linear. In addition, the covariance between the intercept and slope was not significant. When fixing the covariance of the intercept and slope to zero, there was a slight improvement in the fit statistics: RMSEA decreased from 0.026 to 0.023, TLI increased from.976 to .978, and CFI increased from .976 to .980. Therefore, the covariance between the intercept and slope was fixed to zero. Again, this suggests that initial levels of neighborhood disorder are not associated with levels of neighborhood disorder over time.

When fitting the linear and continuous neighborhood processes together, the growth parameters were assessed to determine if they were significantly correlated. The covariance between the intercepts of the binary and continuous processes was positive and significant (0.499, $p \leq .001$), suggesting that children with a higher probability of experiencing neighborhood disorder are also exposed to more disorder. To represent the association between the initial level of neighborhood disorder and the initial probability of experiencing neighborhood disorder, the intercepts between the binary and continuous processes were allowed to covary. All other covariances were non-significant and fixed to zero to stabilize the estimation.

Baseline growth models for antisocial behavior and depression/anxiety were also examined to assess their fit and shape. The fit statistics for antisocial behavior suggest that a linear model is best, whereas they suggest a quadratic model is best for depression. The models were computed with and without a quadratic term for depression, and no differences were observed in the results. Therefore, in the interest of model parsimony, depression was modeled as linear. After assessing the shape and fit of the mental health outcomes, they were incorporated in parallel process latent growth models with the two neighborhood processes.

5.5 Results

5.5.1 Descriptive Statistics

Table 5.1 presents descriptive statistics for children's mental health outcomes, family income, and the two neighborhood processes from 1992 to 2000. Mean levels of depression/anxiety increase monotonically over time from 1.35 to 1.75. In contrast, mean levels of antisocial behavior decrease over time from 1.31 to 1.02. From 1992 to 2000, average family income increases from $41,847 to $51,663. With respect to neighborhood disorder, the probability of experiencing high levels of neighborhood disorder decreases from 33.2% in 1992 to 29.5% in 2000. Among children who experience high levels of neighborhood disorder, the mean level of disorder slightly decreases over time from 6.88 to 6.80. The sample is heterogeneous with respect to racial background, with 55.6% of respondents identifying as White, 26.0% as African American, and 18.4% as Hispanic. The proportion of male (49.8%) and female (50.2%) children in the sample is similar.

Table 5.1 Descriptive Statistics of Children's Mental Health Outcomes, Neighborhood Disorder, and Family Income

		Survey Year and Corresponding Age Range in Years				
		1992	1994	1996	1998	2000
		4-6	6-8	8-10	10-12	12-14
Depression/Anxiety	$\bar{X}$	1.35	1.65	1.77	1.87	1.75
	(S.D.)	(1.44)	(1.67)	(1.71)	(1.86)	(1.82)
Antisocial Behavior	$\bar{X}$	1.31	1.21	1.15	1.13	1.02
	S.D.	1.33	1.39	1.37	1.36	1.37
Minimal Neighborhood Disorder	%	66.8	66.0	66.4	67.9	70.5
High Neighborhood Disorder	%	33.2	34.0	33.6	32.1	29.5
Level of Neighborhood Disorder	$\bar{X}$	6.88	7.33	7.02	7.18	6.80
	S.D.	2.58	2.87	2.75	2.79	2.71
Family Income	$\bar{X}$	$41,847	$45,494	$45,855	$48,246	$51,663
	S.D.	29,107	39,717	35,380	40,021	48,814

5.5.2 Baseline Growth Models of Neighborhood Disorder, Antisocial Behavior, and Depression/Anxiety

Results from the baseline growth models are presented in Table 5.2. With respect to the binary process for neighborhood disorder, the intercept is fixed to zero for model identification purposes, and the slope is negative and significant (-0.041; $p \leq .01$), indicating that the log odds of experiencing high levels of neighborhood disorder decreases by 0.04 ($e^{-0.041} = 0.96$) for every unit increase in time, which corresponds to one survey year. In terms of the continuous process for neighborhood disorder, mean levels of the logarithm of neighborhood disadvantage are 6.39 in 1992 (1.854, $p \leq .001$), and the slope is not significant, suggesting very little change in the level of neighborhood disadvantage over time. Mean levels of antisocial behavior are 1.291 in 1992, and decrease by 0.032 for every unit increase in time. Mean levels of depression/anxiety are 1.432 in 1992, and increase by 0.060 for each additional survey year. Finally, as displayed in the lower portion of Table 5.2, the variances of all growth parameters are significant. This suggests that the probability and level of neighborhood disorder varies across children in 1992 and over time. Furthermore, children vary in their initial levels of antisocial behavior and depression/anxiety, and in their rates of change over time.

Table 5.2 Baseline Models of Neighborhood Disorder, Antisocial Behavior, and Depression/Anxiety

	Binary Neighborhood (n=1000)	**Continuous Neighborhood (n=694)**	**Antisocial Behavior (n=1000)**	**Depression/ Anxiety (n=1000)**
Means				
Intercept	Fixed	1.854***	1.291***	1.432***
		(0.018)	(0.043)	(0.050)
Slope	-0.041*	-0.003	-0.032***	0.060***
	(0.021)	(0.003)	(0.006)	(0.009)
Covariances				
Intercept with Slope	-0.124	-0.001	-0.034**	-0.047**
	(0.095)	(0.002)	(0.013)	(0.018)
Variances				
Intercept	5.289***	0.051***	1.026***	1.343***
	(0.911)	(0.010)	(0.112)	(0.124)
Slope	0.033**	0.001*	0.010***	0.026***
	(0.013)	(0.000)	(0.002)	(0.004)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

5.5.3 Two-Part Parallel Process Models

Table 5.3 presents the results from the two-part parallel process latent growth model for antisocial behavior. In model 1, the growth parameters of antisocial behavior are regressed on the growth parameters of the binary and continuous neighborhood processes while controlling for race and the child's sex. Results reveal that the intercepts of both neighborhood processes are significantly correlated with the intercept of antisocial behavior. This suggests that the probability of experiencing high levels of neighborhood disorder in 1992 is contemporaneously associated with elevated levels of antisocial behavior. More specifically, children who are exposed to high levels of neighborhood disorder in 1992 exhibit levels of antisocial behavior that are 0.131 greater than their counterparts who are exposed to minimal levels of neighborhood disorder, and they maintain this difference over time. Furthermore, among children who experience high levels of neighborhood disorder in 1992, every 1 percent increase in the logarithm of

neighborhood disorder is contemporaneously associated with an increase of 0.009 (0.979; $p \leq .001$) in antisocial behavior. The influence of the logarithm of neighborhood disorder on children's antisocial behavior in 1992 is also maintained over time. In addition, the slope of the binary neighborhood process is positively correlated with the slope of antisocial behavior (0.220; $p \leq .05$), indicating that antisocial behavior increases by 0.220 for each additional survey year in which children are exposed to high levels of neighborhood disorder. This suggests that exposure to persistently low levels of neighborhood disorder is associated with mental health benefits. In model 2, which controls for family income, the only significant correlations remaining are between the intercepts of the binary and continuous neighborhood processes and antisocial behavior. This suggests that family income partially mediates the association between neighborhood disorder and children's antisocial behavior. Furthermore, it suggests that the impact of neighborhood disorder on children's mental health is a function of the selection of low-income families into disordered residential contexts. Yet, the probability of experiencing high levels of neighborhood disorder and the actual level of neighborhood disorder continue to have an independent impact on children's initial levels of antisocial behavior in 1992.

Table 5.3 Two-Part Parallel Process Growth Model for Antisocial Behavior

	Model 1 (n=1000)		**Model 2 (n=859)**	
	Intercept (S.E.)	**Slope (S.E.)**	**Intercept (S.E.)**	**Slope (S.E.)**
Binary Neighborhood Means				
Intercept	0.131***	-0.001	0.094**	-0.003
	(0.031)	(0.005)	(0.036)	(0.005)
Slope		0.220*		0.124
		(0.111)		(0.077)
Continuous Neighborhood Means				
Intercept	0.979**	-0.024	0.935*	0.007
	(0.396)	(0.071)	(0.465)	(0.079)
Slope		0.890		0.733
		(0.801)		(0.843)
Residual Variances	0.879***	0.008***	0.904***	0.008**
	(0.100)	(0.003)	(0.104)	(0.003)

*$p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Table 5.4 presents the results from the two-part parallel process latent growth model for depression/anxiety. In model 1, the growth parameters of depression/anxiety are regressed on the growth parameters of the binary and continuous neighborhood processes while controlling for race and the child's sex. Results reveal that the intercept of the binary neighborhood process is significantly correlated with the intercept of depression/anxiety. This suggests that the probability of experiencing high levels of neighborhood disorder in 1992 is contemporaneously associated with elevated levels of depression/anxiety. More specifically, children who are exposed to high levels of neighborhood disorder in 1992 exhibit levels of depression/anxiety that are 0.126 higher than their counterparts who are exposed to minimal levels of neighborhood disorder, and they maintain this difference over time. In model 2, which controls for family income, the correlation between the intercept of the binary process remains significant, but is reduced from 0.126 to 0.075, suggesting that family income partially mediates the association between neighborhood disorder and children's initial levels of depression/anxiety in 1992.

Table 5.4 Two-Part Parallel Process Growth Model for Depression/Anxiety

	Model 1 (n=1000)		**Model 2 (n=859)**	
	Intercept (S.E.)	**Slope (S.E.)**	**Intercept (S.E.)**	**Slope (S.E.)**
Binary Neighborhood Means				
Intercept	0.126***	0.010	0.075*	0.010
	(0.030)	(0.006)	(0.035)	(0.007)
Slope		0.148		0.135
		(0.130)		(0.125)
Continuous Neighborhood Means				
Intercept	0.317	0.032	-0.054	0.143
	(0.443)	(0.100)	(0.530)	(0.112)
Slope		1.007		0.894
		(1.020)		(1.121)
Residual Variances	1.262***	0.023***	1.268***	0.021***
	(0.119)	(0.004)	(0.117)	(0.004)

*p ≤ .05; ** p ≤ .01; *** p ≤ .001

5.6 Discussion

The primary objective of this paper was to examine the extent to which patterns of stability and change in perceived neighborhood disorder initiate and shape children's trajectories of mental health. I advance previous research on contextual influences and children's mental health through the use of two-part latent growth modeling. In this type of analysis, neighborhood disorder is conceptualized as a dynamic process involving a binary component that distinguishes between the probability of experiencing minimal vs. high levels of neighborhood disorder, and a continuous component that represents the actual level of perceived neighborhood disorder for children in the latter category. These two processes are included in parallel process latent growth models to examine their separate and distinct impact on children's trajectories of mental health. This approach has the advantage of distinguishing between children's initial exposure to neighborhood disorder and their exposure over time, and of comparing the mental health profiles of children exposed to different patterns of neighborhood disadvantage, particularly with respect to stability and change.

The first step in the analyses highlights the different experiences of children who are exposed to minimal versus high levels of neighborhood disorder over the early life course. In particular, the probability of experiencing high levels of neighborhood disorder declined over time. Yet, among children who live in neighborhoods characterized by high levels of disorder, the actual level of disorder to which they are exposed remains stable over time. Accordingly, the results draw attention to the distinct experiences of children with different residential histories. For children who live in highly disordered neighborhoods, the stresses associated with crime, violence, and deteriorating infrastructure become enduring features in their lives.

The results from the second step of the analyses, which examine the interdependent relationship between trajectories of neighborhood disorder and trajectories of children's mental health, emphasize that the timing of neighborhood disorder has important consequences for children's well-being. In particular, both processes of

neighborhood disadvantage are contemporaneously associated with children's mental health problems when they are between the ages of 4 and 6, yet the pattern varies for antisocial behavior and depression/anxiety. Children who are exposed to high levels of disorder in early life exhibit more symptoms of antisocial behavior and depression/anxiety than their counterparts who are exposed to minimal levels of disorder, irrespective of the actual level of neighborhood disorder they experience. Furthermore, among children exposed to high levels of neighborhood disorder between the ages of 4 and 6, levels of antisocial behavior increase proportionally in relation to the amount of disorder experienced. These findings are consistent with other studies that examine the influence of neighborhood disadvantage in early life (Wheaton and Clarke 2003; Odgers et al. 2009). Furthermore, the influence of early neighborhood disorder persists after controlling for family income, indicating that the negative impact of neighborhood context is independent of individual-level characteristics such as low socioeconomic status. This suggests that even children from more advantaged family backgrounds experience the consequences of neighborhood disorder. In sum, the results demonstrate that exposure to high levels of neighborhood disadvantage in early life initiates children's trajectories of mental health at an elevated level, and this impact is maintained over the early life course. Thus, this paper highlights the need to incorporate the experiences of young children in the neighborhood literature; otherwise, the consequences of residential adversity on mental health may be underestimated (Wheaton and Clarke 2003; Wickrama and Noh 2010).

In addition, the results from this paper demonstrate that the duration of exposure to neighborhood disorder over time is particularly detrimental to children's well-being, and this is consistent with previous research on neighborhood context (Shonberg and Shaw 2007; Odgers et al. 2009). In particular, growth in antisocial behavior increases at an accelerated rate among children who experience persistently high levels of neighborhood disadvantage compared to their counterparts who experience persistently low levels of neighborhood disadvantage. This would imply that consistent exposure to favorable neighborhood conditions is associated with mental health benefits. However, these results do not persist after controlling for family income, suggesting that the

influence of neighborhood disadvantage on children's mental health over time is a function of the selection of lower income families into deprived neighborhoods. It also suggests that family income mediates the relationship between neighborhood disorder and children's mental health. Thus, income plays two roles in these analyses. For example, income and neighborhood disorder are closely connected, and contextual influences such as crime, violence, and deteriorating infrastructure constitute an important source of stress in the lives of children from low socioeconomic status backgrounds (Pearlin 1989; Aneshensel and Succoff 1996). Furthermore, families that experience long-term economic disadvantage likely do not have the resources to relocate. Thus, children from low-income families not only face the stress of ongoing financial hardship, but also the additional stress of persistent exposure to neighborhood disorder. According to Wheaton and Clarke (2003), including individual level controls only as main effects potentially reduces the independent impact of neighborhood disadvantage. For example, the authors argue that neighborhood and family contexts have interactive rather than separate effects on children's mental health. To illustrate this point, they estimate cross-level models that demonstrate children who experience adversity at both the family and neighborhood levels have the greatest mental health problems. Therefore, it may be that some research "over-controls" for individual level characteristics, and consequently, underestimates the extent to which neighborhoods influence children's outcomes (Aneshensel 2010; Sampson, Morenoff, and Gannon-Rowley 2002). Given the salience of individual and contextual influences on children's mental health, additional research is needed that considers the interactive relationship between these separate but interdependent factors in children's lives.

5.7 Limitations

Although the NLSY-CS offers many advantages to studying children's mental health, the quality of children's neighborhoods is based on maternal perceptions of neighborhood disorder. Thus, it is possible that some mothers perceive the same "objective" neighborhood conditions in different ways. However, research demonstrates that "subjective" measures of neighborhood safety parallel observable and "objective"

indicators of neighborhood disadvantage, such as crime rates or the percentage of residents below the poverty level. For example, Austin et al. (2002) find that housing quality, rates of victimization, and the physical environment of neighborhoods were correlated with self-reports of neighborhood safety. Thus, it is likely to mothers provide accurate descriptions of the neighborhoods in which they live. Additional research is required to examine the extent to which stability and change in "objective" measures of neighborhood disorder influence children's mental health.

5.8 Conclusion

This study advances previous research by using analytical techniques that assess the extent to which the stable and dynamic components of neighborhood disorder influence the progression of children's trajectories of mental health, rather than at a single point in time. In many respect, the results support a life course and stress process framework by demonstrating the interdependent relationship between neighborhood disadvantage and children's mental health that unfolds over time.

The results from this study emphasize the long-term consequences of early and persistent neighborhood disorder for children's mental health problems, and thus highlight the need for early interventions to prevent the progression of children's symptomatology. For example, government sponsored relocation programs, such as the Moving to Opportunity project, underscore the benefits of moving to more favorable residential contexts, including greater levels of safety, lower victimization, and ultimately improved mental health and well-being (Clampet-Lundquist and Massey 2008; Kling et al. 2007).

Finally, whereas traditional growth modeling has the advantage of distinguishing between children's initial exposure to neighborhood disorder and their exposure over time, two-part growth modeling has the added advantage of capturing stability and change in neighborhood context. This analytical approach thus presents an important

methodological development in life course research, and can be used to measure stability and change in other areas of children's lives.

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Chapter 6

6 Conclusion

6.1 Summary of the Research

The papers presented in this dissertation utilize a stress process model and life course framework to better understand the impact of socioeconomic status, perceived neighborhood disorder, and family processes on children's trajectories of mental health. The first paper focuses on long-term patterns in children's socioeconomic status at the family-level, and the extent to which they influence the course of children's mental health. I extend this research in my second paper by exploring how these temporal patterns in children's socioeconomic status influence trajectories of maternal emotional support and the provision of cognitive stimulation in the home environment. The second paper also explores how these different economic profiles moderate the relationship between family processes and children's trajectories of mental health. Finally, the third paper in my dissertation considers the broader social context in which children live. In particular, I examine stability and change in perceived neighborhood disorder and its impact on children's mental health over the early life course.

These papers make contributions to the literature on children's mental health in several ways. First, I demonstrate the significance of incorporating children's economic experiences and exposure to neighborhood disorder in a stress process and life course framework. Second, I extend the family stress and investment models by demonstrating the extent to which long-term patterns of stability and change in family income influence family processes, and how the pathways stipulated in these models vary across different economic contexts. Third, I make methodological contributions to the literature on children's mental health by using analytical techniques that conceptualize and measure family income and perceived neighborhood disorder as long-term processes that unfold over time. In addition, I examine how these temporal patterns in family income, perceived neighborhood disorder, and family processes influence the progression of children's mental health over the early life course, instead of at a single point in time. I

now turn to a more detailed discussion of the findings and their relevance for research on children's mental health.

6.2 Summary of Findings

6.2.1 Paper 1

The first paper of my dissertation examines the interdependent relationship between trajectories of family income and trajectories of children's mental health. The first step in this paper involved constructing categories that represent children with comparable profiles of family income over the early life course: increasing, decreasing, fluctuating, and stability across low-, medium-, and high-income families. These categories are significant for several reasons, and advance previous research that considers temporal patterns in children's economic circumstances (McLeod and Shanahan 1996; Strohschein 2005; Wagmiller et al. 2006). First, they focus on children situated in various locations across the income distribution, as opposed to only children exposed to economic disadvantage. Second, they capture stability in children's exposure to low, medium, and high levels of family income, and identify transitions in children's economic circumstances.

In the second step of my first paper, I incorporate the income categories in multiple group latent growth models to demonstrate how they initiate and shape children's trajectories of antisocial behavior and depression/anxiety. Consistent with a life course and stress process framework (Pearlin et al. 2005), the results underscore the dynamic and ongoing relationship between socioeconomic status and children's mental health that unfolds over time. In particular, the most pronounced difference in mental health was observed between children exposed either to persistently low or persistently high levels of income throughout the early life course. For example, children who are continuously exposed to economic disadvantage exhibit significantly higher symptoms of antisocial behavior and depression/anxiety at age 4 and over time compared to their counterparts in the other income categories. In contrast, children who experience

persistently high levels of family income exhibit significantly lower symptoms of antisocial behavior and depression/anxiety at age 4 and over time. These findings contribute to previous studies that contend that the duration of economic disadvantage is particularly detrimental to children's mental health, and that long-term affluence is associated with mental health benefits (Brooks-Gunn and Duncan 1997; Yeung et al. 2002; Gershoff et al. 2007).

Although the most significant differences in mental health problems emerged between children with persistently low and high economic circumstances, the results from my first paper also draw our attention to the experiences of children in middle-income families that do not experience economic growth over time. In particular, children in the low-stable and medium-stable income categories exhibit a modest increase in antisocial behavior in early adolescence, whereas children with persistently high levels of family income experience a steady decrease in symptoms. As noted in the first paper of my dissertation, the NLSY-CS corresponds to a period of widespread economic growth in the United States (National Bureau of Economic Research 2014). Thus, families that were not able to benefit from this economic growth may have been in a disadvantaged position, which may have contributed to children's mental health problems.

In addition to highlighting the implications of stability in economic circumstances for children in various positions across the income distribution, my first paper advances previous research by demonstrating the salience of decreasing and fluctuating family incomes for children's mental health (Moore et al. 2002; Luo and Waite 2005). For example, whereas children in the medium-stable category were more disadvantaged relative to children in the high-stable category, they were in a more advantageous position compared to children who experienced a decrease in family income over time. More specifically, children in the middle-stable income category demonstrate a significantly greater decrease in antisocial behavior with age compared to children in the decreasing income group. In addition, children exposed to fluctuating economic circumstances experience higher levels of antisocial behavior and depression/anxiety at age 4 than children in the high-stable category. These findings suggest that studies on

children's mental health need to move beyond simple dichotomies of poor versus not poor children, and consider the experiences of children with different economic profiles across the income distribution. By incorporating children with diverse economic circumstances in mental health research, we can gain a better understanding of the nuanced and important differences that shape their well-being and development.

6.2.2 Paper 2

The second paper in my dissertation extends findings from my first paper by demonstrating the extent to which these different economic contexts influence trajectories of family processes, and the relationship between these family processes and children's trajectories of mental health. The first step in the analyses involved using multiple group latent growth modeling to examine how the income categories constructed in my first paper initiate and shape trajectories of maternal emotional support and cognitive stimulation. To date, the family stress and investment models have focused almost exclusively on the experiences of children from poor and non-poor families. These studies suggest that economic disadvantage undermines the quality of parent-child relationships, whereas economic advantage promotes positive and supportive parenting and the development of enriching home environments (Yeung et al. 2002; Gershoff et al. 2007). I extend this research by demonstrating how stability and change in economic resources influence family processes. Furthermore, whereas most research focuses on only one of the conceptual models, my research integrates the family stress and investment models to better understand the complex and dynamic ways in which family processes influence children located in various positions across the income distribution.

Consistent with previous research from the family stress and investment perspectives, I find that the most pronounced difference in emotional support and cognitive stimulation when children are 4 years of age is between children in the low- and high-stable groups (Conger, Conger and Martin 2010). In addition, the results demonstrate how the family stress and investment models operate over time in relation to stability and change in economic circumstances, thus highlighting the ongoing and

parallel relationship between income and family processes. For example, children with persistently high levels of family income are exposed to a significantly greater increase in cognitively stimulating experiences with age compared to their counterparts in the other income categories. In addition, children in middle-income families that do not experience growth in economic conditions over time experience a significantly greater decrease in cognitive stimulation with age. Furthermore, the results demonstrate that family income and maternal emotional support are interconnected, with children who experience a decrease in economic resources being exposed to a corresponding reduction in emotionally supportive parenting.

In addition, the results from the second paper in my dissertation demonstrate the extent to which stability and change in socioeconomic status moderates the association between trajectories of family processes and children's trajectories of mental health. Whereas the provision of emotional support and cognitively stimulating home environments influence children's antisocial behavior and depression/anxiety at age 4 across most of the income categories, the relationship that unfolds over time between the family processes and children's mental health is quite different. In particular, consistent with the family stress model, the results suggest that children who experience long-term economic disadvantage derive more benefits from emotional support, despite having less supportive relationships with their mothers. I also extend the family stress model by demonstrating the importance of cognitively stimulating experiences under conditions of economic disadvantage and income instability. Just as emotional support buffers the impact of long-term economic disadvantage on children's trajectories of mental health, the results suggest that cognitively stimulating experiences buffer the impact of income instability on children's trajectories of mental health.

The results also provide support for the family investment model. In particular, they suggest that the association between trajectories of cognitive stimulation and trajectories of mental health is more pronounced for children with greater economic resources. For example, not only do children with persistently high levels of family income have the greatest amount of cognitive stimulation in their lives, they also derive

more benefit from it compared to their lower status counterparts. The impact of cognitive stimulation on trajectories of depression/anxiety was also more pronounced for children who experience an improvement in family income. Thus, consistent with previous research, the findings highlight the pathways through which families with greater economic resources are able to contribute to their children's healthy development (Yeung et al. 2002).

6.2.3 Paper 3

My third and final paper also draws on a stress process and life course framework to better understand the impact of perceived neighborhood disorder on children's trajectories of mental health. The first task in this paper involved measuring stability and change in trajectories of perceived neighborhood disorder. To do so, I conceptualized perceived neighborhood disorder as a two-part process consisting of binary and continuous components. When integrated within latent growth curve models, these two processes distinguish between initial levels of neighborhood disorder and trajectories that unfold over time, the duration of neighborhood conditions, and change in level of neighborhood disorder over time. This is a unique approach to studying stability and change in contextual influences. Whereas previous research examines the timing, duration, and sequencing of neighborhood disorder, few studies consider these temporal patterns simultaneously. In addition, the analyses focus on distinguishing between the relative impact of family-level and neighborhood-level economic disadvantage, and the extent to which social selection bias may influence the relationship between perceived neighborhood disorder and children's mental health.

The first step in the analyses revealed important differences between children exposed to minimal versus high levels of perceived neighborhood disorder. For example, the probability of experiencing high levels of neighborhood disorder decreased over time. However, among children who are exposed to high levels of neighborhood disorder, the amount of neighborhood disorder they experienced remained stable over time. This suggests fundamentally different experiences for children with different profiles of

neighborhood disorder. For children who live in neighborhoods characterized by high crime rates, violence, and deteriorating infrastructure, these negative conditions become persistent and pervasive stressors in their lives.

In the second step of the analyses I incorporate the two neighborhood processes in parallel process growth models to assess their separate and distinct impact on children's trajectories of mental health. Results reveal that both neighborhood processes were associated with significantly higher levels of antisocial behavior when children are between 4 and 6 years of age. This indicates that not only does the probability of experiencing neighborhood disorder influence children's mental health, but each additional increase in the level of neighborhood disorder corresponds to increases in antisocial behavior. In addition, the probability of experiencing neighborhood disorder when children are between 4 and 6 years of age is associated with elevated symptoms of depression/anxiety. Thus, perceived neighborhood disorder influences children's depression/anxiety, regardless of the actual level of disorder experienced. Both of these results persist after controlling for family income, suggesting that perceived neighborhood disorder has an independent impact on children's mental health when they are between 4 and 6 years of age. Thus, consistent with previous research, the results from this paper emphasize that the timing of neighborhood disorder has important consequences for children's mental health, with exposure to adverse residential conditions in early life being particularly detrimental (Wheaton and Clarke 2003).

In addition, the results demonstrate that the two neighborhood processes have a distinct impact on the course of children's mental health trajectories over time. Whereas neither neighborhood process was associated with children's trajectories of depression/anxiety, every additional survey year in which children were exposed to high levels of neighborhood disorder was associated with an increase in antisocial behavior. This suggests that children who experience persistently low levels of neighborhood disorder exhibit less behavioral problems. Thus, these findings advance previous research that demonstrates the duration of neighborhood disorder has important consequences for children's well-being (Schonberg and Shaw 2007; Clarke et al. 2014). However, these

results did not persist after controlling for family income, suggesting that the influence of perceived neighborhood disorder on children's mental health may result from the selection of low-income families into disordered neighborhoods (Propper et al. 2005; Wainwright and Surtees 2004). In sum, the results from this paper emphasize the important link between income and perceived neighborhood disorder, and demonstrate that children exposed to long-term economic disadvantage are less likely to experience an improvement in neighborhood conditions.

6.3 Limitations

Although the NLSY-CS offers many advantages to studying the impact of economic disadvantage on children's mental health, it also has some limitations. In particular, family income, perceived neighborhood disorder, children's mental health, emotional support, and cognitive stimulation are all based on maternal reports, which may introduce common-method bias in the analyses.

For example, there is some indication that mothers who are depressed are more likely to overestimate their children's mental health symptoms (Leckman-Westin, Cohen, and Stueve 2009), but whether or not depressed mothers provide accurate descriptions of their children's psychological well-being continues to be a subject of debate (Roosa Ordway 2011). Furthermore, the youngest children in the NLSY-CS were not able to report on their own mental health problems, thus making mothers' reports necessary, albeit potentially limiting.

Similarly, mothers' psychological well-being may influence the way in which they perceive the quality of parent-child relationships and their home environment. For example, research suggests that environmental conditions in the home are associated with mothers' mental health and the quality of their parenting behaviors (Yeung et al. 2002). Given that the NLSY-CS does not include adequate measures of maternal depression, it is not possible to assess these relationships further.

6.4 Directions for future research

6.4.1 Socioeconomic Status as a Continuum

The papers in this dissertation highlight the value of considering the experiences of children situated in various locations across the income distribution, rather than simply poor children as has general been the case in the literature on children's mental health (McLeod and Shanahan 1996; Moore et al. 2002). Future research would benefit from considering the experiences of children in middle- and high-income families, as well as children that are exposed to income instability. As the results from this paper suggest, there are important dynamics in the lives of these children that warrant additional research. For example, the results from my first and second papers suggest that middle-income families may experience some of the stresses associated with material hardship, but their experiences are often obscured in studies that use dichotomous poverty measures. In addition, income instability is stressful to parents and their children, and may expose children to short periods of poverty. The specific circumstances that lead to income instability and its impact on various dimensions of children's well-being is in need of additional research.

6.4.2 Moderated-Mediation and Mediated-Moderation

It is increasingly recognized that the processes involved in the family stress and investment models vary for different children (Bradley and Corwyn 2002). Although the analyses in my third paper examine the extent to which stability and change in family income influence family processes, and whether different economic contexts moderate the association between family processes and children's mental health, it does not explicitly test for moderated-mediation. These types of studies examine whether the mediating role of family processes in the relationship between income and children's outcomes varies as a function of the characteristics of families, parents, and children (Wills et al. 1995; Mistry et al. 2004). In contrast, the extent to which family processes buffer the impact of poverty on children's mental health may be mediated through other

additional factors, a process referred to as mediated-moderation (Barron and Kenny 1986). Mediators and moderators are interconnected and additional research is needed to understand their independent and interactive effects in the link between socioeconomic status and children's mental health.

6.4.3. Incorporating Children in a Life Course Perspective

The analyses in this dissertation include children who are as young as 4 years of age, and demonstrate that social structural conditions have important consequences for their well-being. Whereas the majority of life course research focuses on older populations, psychologists and psychiatrists have typically dominated research on children's mental health. An emerging body of literature, however, suggests that a life course perspective offers the opportunity to understand the extent to which children's experiences in the family of origin influence their growth and development over time (Avison 2010). Additional research is required to identify the numerous sources of stress in children's lives and their impact on various dimensions of children's health and development. Furthermore, long-term patterns of stability and change are central to a life course perspective. There are ample opportunities for conceptualizing and measuring stability and change in several domains of children's lives, including family structure and parental employment. These studies have the potential to improve our understanding of the structural inequalities that negatively impact children's mental health, and the social, economic, and psychological resources children can mobilize to promote their well-being and increase their opportunities in various spheres of life.

6.5 Concluding Remarks

The papers presented in this dissertation demonstrate that long-term processes in socioeconomic circumstances and neighborhood of residence contribute to mental health disparities in children. Yet, they also highlight important features in children's lives, especially warm and supportive parenting and high-quality stimulating experiences, that operate as protective factors to buffer the impact of economic stressors on children's

mental health. Identifying the sources of children's stress, and the interventions that reduce their impact and promote children's well-being, are important tasks in mental health research. Ultimately, these research efforts will contribute to social policies that promote children's development so that they can lead healthy and productive lives as adults.

6.6 References

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Appendices

Table 2.1 Structure of the NLSY-CS Data

	Survey Year												
Cohort	1986	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008	2010
1972	14	X	X	X	X	X	X	X	X	X	X	X	X
1973	13	X	X	X	X	X	X	X	X	X	X	X	X
1974	12	14	X	X	X	X	X	X	X	X	X	X	X
1975	11	13	X	X	X	X	X	X	X	X	X	X	X
1976	10	12	14	X	X	X	X	X	X	X	X	X	X
1977	9	11	13	X	X	X	X	X	X	X	X	X	X
1978	8	10	12	14	X	X	X	X	X	X	X	X	X
1979	7	9	11	13	X	X	X	X	X	X	X	X	X
1980	6	8	10	12	14	X	X	X	X	X	X	X	X
1981	5	7	9	11	13	X	X	X	X	X	X	X	X
1982	**4**	**6**	**8**	**10**	**12**	**14**	X	X	X	X	X	X	X
1983	3	5	7	9	11	13	X	X	X	X	X	X	X
1984	2	**4**	**6**	**8**	**10**	**12**	**14**	X	X	X	X	X	X
1985	1	3	5	7	9	11	13	X	X	X	X	X	X
1986	0	2	**4**	**6**	**8**	**10**	**12**	**14**	X	X	X	X	X
1987	X	1	3	5	7	9	11	13	X	X	X	X	X
1988	X	0	2	**4**	**6**	**8**	**10**	**12**	**14**	X	X	X	X
1989	X	X	1	3	5	7	9	11	13	X	X	X	X
1990	X	X	0	2	**4**	**6**	**8**	**10**	**12**	**14**	X	X	X
1991	X	X	X	1	3	5	7	9	11	13	X	X	X
1992	X	X	X	0	2	**4**	**6**	**8**	**10**	**12**	**14**	X	X
1993	X	X	X	X	1	3	5	7	9	11	13	X	X
1994	X	X	X	X	0	2	**4**	**6**	**8**	**10**	**12**	**14**	X
1995	X	X	X	X	X	1	3	5	7	9	11	13	X
1996	X	X	X	X	X	0	2	**4**	**6**	**8**	**10**	**12**	**14**
1997	X	X	X	X	X	X	1	3	5	7	9	11	13
1998	X	X	X	X	X	X	0	2	4	6	8	10	12
1999	X	X	X	X	X	X	X	1	3	5	7	9	11
2000	X	X	X	X	X	X	X	0	2	4	6	8	10
2001	X	X	X	X	X	X	X	X	1	3	5	7	9
2002	X	X	X	X	X	X	X	X	0	2	4	6	8
2003	X	X	X	X	X	X	X	X	X	1	3	5	7
2004	X	X	X	X	X	X	X	X	X	0	2	4	6
2005	X	X	X	X	X	X	X	X	X	X	1	3	5
2006	X	X	X	X	X	X	X	X	X	X	0	2	4
2007	X	X	X	X	X	X	X	X	X	X	X	1	3
2008	X	X	X	X	X	X	X	X	X	X	X	0	2
2009	X	X	X	X	X	X	X	X	X	X	X	X	1

Table 2.2 Format of the Restructured NLSY-CS Data

	Chronological Age					
Cohort	4	6	8	10	12	14
1972	X	X	X	X	X	1986
1973	X	X	X	X	X	X
1974	X	X	X	X	1986	1988
1975	X	X	X	X	X	X
1976	X	X	X	1986	1988	1990
1977	X	X	X	X	X	X
1978	X	X	1986	1988	1990	1992
1979	X	X	X	X	X	X
1980	X	1986	1988	1990	1992	1994
1981	X	X	X	X	X	X
1982	**1986**	**1988**	**1990**	**1992**	**1994**	**1996**
1983	X	X	X	X	X	X
1984	**1988**	**1990**	**1992**	**1994**	**1996**	**1998**
1985	X	X	X	X	X	X
1986	**1990**	**1992**	**1994**	**1996**	**1998**	**2000**
1987	X	X	X	X	X	X
1988	**1992**	**1994**	**1996**	**1998**	**2000**	**2002**
1989	X	X	X	X	X	X
1990	**1994**	**1996**	**1998**	**2000**	**2002**	**2004**
1991	X	X	X	X	X	X
1992	**1996**	**1998**	**2000**	**2002**	**2004**	**2006**
1993	X	X	X	X	X	X
1994	**1998**	**2000**	**2002**	**2004**	**2006**	**2008**
1995	X	X	X	X	X	X
1996	**2000**	**2002**	**2004**	**2006**	**2008**	**2010**
1997	X	X	X	X	X	X
1998	2002	2004	2006	2008	2010	X
1999	X	X	X	X	X	X
2000	2004	2006	2008	2010	X	X
2001	X	X	X	X	X	X
2002	2006	2008	2010	X	X	X
2003	X	X	X	X	X	X
2004	2008	2010	X	X	X	X
2005	X	X	X	X	X	X
2006	2010	X	X	X	X	X
2007	X	X	X	X	X	X
2008	X	X	X	X	X	X
2009	X	X	X	X	X	X

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