

**Moderating effects of education on the problem behavior
trajectories of high SES children: A secondary data analysis of
the Millennium Cohort Study**



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ABSTRACT:

The aim of this dissertation is to identify potential signs of maladjustment within high SES children and the moderating effects of student-teacher relationships. Specifically, this dissertation analyzes the transactional effects between problem behavior, internalizing problems, and student-teacher relationships across high and low SES children over time.

This dissertation analyzes data from the Millennium Cohort Study (MCS) using structural equation modeling (SEM). The MCS is a nationally representative longitudinal survey following the development of over 19,000 UK children from birth to fourteen years of age. Containing information about problem behavior, socioeconomic status, student-teacher relationships, and internalizing problems, the MCS suffices as an ideal dataset for this study.

Using an analytic sample of 11,796 children, this dissertation explores three topics: 1) the developmental trajectory of problem behavior between the ages of three, five, seven, eleven, and fourteen, 2) the differential effects of student-teacher relationships on problem behavior, and 3) the patterns of internalizing problems across gender and SES groups between the ages of three, five, seven, eleven, and fourteen.

Findings from the first topic suggest that children's problem behavior decreases linearly over time, but that significant levels of individual variations exist across children. The findings also suggest that children with higher initial problem behavior levels at age three display steeper drops in problem behavior over time than those who have low initial levels of problem behavior.

Findings from the second topic suggest that student-teacher relationships and problem behavior have a transactional and negative relationship. That is, lower problem behavior at age eleven predicted better student-teacher relationships at age eleven, which then predicted lower problem behavior levels at age fourteen.

Lastly, findings from the third topic suggest that patterns of internalizing problems manifest in both similar and different ways across high and low SES girls and boys. Overall, the stability of internalizing problems grew stronger over time. Findings also showed that student-teacher relationships and internalizing problems have a negative relationship. However, the moderating effects were not carried over to moderate problems at age fourteen.

This dissertation explores the problem behavior development of high SES children not yet prominent in the field of early education research. It is hoped that these findings will inform teachers, policy makers, and intervention designers to improve children's socio-emotional development and lifelong outcomes.

CHAPTER 1: INTRODUCTION

The aim of this dissertation is to identify trends, antecedents, and moderators associated with problem behavior development in young children from high and low SES families. Previous research demonstrates that problem behavior during early childhood is an important antecedent for future developmental maladjustment, which include mental, academic, and economic outcomes in adulthood and beyond (Conroy, Dunlap, Clarke, & Alter, 2005; Henry, Knight, & Thornberry, 2012; Kremer, Flower, Huang, & Vaughn, 2016; Piquero, Farrington, Welsh, Tremblay, & Jennings, 2009; Sadler & Sugai, 2009; Siperstein, Wiley, & Forness, 2011). Among other factors, socioeconomic status is extensively studied in educational research because of its far-reaching effects on developmental outcomes (e.g., Bryant, Glazer, Hansen, & Kursch, 1974; Coleman et al., 1966; Khanam & Nghiem, 2016; Lynd & Lynd, 1929; Sirin, 2005; White, 1982). Given that high levels of problem behavior are proven antecedents of adverse life outcomes, it is crucial to find moderators that reduce rather than intensify problem behaviors, and help children to achieve their full potential.

Problem behavior occurs through various paths, suggesting opportunity for positive change (Drabick & Kendall, 2010). For example, factors such as difficult temperamental dimensions (Rothbart, Sheese, Rueda, & Posner, 2011) or prenatal maternal stress (Walker et al., 2011) are known as strong biological antecedents of individual differences in problem behavior development (De Pauw, Mervielde, & Van Leeuwen, 2009). While such variables are generally difficult to manipulate through interventions, children's relationships with teachers provide an easier channel for flexibility and change, since teachers can manage behavior using developmentally appropriate strategies that adhere to children's different needs (Webster-Stratton, Reid, & Hammond, 2001).

There is an apparent imbalance in the literature; extensive research exists concerning the maladjustment pathways of children from low-SES families but not for their high-SES counterparts (Neville et al., 2013; Duncan, Ziol-Guest, & Kalil, 2010; Sarsour, Sheridan, Jutte, Nuru-Jeter, Hinshaw, & Boyce, 2011). Furthermore, while intervention studies to manage low-SES children's behavior are expansive and still growing (Black & Fernando, 2014; Cowan, Cowan, Pruett, Pruett, & Wong, 2009; Kumanyika & Grier, 2006), few studies have analyzed problem behavior with high-income samples, particularly children (Luthar & Ansary, 2005; Luthar & Latendresse, 2005; Lyman & Luthar, 2014). Other studies have examined the magnitude of maladjustment within high SES adolescents and adults (Luthar & Ansary, 2005; Luthar & D'Avanzo, 1999; Luthar & Latendresse, 2005). However, such studies were not longitudinal, thus precluding analysis of problem development and identification of childhood antecedents over time.

During early and middle childhood, better behavior has been linked with academic success, peer rejection, and better socio-emotional adjustment (Henry et al., 2012; Kremer et al., 2016; O'Connor, Dearing, & Collins, 2011; Sadler & Sugai, 2009; Webster-Stratton, Reid, & Stoolmiller, 2008). From adolescence, problem behavior is associated with serious problems such as substance abuse, unemployment, and higher incarceration rates (Frick & Viding, 2009; Henry et al., 2012; Piquero et al., 2009).

Positive behavior development is widely agreed to be important for wellbeing and positive life outcomes (Svetlova, Nichols, & Brownell, 2010). To illustrate, children who exhibit severe problem behaviors are of greatest concern to caregivers and educators, since those not intervened are predisposed to a negative developmental course (Dunlap et al., 2006). Despite such predominance, effective and long lasting mechanisms to moderate problem behavior that meets the needs of all children have yet to be established. This dissertation aims to fill these gaps by examining how high socioeconomic status and student-teacher relationships influence problem behavior development over time.

1.1 PROBLEM BEHAVIOR DEFINED

Problem behavior is a complex construct encompassing several areas of dysfunction with wide variations in its manifestations (Denham, Bassett, Thayer, Mincic, Sirotkin, & Zinsler, 2012; Hemovich, Lac, & Crano, 2011; Plotz, Hammerla, Rozga, Reavis, Call, Abowd, 2012), which has led to a diverse and voluminous range in the literature. It is therefore necessary to first provide a clear definition of problem behavior in this study.

Problem behavior can be defined as “any repeated pattern of behavior [...] that interferes with or is at risk of interfering with optimal learning or engagement in pro-social interactions with peers and adults” (Kaiser, 2007, p.115). For example, problem behavior during the preschool ages includes angry feelings, temper tantrums, stubbornness with parents and other adults, and recurring quarrels with other children (Barkley et al., 2002; Lavigne et al., 1996; Speltz, DeKlyen, Greenberg, & Dryden, 1995).

In this study, problem behavior will be operationalized using the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1994), encompassing the four dimensions of emotional symptoms, conduct problems, hyperactivity/inattention, and peer problems. The SDQ has been extensively utilized for identification and assessment for externalizing and internalizing problems in research, clinical, and community settings (Vaz et al., 2016).

After many years, researchers and child psychologists have converged that behavior is

affected by the cumulative and interactive influences of biological, psychological, and social factors over time, beginning early in life (Bandura, 1978; Cooper, Bilton, & Kakos, 2013; Sameroff & Chandler, 1975; Thomas, Chess, & Birch, 1968). The earliest signs of problem behavior emerge during infancy via difficult temperamental characteristics such as high irritability and inconsolability (Coplan & Bullock, 2012; Danzig, Dyson, Olino, Laptook, & Klein, 2015; Sanson, Hemphill, Yagmurlu, & McClowry, 2011). These characteristics are associated with higher levels of future problem behaviors, in turn related with greater risk for difficulties in later social functioning, which encompass peer relationships, interpersonal skills, and socio-emotional adjustment (Coplan & Bullock, 2012; Danzig et al., 2015). Temperamental differences develop through interaction with environmental processes such as early toxic stress (Hanson et al., 2015), exposure to domestic violence and child maltreatment (Jaffee & Maikovich-Fong, 2011; Moylan, Herrenkohl, Sousa, Tajima, Herrenkohl, & Russo, 2010), chronic poverty (Yoshikawa, Aber, & Beardslee, 2012), family adversity (Neece, Green, & Baker, 2012; Obradovic, Bush, Stamperdahl, Adler, & Boyce, 2010), and parenting that is authoritarian, permissive, or uninvolved (Williams et al., 2009). The presence or degree of exposure to such risk factors determines children's susceptibility to future problem behavior development, suggesting the importance of environmental contexts (Danzig et al., 2015).

1.2 THE PRESENT STUDY

The present study will investigate three topics: 1) the developmental trajectory of problem behavior between the ages of three, five, seven, eleven, and fourteen, 2) the differential effects of student-teacher relationships on problem behavior, and 3) the patterns of internalizing problems across gender and SES groups between the ages of three, five, seven, eleven, and fourteen.

These three topics will be investigated with data from the Millennium Cohort Study (MCS), a nationally representative longitudinal survey following the development of over 19,000 UK children from diverse socio-economic backgrounds. The sufficient information on the variables of interest and longitudinal nature of the data rendered the MCS suitable to analyze children's developmental trajectories over time (Sameroff & Chandler, 1975; Singer & Willett, 2003).

The MCS contains data with socioeconomic status, student-teacher relationship, internalizing problems and problem behavior information. In this study, latent factors were used to represent some of the variables of interest. As such, latent variables can be represented through other observable variables but cannot be measured directly (Duncan, Duncan, & Strycker, 2006). Latent variables are

commonly used to represent abstract constructs that are generally agreed to exist but lack a definite conceptual measure, such as happiness (Kline, 2011).

Likewise, student-teacher relationships, problem behavior, internalizing problems, and socioeconomic status are concepts used in this study that lack a single, definitive measure. As such, observable indicators were transformed into a single latent construct for each concept. Other variables (e.g., gender and regional, economic, and socioeconomic strata) were incorporated into the analysis maintaining their original form.

The statistical technique of latent growth curve (LGC) modeling within structural equation modeling (SEM) will be employed in order to examine the relationships between the aforementioned variables in the form of the three research questions presented below:

1.3 RESEARCH QUESTIONS

1. How does problem behavior develop between the ages of three, five, seven, eleven, and fourteen?
2. How do student-teacher relationships moderate this problem behavior development between the ages of eleven and fourteen?
3. How do internalizing problems develop across gender and SES groups between the ages of three, five, seven, eleven, and fourteen?

1.4 STRUCTURE OF THE PAPER

This study is composed of the following five chapters:

1. The *introduction chapter* states the study's aims, defines problem behavior, describes the analytic sample and statistical technique of the study, and presents the research questions the dissertation investigates.
2. The *literature review chapter* analyzes the existing literature in respect to problem behavior (including internalizing problems), socioeconomic status, and student-teacher relationships. The chapter then describes how the current study fits in and adds to the existing research base. Lastly, the chapter will close with a theoretical model that motivates the dissertation's analyses.
3. The *methodology chapter* describes the analytic sample, methods utilized to answer the research questions, and the associated ethical considerations. The methodology chapter then goes on to explain

the research hypotheses and accompanying statistical models that were employed for testing the research hypotheses.

4. The *results chapter* presents the findings of the statistical analyses for each research question.

5. The *discussions chapter* interprets the findings and analyzes how the findings fit in with previous literature. The discussions chapter and dissertation then concludes with the strengths, limitations, and implications of the study.

1.5 RESEARCH CONTEXT

Previous studies have examined the various ways family socioeconomic status (Bornstein & Bradley, 2002; Neville et al., 2013; Duncan et al., 2010; Sarsour et al., 2011) as well as student-teacher relationships (Chang, 2009; Skinner & Belmont, 1993; Spilt, Koomen, & Thijs, 2011) influence children's behaviors over time. To the best of my knowledge, this is the first MCS study aiming to examine the effects of student-teacher relationships on problem behaviors across high and low SES children, with a particular focus on high SES children and the potential negative pathways they may be facing. As such, this study will contribute to the existing literature by exploring new paths between student-teacher relationships and problem behaviors among high SES children in a representative sample of UK children. This dissertation aims to identify pathways that could moderate the development of problem behavior. Further, this dissertation hopes to provide teachers, policy makers, researchers, and intervention designers with some guidance to ameliorate children's problem behaviors, and hence, promote child wellbeing and improve life outcomes.

CHAPTER 2: LITERATURE REVIEW

This chapter will review the literature in respect to problem behavior (including internalizing problems), socioeconomic status, and student-teacher relationships. First, evidence that illustrates the rising prevalence and stability of problem behavior and its relationship with negative future adjustment outcomes will be discussed. Then, previous research that has explored the effects of socioeconomic status and student-teacher relationships on problem behavior will be described. Thirdly, gaps in the literature will be discussed. Finally, the theoretical model that motivates the analyses will be presented.

2.1 PROBLEM BEHAVIOR

2.1.1. PREVALENCE

Problem behavior is “any repeated pattern of behavior [...] that interferes with or is at risk of interfering with optimal learning or engagement in pro-social interactions with peers and adults” (Kaiser, 2007, p.115). While many patterns of problem behavior are considered typical in normal development, persistence of such behavior raises concern for future problems (Karreman, Haas, Tuijl, van Aken, & Dekovic, 2010; Lanza, Rhoades, Nix, Greenberg, & Conduct Problems Prevention Research Group, 2011). Studies have documented the prevalence of problem behavior to clinically impair at least 8% to 10% of children under the age of 5, significantly hindering emotional, behavioral, and social development (Gleason, Goldson, & Yogman, 2016). While exact prevalence is difficult to determine because of its dependence on diagnostic and group differences, estimates across studies report a steady historical increase among young children (Paula, Ribeiro, Fombonne, & Mercadante, 2011; Russell, Rodgers, Ukoumunne, & Ford, 2014; Sheldrick, Merchant, & Perrin, 2011; Thomas, Mitchell, & Bastra, 2013), exhibiting a rise in prevalence rate of approximately 6% to 15% (Richman, Stevenson, & Graham, 1975) to a 10% to 20% most recently (Hemmeter, Snyder, Fox, & Algina, 2016). With this increase, it becomes a continuing and growing challenge for caregivers and early educators in the United Kingdom (Buescher, Cidav, Knapp, & Mandell, 2014; Emerson et al., 2001) and internationally (Erbas, Turan, Aslan, & Dunlap, 2010; Ha & Jeong, 2009; Perry, Dunne, McFadden, & Campbell, 2008). Consequently, it is becoming increasingly important to address such behaviors through evidence-based interventions and policies.

2.1.2. TYPES OF PROBLEM BEHAVIOR: EXTERNALIZING AND INTERNALIZING

Conceptualization of problem behaviors depends on the child's age and associated developmental stage (O'Connor et al., 2011; Slobodskaya & Akhmetova, 2010). For example, problem behavior during the preschool ages includes angry feelings, temper tantrums, stubbornness with parents and other adults, and recurring quarrels with other children (Barkley et al., 2002; Lavigne et al., 1996; Speltz et al., 1995). While moderate displays of these behaviors are considered normal at this age, continuity throughout the elementary years would be a cause for concern, disclosing the need for intervention and treatment (Robinson, Eyberg, & Ross, 1980). Temper tantrums normally peak around 18 to 24 months until children enter school, where common displays of problem behavior changeover to behaviors such as teasing, irritability, bullying, and fighting. However, maternal reports suggest steady decreasing of such behavior across the ages of 2 and 11 years, as these children begin to develop more social relationships, interactions, verbal skills, and self-regulation capacities during this timeframe. Later, severe forms of aggressive behavior, violence, delinquency, and illegal drug use commence during adolescence, resulting in augmented repercussions (Liu, Lewis, & Evans, 2013).

Problem behaviors are often described in terms of either internalizing or externalizing problems, and most childhood disorders can be classified as either of the two domains of dysfunction (Bornstein, Hahn, & Haynes, 2010; Bub, McCartney, & Willett, 2007), although findings suggest externalizing and internalizing problems often co-occur (Edwards & Hans, 2015; Fanti & Henrich, 2010; Lee & Stone, 2012).

Internalizing behaviors include withdrawal, anxiety, and fearfulness (Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Reijntjes, Kamphuis, Prinzie, & Telch, 2010), associated with pathological maladjustment outcomes such as learning problems, depression, academic underachievement, and impaired social problem-solving skills (Reijntjes et al., 2010). Early intervention of internalizing behavior problems is important because unaddressed problems are shown to deteriorate to severe psychological problems such as depression and anxiety disorders (Rosario, Salzinger, Feldman, & Ng-Mak, 2008). In contrast, externalizing behaviors are characterized by hostility, impulsivity, hyperactivity, disruptiveness, and defiance (Cheung, Goodman, Leckie, & Jenkins, 2011; Gryczkowski, Jordan, & Mercer, 2010), and are associated with negative outcomes such as peer victimization, management problems, and lower social competence (Langberg et al., 2010; McCartney, Burchinal, Clarke-Stewart, Bub, Owen, & Belsky, 2010; Williams et al., 2009). Further, severe consequences such as higher risk for future juvenile delinquency, adult crime, and violence are associated with externalizing behavior problems (Bornstein et al., 2010; Buschgens,

Swinkles, van Aken, Ormel, Verhulst, & Buitelaar, 2009). Adolescent problem behavior is very costly because of its effects on the individual, individual's family, potential victims, and surrounding community. Naturally, such types of behavior problems are concerning not only at the individual and familial level, but also on the community and societal level, increasingly being viewed as a public health problem (Liu, 2004).

2.1.3. PROBLEM BEHAVIOR: STABILITY AND RELATIONSHIP WITH LATER DEVELOPMENT

Previous studies demonstrate the stability of problem behaviors throughout development (Basten et al., 2016; Casalin, Luyten, Vliegen, & Meurs, 2012; Degnan, Hane, Henderson, Moas, Reeb-Sutherland, & Fox, 2011). In general, problem behaviors are considered serious if they persist to the point of hindering developmental processes (Campbell, 2002; Durand, Hieneman, Clarke, Wang, & Rinaldi, 2012). Serious problems behaviors identified during early childhood often endure throughout school age and beyond, although evidence suggests that externalizing behaviors are on average more stable than internalizing behaviors (Bornstein et al., 2010). It is common for children to be identified with difficulties at preschool age to develop into adolescents with serious problem behaviors, suggesting relative stability of such traits over time (Basten et al., 2016; Lewis & Plomin, 2015). Moreover, a recent and rapidly growing body of research collectively supports the identification of problem behaviors during infancy and toddlerhood based on the association between quality of attachment during early childhood and future adjustment (Brumariu & Kerns, 2010; Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010; Kochanska & Kim, 2013). For these reasons, developmental psychopathologists have increasingly begun to study and identify early predictors of behavioral problems beginning at infancy and toddlerhood (Guralnick, 2011; Rogers et al., 2012; Shonkoff, 2010).

However at such an early age, many developmental psychologists find it difficult to conclude between an irritable index of temperament, which are early emerging biologically influenced individual differences in emotional reactivity and inhibitory control (Garstein, Putnam, & Rothbart, 2012; Rothbart et al., 2011), versus an early indication of oppositional and impulsive behavior (Degnan et al., 2011; De Pauw et al., 2009). Nevertheless, particular dimensions of difficult temperament, such as high levels of inconsolability, are associated with elevated risk of problem behavior, which in turn poses greater risk for problems in later social functioning, which encompass peer relationships, interpersonal skills, and socio-emotional adjustment (Coplan & Bullock, 2012; Danzig et al., 2015; Sanson et al., 2011). Children who possess difficult temperamental dimensions may be particularly susceptible to stress, therefore displaying more problem behaviors, while children

with easier, more compliant temperaments may cope better against the same stressors (Rothbart et al., 2011). As such, difficult temperament could be a precursor of future problem behavior (Karreman et al., 2010). In addition to temperamental characteristics, other factors such as early life stress (Hanson et al., 2015), exposure to domestic violence and child maltreatment (Jaffee & Maikovich-Fong, 2011; Moylan et al., 2010), chronic poverty (Yoshikawa, Aber, & Beardslee, 2012), family adversity (Neece et al., 2012; Obradovic et al., 2010), and parenting that is authoritarian, permissive, and uninvolved (Williams et al., 2009) increase risk for future problem behavior.

Early childhood problem behaviors are associated with many developmental risks, which surface as soon as children enter school. Approximately one-third of kindergarten teachers report children are not ready for school regarding behavior, specifically (Bierman, Torres, Domitrovich, Welsh, & Gest, 2009; Chien et al., 2010; Miller & Goldsmith, 2017). Children with behavior problems tend to receive less support from teachers (O'Connor et al., 2011), perform worse academically (Kremer et al., 2016), and are more likely to develop an emotional/behavioral disorder (EBD) (Conroy et al., 2005; Siperstein et al., 2011). These difficulties lead to lower school adjustment, consequently placing children at high-risk for underachievement, academic failure, dropout, and delinquency (Henry et al., 2012; Webster-Stratton et al., 2008; World Health Organization, 1992).

The severity and persistence of negative behavior patterns will most likely grow worse if left untreated, not only affecting academic outcomes and childhood development, but deteriorating further to chronic problems such as delinquency, substance abuse, unemployment, higher rates of incarceration, higher risk for a psychiatric disorder, and many other complex problems during adulthood (Frick & Viding, 2009; Henry et al., 2012; Piquero et al., 2009).

Collectively, previous research reveals the extensive ramifications of problem behavior, which disturb multiple domains of development if left untreated. Despite such predominance, effective and long lasting mechanisms to moderate problem behavior that meets the needs of all children have yet to be established. Behavior development is recognized as a prominent agent in the development and wellbeing of children, and a comprehensive understanding of the correlates, antecedents, and predictors in relation to it is necessary to reduce recurring difficulties for future generations. Constructing a comprehensive knowledge base on behavior development is necessary to design effective interventions to reduce the aforementioned difficulties. Recognizing this significance, this study aims to identify patterns of problem behavior and potential approaches to mitigate negative pathways among children before deterioration into future problems.

2.2 HIGH SES CHILDREN

2.2.1. SOCIOECONOMIC STATUS IN RESEARCH

Ratified in 1989, the Convention on the Rights of the Child (1989) is an international agreement centered on the core belief that it is a communal responsibility to support children's maximum developmental potential. The convention outlines survival, development, protection and participation as the four rights all children should be entitled to. Moreover, in circumstances that could inhibit the availability of appropriate supports, services, and resources (such as family poverty), the maladjustment resulting as consequences of such deficiencies should be addressed by adults in the family, community, and country. As such, recent problem behavior related studies acknowledge behavioral difficulties as a need that disrupts children's maximal developmental potential and thus advocates for the 'developmental' rights of the child and the responsibility to support such needs (e.g., Wachs, Black, & Engle, 2009; Milteer & Ginsburg, 2012; Olweus & Limber, 2010).

Socioeconomic status (SES) is defined as an individual's access to economic and social resources and opportunities that are valued for succeeding within the social hierarchy (Hauser & Warren, 1997; Oakes & Rossi, 2003; Powers, 1982). Among other factors, socioeconomic status is extensively studied in educational research because of its far-reaching effects on developmental outcomes (e.g., Bryant et al., 1974; Coleman et al., 1966; Khanam & Nghiem, 2016; Lynd & Lynd, 1929; Sirin, 2005; White, 1982). SES cannot be directly measured, and must be represented as a latent variable (Oakes & Rossi, 2003). Operationalizing SES is a complex process, and several aspects should be considered before deciding how it should be measured.

The variables utilized as measures of SES can largely be classified as either "direct" measures (e.g., income in dollars or pounds), "sociohistorically constructed" measures (e.g., occupational prestige, social class), or proxy measures (e.g., free school lunch). Within these measures, composite measures put together multiple pieces of information that are said to represent the underlying construct into a singular (i.e., scalar) measurement, while simple measures typically tap into a single domain (Oakes & Rossi, 2003). While quantifiable direct measures are straightforward, it is sometimes inadequate to capture the abstract nature of SES, which essentially aims to represent the dimension of social class.

French sociologist Bourdieu conceptualizes social class through the notion of 'habitus,' which are culturally and socially influenced ways of thinking and moving (Bourdieu & Waquant, 1992). Different social classes are said to have different habitus, as it is a cumulative product of early experiences and socialization, being constantly revised through interactions with the outside world.

Thus, the unique, individualistic, and dynamically changing nature of habitus further illustrates the intricate nature of SES.

Despite the complexities, most educational research incorporates parental income, education, and occupation as either simple or composite indicators of SES (Sirin, 2005). Occupation represents the income and education required to have a particular occupation, adequately indicating social class. The model of social class structured by Goldthorpe and colleagues (2007) is one of the most commonly used measures of occupation. This model determines social class via consideration of two features of an occupation: complexity to oversee work and the extent of specialized skill necessary to carry out the job (Goldthorpe, 2007). The National Statistics Socio-Economic Classification (NS-SEC) of occupations emerged from this model of social class, and its information is available in the MCS data as well (Rose & Pevalin, 2005). However, occupational indicators are prone to the critical limitation of imprecise assignment to unemployed individuals, which may result in an inaccurate cataloguing of present social circumstances. As a result, when occupation is used as a single indicator, exclusion of some of the population could lead to inaccurate representations of socioeconomic differences. For example, those that have retired, work from home, or are students are groups that are commonly inaccurately represented (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006).

Next, parental education is considered a stable element of SES because it is generally determined at an early age and tends to remain constant over time. Although stable, the context of particular educational levels change depending on the birth cohort, owing to social efforts to improve educational attainment for women and minority groups over recent decades. Such cohort effects may be meaningful but are rarely considered (Galobardes et al., 2006). As the MCS only followed children from a single birth cohort, this was not a critical concern. However, careful considerations of what SES intended to represent in the current study had to be made.

Finally, parental income represents the social and economic resources that are potentially accessible to the child. Income is the dimension of SES that measures the domain of material resources most precisely (Galobardes et al., 2006). Family income may determine the quality and security of housing acquirable, which could affect children's health and ensuing developmental outcomes (Zhang, Baker, Tufts, Raymond, Salihu, & Elliot, 2013). Income also indicates the neighborhood affordable for the family to live in, which suggests the quality of available and accessible educational resources (Dickinson & Adelson, 2014; Klein, 2011). The study context during which data collection took place was important in order to effectively conceptualize and understand how the different indicators of SES affected the lives of the cohort members and their families in the United Kingdom during the early 2000s. The late 1980s and early 2000s was a significant time for UK families in terms of income and relative poverty. That is, income inequality rose rapidly in the

1980s, affecting all groups in the population. Over the 1990s, inequality continued to rise, though at a much more moderate rate than in the preceding decade. Alongside the drastic changes in income inequality were large rises in relative poverty. As the living standards of the poorest fell further behind the rest of the population, relative poverty rates doubled from the late 1970s to the early 1990s (Dearden, Goodman, & Saunders, 2003). On a similar note, the Gini coefficient is a commonly used inequality indicator, which summarizes the degree of inequality in a value between 0 and 1, where the higher value indicates higher inequality (Belfield, Blundell, Cribb, Hood, & Joyce, 2017). When its steady rise during the 1990s and 2000s finally reached 0.36 in 2007-08, the Gini coefficient reached its peak (Belfield et al., 2017). As such, the historical and national context during this time disposed marked differences in the lives and living standards of those in the highest income tier compared to those on the other end of the income spectrum. Such large gradients are likely to translate into family processes and in turn child outcomes and wellbeing.

2.2.2. RESEARCH TRENDS WITH BEHAVIOR PROBLEMS IN HIGH SES CHILDREN

Previous research demonstrates that parental socioeconomic status affects the well being of the child. This is anticipated, since children are intricately connected within their family context (Dropkin & Jauregui, 2015). The vast majority of research focuses on the lower end of the socioeconomic spectrum, since the stressors that follow poverty hinder caregivers' ability to provide care that is consistent, nurturing, and reliable (Miller, Farkas, Vandell, & Duncan, 2014; Shonkoff & Fisher, 2013). To illustrate, difficulties in employment, insecure housing, mental health disorders, domestic violence, and substance abuse are all factors related to low socioeconomic status that elevate parental stress (Shonkoff & Fisher, 2013). The "family stress model" (Conger & Elder, 1994) holds that the strains of economic pressure have far reaching effects for family functioning and home atmosphere. The model relates increased financial burden with parents and caregivers' vulnerability against emotional symptoms such as anxiety, depression, and anger. Moreover, effects of inter-parental conflict and relationship dissatisfaction are shown to influence parent-child relationships, intensifying tension and stress in the home context. This model posits that financial burden affects child development indirectly through parental stress, which increases risk for parenting practices that are uninvolved, irregular, and harsh (Conger, Conger, & Martin, 2010).

On the other side of the economic spectrum, evidence suggests that youth from extremely wealthy families feel comparably high degrees of emotional and physical distance towards their parents as youth from impoverished families. These youth showed to report as much maladjustment as their middle and lower class counterparts in the areas of delinquency and substance use (Luthar &

Ansary, 2005; Luthar & Latendresse, 2005). Such findings shed light on whether higher SES youth are necessarily advantaged in domains excluding financial resources. In the field of developmental psychopathology research, first signs that evidenced maladjustment among high SES adolescents were observed in the domain of substance abuse (Luthar & D'Avanzo, 1999). Affluent, suburban youth were shown to exhibit higher levels of misconduct in comparison to the low-income, urban sample. To demonstrate, they were more prone to engage in substance use of all sorts, with 35% of affluent girls reporting substance use at least once, compared to their low-income counterparts who only reported 15% (Luthar & D'Avanzo, 1999). The same was true for boys as well, with 32% of high-income boys reporting substance use at least once, versus a 22% among their low-income counterparts (Luthar & D'Avanzo, 1999). Furthermore, comparable levels of delinquency in relation to urban youth in poverty were indicated, with 1 in 10 affluent adolescents manifesting high levels of delinquency, substance use, and school disengagement, which translated to poor academic outcomes during the high school years (Luthar & Ansary, 2005). The relative price of illegal substances may be lower for high SES adolescents compared to lower SES adolescents, as research finds increased prices for illicit substances to be associated with decreased consumption (Chaloupka & Warner, 2000; Cook & Moore, 2000; Farrell, Manning, & Finch, 2003; Keeler, Hu, Barnett, Manning, & Sung, 1996). Repercussions of antisocial behaviors for wealthy adolescents in the long run are unknown at this time, reflecting the need for longitudinal research on problem behaviors of the high SES population, beginning from childhood and extending into adulthood to identify potential antecedents and its relationship to future adjustment (Luthar & Ansary, 2005; Luthar & Sexton, 2004).

Internalizing problems such as envy, extrinsic goals, body dissatisfaction and perfectionism were additional particularly predominant dimensions that the affluent group displayed apparent disadvantages compared to the lower-SES group, especially among girls (Lyman & Luthar, 2014). Body dissatisfaction was associated with both internalizing problems and a sense of lost personal mastery, raising concerns for adverse affects on personal and psychological adjustment (Lyman & Luthar, 2014).

These findings indicate that children in both high and low socioeconomic environments are vulnerable to risks for future adjustment problems. Although balancing work and family life is a struggle for all employers, those with increased work hours that follow highly educated professional and managerial positions face particular challenges. Employers' expectations of total absorption and prioritization of work, increased competition, and declining job security all contribute to the long work hours in the most well paid workplaces throughout the industrialized world (Wharton & Blair-Loy, 2006). This caused widespread feelings of insufficient family time for employers who wished more time together with children, particularly in dual-earner families (Bianchi & Milkie,

2010). These concerns are rightly so, as research indicates that insufficient time engaging with children predicted higher levels of future risky behaviors during adolescence (Crouter, Head, McHale, & Tucker, 2004). In addition, a spike in women's employment were seen in 1999 (at 60%), which may indicate more women who are mothers spending time away from home and their children, resulting in more distant parent-child relationships (Bianchi & milkie, 2010; Buehler & O'Brien, 2011; Gennetian, Hill, Lopoo, & London, 2010). According to the family stress model, such societal changes that marked the early 2000s may have affected perceptions of emotional distance within high SES children who have parents spending more time away at work. Although affluent communities have easier access to acquire appropriate systems of treatment and support, many parents feel hesitant to seek for professional or clinical assistance for children's emotional problems. Consequently, psychologists in affluent schools have warned that children from wealthy families may be lacking the supports of school-based mental health services that their middle class counterparts are routinely utilizing (Luthar & Latendresse, 2005).

As much previous literature concentrates on the adverse outcomes of the low-SES population, teachers, policy makers, intervention designers, and program administrators may be less concerned with potential long-term implications of difficulties within high SES populations (Humensky, 2010). While some research has examined difficulties among high SES youth and adults, no research (to my knowledge) exists on the difficulties of high SES children. If there is proven evidence that high SES youth and adults experience comparable levels of adversity, it is necessary to direct more attention towards their younger counterparts and prevent difficulties earlier, which is what this dissertation aims to do.

2.3 STUDENT-TEACHER RELATIONSHIP AS A POTENTIAL MODERATOR

While early problem behaviors are known to be stable, past research suggests that there also exists opportunities for positive change (Eldevik, Hastings, Hughes, Jahr, Eikeseth, & Cross, 2010). It is therefore important to identify predictors of serious behavior problems, to aid the design of effective and evidence-based intervention programs.

2.3.1. STUDENT-TEACHER RELATIONSHIP AND PROBLEM BEHAVIOR

Schools are contexts that are ideally characterized by a safe and supportive learning environment, as well as fostering students' personal and social growth (Calvert, 2009). Within the

school setting, teachers are expected to follow guidelines, professional codes of practice, and undergo training in order to deliver high-quality instruction, monitor student progress, differentiate lessons to accommodate the wide spectrum of student abilities, and manage student behavior (Bub et al., 2007; Orsati & Causton-Theoharis, 2013). Educators are also in charge of supporting students' academic achievement and are aware of the relationship between behavior and academic outcomes. That is, students who engage in appropriate behavior at school are more likely to obtain higher grades. Alternatively, children who constant displays of problem behavior are more inclined to receive exclusionary discipline practices that disrupt instruction time, resulting in a process of falling behind both academically and socially (Mitchell, Hirn, & Lewis, 2017). Considering the substantial portion of time children spend in school, teachers may serve as an important role in promoting positive behavioral changes.

Research suggests that high-quality student-teacher relationships may be a key factor to such changes. Through relationships individuals acquire fundamental interaction skills, establish attribution biases, inter- and intra- personal skills, and scaffold the formation of important socio-emotional and behavioral skills. High levels of closeness and low levels of conflict constitute high-quality relationships, while low levels of closeness and high levels of conflict characterize low-quality relationships. High-quality relationships are essential for the healthy development of socio-emotional adjustment by fostering appropriate self-regulatory, coping, and prosocial skills, and are associated with lower levels of externalizing and internalizing problems (Pianta, 1999).

In contrast, low-quality relationships have shown to be related to higher levels of internalizing and externalizing problems, negative school attitudes, lower academic achievement and classroom participation, less prosocial behavior, future peer rejection and exclusion, hyperactivity, and disciplinary problems (Koomen, Verschueren, van Schooten, Jak, & Pianta, 2012).

Although student-teacher relationships and behavior problems seem to have a straightforward relationship, research reveals the dynamic nature of children's relationships with teachers, which experience qualitative changes over time (O'Connor et al., 2011). For instance, fluctuations in children's physical, social, emotional, and cognitive growth are expected to affect student-teacher relationships. More specifically, children's reliance and dependency on teachers may decrease as children develop language skills, independence, and autonomy. Additionally, relationship closeness may decline near adolescence as children become more fixated on their relationships with peers. Nevertheless, there is theoretical and evidence-based support for a directional association between teacher-student relationship and children's behavior, as will be explored in this study (Bergin & Bergin, 2009).

2.4 GAPS IN THE LITERATURE

Cross-disciplinary evidence on high SES adult populations suggests risks in several mental health domains (Aknin, Norton, & Dunn, 2009; Luthar & Latendresse, 2005; Quoidbach, Dunn, Petrides, & Mikolajczak, 2010). For example, epidemiologists have acknowledged that material wealth is associated with higher depression rates. Economists have recognized the pressures to work exhausts personal energies, while psychologists associate little leisure time with the high productivity associated with affluence, resulting in stress, burnout, and poorer mental health (Kasser & Ryan, 1993, 1996; Ryan, Chirkov, Little, Sheldon, Timoshina, & Deci, 1999; Sheldon & Kasser, 1995). Even if high SES adults are truly vulnerable to adversity due to wealth related facets, some contend that this distress does not emerge during childhood owing to the ability to afford various forms of professional help such as mental health services or alternative caregivers, and accessibility to environmental safety nets such as resourceful schools and skilled psychotherapists (Luthar & Ansary, 2005; Luthar & Burack, 2000).

A large and increasing research literature identifies poverty as a risk factor associated with many negative outcomes for children and their parents (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Duncan et al., 2010; Vernon-Feagans & Cox, 2013). If thought of reversely, it can be speculated that high socioeconomic status is associated with many protective factors. Consequently, high SES could expect to be linked with positive parenting. In fact, high socioeconomic status has been shown to predict higher quality of parent-child interaction, as negative patterns of interaction by depressed mothers have less drastic effects on the quality of parent-child interaction for high SES mothers compared to their low SES counterparts (Stein, Malmberg, Sylva, Bames, Leach, & the FCCC team, 2008). However, such studies have not inspected the development in behavior and internalizing problems over time to observe when the protective factors of high SES are no longer as effective.

As much of the research, policy, and intervention efforts focus on children from low SES backgrounds, this study hopes to investigate children at the other end of the socioeconomic spectrum, in order to help parents, teachers, and practitioners to identify and help children who may be at risk. There is no doubt children in poverty are susceptible to far more adversities in regards to the co-occurring and cumulative risk factors they encounter. On the other hand, adults such as teachers, researchers, and administrators in school may be less likely to be aware of the need for efforts in higher-income areas if the focus is exclusively on lower SES populations. The principle of equifinality suggests that several pathways exist for problem behaviors, and that these pathways may unfold differently for children from high- and low-SES environments (Drabick & Kendall, 2010;

Schonberg & Shaw, 2007). For instance, not only will there be different risk and protective factors for high- and low- SES children, antecedent-consequence linkages are complex and the ways in which the same factors manifest within the lives of each individual child are disparate (Cox, Mills-Koonce, Propper, & Garipey, 2010). The present study has been conceptualized to direct attention to these issues, with the main aim of establishing adversities potentially overlooked at the other socioeconomic extreme, and the moderating effects of student-teacher relationships as an educational intervener.

2.5 PRESENT STUDY

The present study analyzes three topics: 1) how problem behavior develops between the ages of three, five, seven, eleven, and fourteen; 2) how student-teacher relationships moderate this problem behavior development between the ages of eleven and fourteen; and 3) how internalizing problems develop across gender and SES groups between the ages of three, five, seven, eleven, and fourteen. The use of the longitudinal and nationally representative data from the Millennium Cohort Study (MCS) will ensure that the findings from this study will contribute to the existing literature in the field of developmental research.

The following section will now outline the traditional theoretical approaches to examining problem behavior, which has developed over time and the theoretical model that guides the structure of the present analyses.

2.6 THEORETICAL MODEL

2.6.1. PREVIOUS THEORIES REGARDING PROBLEM BEHAVIOR DEVELOPMENT

Understanding the developmental paths and correlates of behavior problems is a key aim for the field of developmental psychopathology. Accordingly, several approaches have been employed to interpret maladaptive behavior patterns within children and their developmental trajectories, evolving over the past three decades to converge on an integrative understanding of adjustment and developmental psychopathology in young children. In the context of the current study, these theoretical advances serve as critical roles in acknowledging the potency of early problem behaviors

to induce future life outcomes and informing the design and implementation of interventions (Dunlap & Fox, 2011).

During the early 1970s in the beginning stages of developmental theories, early childhood behavior problems were regarded as part of normative development, with minor implications for later functioning. As such, limited concern of early childhood problem behaviors mirrored the conceptual gaps in the developmental issues of young children's psychopathology (Campbell, Shaw, & Gilliom, 2000). Efforts to intervene only emerged after the child entered school and the problem behavior persisted in high frequency and severity. These earliest attempts to provide professional treatment for children conceptualized problematic behaviors from an individual and biological focus, attributing behavioral difficulties to individual characteristics (Cooper, Smith, & Upton, 1994). Over time, investigations on early infant temperament suggested that a difficult index of temperament, characterized by high levels of irritability and inconsolability, might signal embarking behavior problems. Thomas and his colleagues' (1968) work on temperament and behavior problems built upon these theoretical advances by focusing attention on the "goodness-of-fit" between parents and children. From this point on emerged work on transactional systems (Sameroff & Chandler, 1975) and attachment theory (Aisworth, 1973; Bowlby, 1969), which advocated for the significance of parental engagement and relationship quality for healthy development. These advances on infant temperament, dynamics of parent-child interactions, and quality of attachment generated revived interest in parenting and development. These in turn motivated the rise of more complex models, presenting multiple interactive factors that could shape a difficult infant to become either an agreeable toddler, or an increasingly stubborn and defiant toddler.

Theoretical ideas evolved over time to conceptualize two fundamental frameworks of problem behavior development, behavioristic and systemic. Behaviorism perceives that all behavior occurs as a result of reinforcement. In the context of problem behavior in schools, the reactions of the teachers and other students are common ways problem behavior is being reinforced. The attention the child receives from the teacher and other students to stop problem behavior may either strengthen or reinforce the same behavior that it was intended to eliminate. This framework entails the possibility to change behavior by regulating the consequences of the unwanted behavior. On the other hand, systemic theorists conceptualize behavior in the context in which it has been developed. As such, this framework understands problem behavior in schools through the contexts that surround the child, such as the classroom environment or family system. In this framework, problem behavior is seen as arising from interactions of contexts that surround the child, instead of from within children. From this perspective, interventions can effectively begin at any point in the system, since contexts within a system are interconnected, meaning a single change applied to one part of the system will result in a

chain reaction of changes throughout related systems. For example, a change in the student's behavior will impel a change in their teacher's behavior and vice versa.

From this point emerged the biopsychosocial perspective, which posits that the complex mechanisms between genetic predispositions, social experiences, and environmental influences are in constant, fluid, and dynamic interaction to shape behavioral development. A core element of the model recognizes that biological systems are significantly influenced by environmental factors such as nutrition, parenting styles, poverty, and peer influences from the earliest stages of life (Cooper et al., 2013). The present comprehensive understanding of the biological, social, and environmental influences that affect behavior reflects the theoretical development overtime and strengthens researchers' capacity to ability to meet the needs of children and families.

2.6.2. THEORETICAL MODEL ANALYZED IN THIS STUDY

This dissertation focuses on the mechanisms by which socioeconomic status interacts with the educational moderator of student-teacher relationships to translate into child outcomes. The quantitative analysis undertaken is informed by a number of theoretical models that hypothesize different routes through which problem behaviors develop over time. The current study is based on a model linking one indicator of socioeconomic status to child behavior outcomes measured from age 3 to age 14 (see Figure 1).

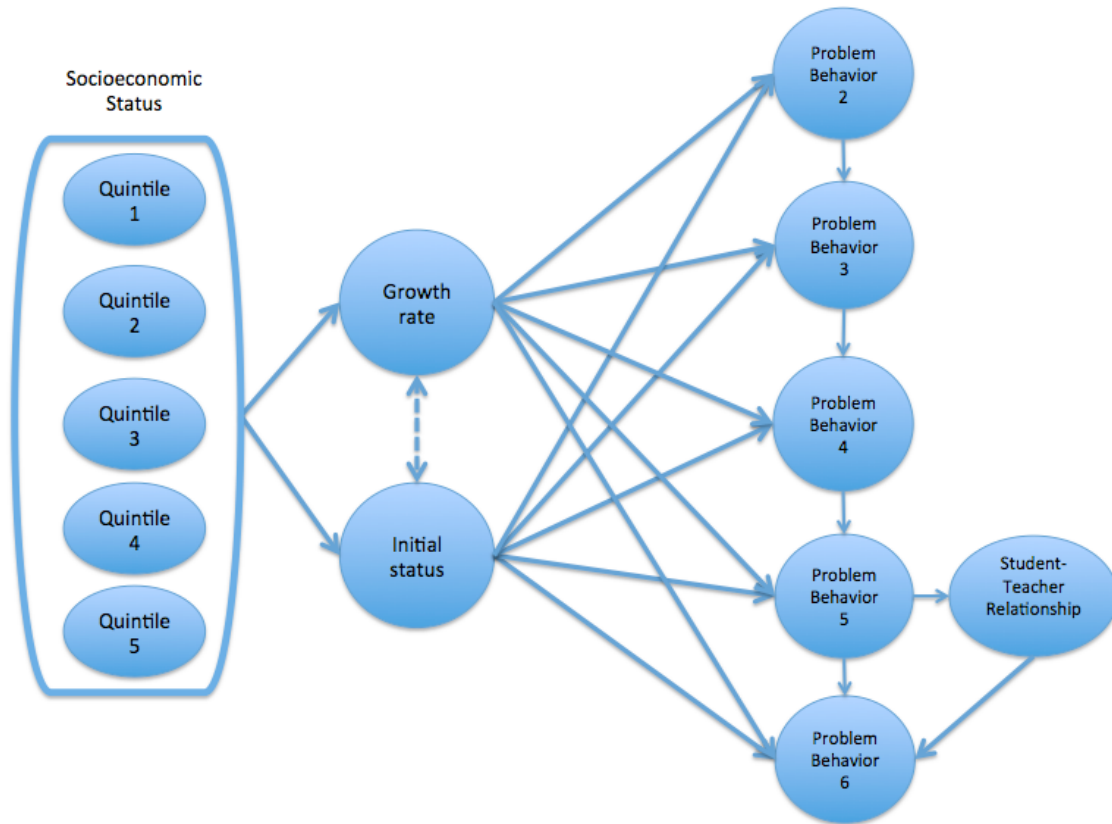


Figure 1. Full model linking socioeconomic status to child behavior outcomes

The starting point of figure 1 is that there are strong socioeconomic gradients in developmental outcomes observed at all ages. The socioeconomic gradients are measured by the five income quintiles, with quintile 1 representing the lowest income quintile and 5 the highest. Next, some potential pathways or ‘moderating factors’ with which socioeconomic differences may interact to alter poor behavioral development are explored. The potential moderating factor examined in this paper is student-teacher relationships at age 11, chosen on the basis of developmental success established by past literature and data availability.

CHAPTER 3: METHODOLOGY

This chapter will describe the methodology incorporated in this study. The study's sample, recruitment process, and ethical considerations will first be outlined. Next, procedures concerning the secondary data analysis employed will be discussed. Third, the measures included in the analysis and accompanying validation efforts will be examined. Finally, the study's research hypothesis and related statistical approach will be reviewed.

3.1 THE SAMPLE

The present study utilizes the nationally representative and longitudinal data from the Millennium Cohort Study (MCS) (Hansen, 2012). The MCS was funded by the Economic and Social Research Council (ESRC) to enable child development research, and includes information collected from over 19,000 UK families on a wide range of issues including parenting, childcare, school, child behavior and cognitive development, child and parental health, parents' employment and education, income and poverty, housing, and neighborhood (Hansen, 2012).

The parents and their children were recruited between years 2001-2002 at the age of 9 months and followed up in succeeding data sweeps at ages 3, 5, 7, 11, and 14 years. Parents involved in the study all provided informed consent, and children under 18 years completed questionnaires with opt-in consent. The MCS data is available to researchers through application to the Essex Data Archive. The original MCS data collectors received ethical clearance from organizations including the National Health Service Ethical Authority as well as the London Multi-Centre Research Ethics Committee. This dissertation uses the data as according to the original consent provided by the participants.

3.1.1. RECRUITMENT

Sampling for the MCS included random selection of participants from Child Benefit records administered by the Department of Social Security (Hansen, 2012). In order to ensure the sample remained representative over time, it is clustered geographically and stratified disproportionately to over represent areas with larger percentages of ethnic minorities, high levels of poverty, and the three smaller countries of the UK (Croft, Stride, Maughan, & Rowe, 2015). Individuals taking part in other cohort studies were omitted from the study's sample. All parts of the sampling process ensured random selected, excluding the over-sampling and omission of those taking part in other studies

(Hansen, 2012). After recruitment, the sample was categorized into regional and economic strata: England-advantaged, England-disadvantaged, England-ethnic, Northern Ireland- advantaged, Northern Ireland- disadvantaged, Scotland-advantaged, Scotland-disadvantaged, Wales-advantaged, Wales-disadvantaged.

3.1.2. ANALYTIC SAMPLE IN THIS STUDY

The final sample used in this study was selected in accordance with the main aims of the research goals. The following criteria had to be satisfied in order to be included in the analytic sample. Since the effects of student-teacher relationship were to be examined, children who did not have information on this construct were omitted. Then, because this study aimed to observe changes in problem behavior trajectories over five time points, children who did not have data on at least three time points were omitted as well. Lastly, the final data set was separated by gender and SES to further examine internalizing problems across high SES boys and girls in research question 3. As such, the analytic sample contains cohort members present at sweeps 2, 3, 4, 5, and 6, and includes a total of 11,796 children for the final analyses. Due to the requirements of the study, the remaining sample is considerably smaller than the total MCS sample size.

3.1.3. NEW USE OF THE DATA

This dissertation uses data from the MCS in a variety of new ways. Similar studies exist which examine developmental outcomes based on different socioeconomic gradients using the MCS data. Dearden and her colleagues (2011) examine how socioeconomic gradients influence cognitive and behavioral outcomes in early childhood, but only up to the age of 5, as data was only available up to this age during the time of research. Kiernan and Huerta (2008) has also looked into how economic circumstances are associated with children's cognitive and behavior development at age 3, but examine parenting behaviors and attitudes as mediating variables. Other similar studies exist examining different combinations of mediators and developmental outcomes in families of various socioeconomic gradients (e.g., Bruckauf & Chzhen, 2016; Del Bono, Francesconi, Kelly, & Sacker, 2014; Flouri, Mavroveli, & Tzavidis, 2009; Flouri, Midouhas, Joshi, & Sullivan, 2016; Flouri & Sarmadi, 2015). However, this is the first MCS study which examine the differential effects of student-teacher relationships on problem behavior, with a particular focus on high SES children and the internalizing problems they may be experiencing. As such, this study will build upon the existing MCS literature by exploring novel pathways between problem behavior and student-teacher relationships among high SES children.

3.2 ANALYTIC APPROACH: SECONDARY DATA ANALYSIS

This study uses data collected in the MCS to investigate the research questions outlined in section 1.3. Since this dissertation's data is drawn from existing MCS data but undertakes new research questions, it is described as secondary data analysis (Dunn et al., 2015).

3.2.1. ADVANTAGES OF SECONDARY DATA ANALYSIS

There are several advantages to using secondary data for analysis (Cheng & Phillips, 2014; Dunn, Arslanian-Engoren, DeKoekkoek, Jadack, & Scott, 2015; Smith, 2008). First, secondary data allows researchers to access and use data, which would be difficult to collect themselves (Dunn et al., 2015). Further, secondary data typically uses validated and reliable surveys and questionnaires, enabling the researcher to obtain reliable information derived from a large sample. This large sample size is also advantageous, as it not only allows findings to be generalizable, but also presents the opportunity to discover statistically significant results (Smith, 2008). This generalizability is highly regarded by policy makers since it allows the conducting of policy worthy analyses and novel contributions to the body of already existing research (Dunn et al., 2015; Smith, 2008).

3.2.2. DISADVANTAGES OF SECONDARY DATA ANALYSIS

The first disadvantage of secondary data analysis commonly pointed out is the absence of taking part in the data collection procedure, which eliminates opportunity to experience the lives of the participants, resulting in research that exclusively involves numbers (Smith, 2008).

The second disadvantage, which is relevant to the research analyses in this study, is whether the study's research aims agree with the original intent of the secondary dataset (Aponte, 2010; Cheng & Phillips, 2014; Smith, 2008). This dissertation aims to examine the relationships between socioeconomic status, student-teacher relationship, and the development of problem behavior and internalizing problems. While the underlying aims put forth by the collectors of data for the MCS encompass the present study's aims to improve child development knowledge and outcomes, the precise measures used for student-teacher relationships may be slightly different from optimal measures (Hansen, 2012). Nevertheless, the use of secondary data analysis enables the present analysis to be administered.

3.3 ETHICS

For this dissertation, ethical approval was gained by the Departmental Research Ethics Committee (see Appendix A). After granted ethical approval, the MCS datasets were requested from the UK National Data Archive. Once approval by the Data Archive, the datasets were downloaded onto an encrypted personal computer.

During the original data collection process of the MCS, ethical approval was granted for each sweep by the National Health Service's (NHS) Research Ethics Committee (REC). For sweep one, ethical approval was granted from the Southwest REC in February 2001. For sweeps two and three, the London REC granted ethical approval in September 2004 and December 2005, respectively. In sweep four, ethical approval was gained from the Northern REC in February 2008 and sweep five gained ethical approval from the Northern and Yorkshire REC in July 2011 (Hansen, 2012). All participants of the MCS gave opt-in consent, and each child participant provided consent through an adult (Hansen, 2012).

3.4 MEASURES

The measures used for this dissertation will be described in this section. These measures include: socioeconomic status, problem behavior, student-teacher relationship, and internalizing problems. Some of these variables have been created via confirmatory factor analysis (CFA), which enables multiple observed variables to represent a latent construct. CFA evaluates whether the group of indicators represent an underlying construct (Blunch, 2008). For example, CFA could evaluate if questionnaire items accurately represent a single trait. The CFA demonstrated that the items for problem behavior, student-teacher relationship, and internalizing problems were well represented by a single underlying factor (see Appendix B). Once CFA confirmed the latent variables, measurement invariance models were then specified to observe if the latent variables consistently measured the underlying construct over time. Each measure and the accompanying efforts to establish reliability and validity will now be discussed.

3.4.1. MEASUREMENT INVARIANCE

The longitudinal consistency of measurement was assessed for the constructs of problem behavior and internalizing problems, to confirm that change over five time points resulted from authentic developmental change rather than from measurement inconsistency. Between groups invariance was

measured for internalizing problems as well, to test for invariance across groups. Measurement invariance models tested for this, and established strong invariance for the measurement of problem behavior and weak invariance for the measurement of internalizing problems (see Appendix C). For the measurement of internalizing problems, weak invariance was acceptable for observing regression weights within autoregressive parameters (Cieciuch, Davidov, Schmidt, Algesheimer, & Schwartz, 2014).

3.4.2. *DEPENDENT VARIABLE: PROBLEM BEHAVIOR*

The first outcome measure examined in this study is problem behavior, measured by the well validated Strengths and Difficulties Questionnaire (Goodman, 1994). The SDQ is extensively utilized for identification and assessment for externalizing and internalizing problems in research, clinical, and community settings (Vaz et al., 2016).

Five subtypes of children's behavior (conduct problems, hyperactivity/inattention, emotional problems, peer problems, and prosocial behaviors) are assessed each with 5 questions, which were summed up to provide a total score for each dimension. The four subtypes of difficult behavior, which exclude the items corresponding to prosocial behavior, were summed up to create a composite total difficulties score. Higher values indicate higher problem behavior for this score. Parents answered each question with 0 (not true), 1 (somewhat true), or 2 (certainly true). The means, standard deviations, skew, and kurtosis values for the four indicators are shown in table 1.

Table 1

Means, Standard deviations, skew, and kurtosis values for problem behavior indicators at sweep 2

Item	Mean	SD	Skew	Kurtosis
Emotional Symptoms	1.34	1.48	1.57	3.33
Conduct Problems	2.76	2.04	.74	.29
Hyperactivity / Inattention	3.82	2.33	.47	-.31
Peer Problems	1.52	1.59	1.13	1.12

Table 1 indicates fairly low levels of average problem behavior ratings and relatively consistent standard deviations across the four indicators. Table 1 also shows the skew and kurtosis,

which values range from .47 to 1.57 for skew and -.31 to 3.33 for kurtosis. A skew of +/- .5 and a kurtosis of +/- 1.00 are generally agreed values of slight non-normality, and a skew of 1.75 and kurtosis of 3.75 indicate severe non-normality (Lei & Lomax, 2005). According to this rule, values indicated in table 1 show values between the range of slight and severe non-normality, which were corrected by converting the four items into a single latent construct. By definition, latent variables are normally distributed and continuous (Kline, 2011). This means that although problem behavior is measured using four non-normally distributed ordinal indicators, the latent problem behavior construct is said to be normally distributed and continuous. As such, the problem behavior measure was transformed into a single normally distributed continuous variable from the four non-normally distributed continuous variables with CFA.

Internal consistency was further inspected with the Cronbach's alpha statistic, which had values of .64, .65, .69, .73, and .72 for the construct of problem behavior at sweeps 2, 3, 4, 5, and 6, respectively. Although the values for some sweeps are below the common benchmark of .7 (Kline, 2011), other researchers (Hinton, Brownlow, McMurray & Cozens, 2004) have argued that Cronbach's alpha values above .5 are acceptable and reflect moderate reliability, particularly in large sample studies with latent variables (Little, Lindenberger, & Nesselroade, 1999). Considering the large analytic sample and the latent nature of problem behavior in this study, the Cronbach's alpha ratings were considered acceptable.

Lastly for construct validity, several studies have established the construct validity and reliability of the SDQ total difficulties score across different sex, age, race/ethnicity and income subgroups (He, Burstein, Schmitz, & Merikangas, 2013; Riso, Salcuni, Chessa, Raudino, Lis, Altoe, 2010; Roy et al., 2008; Stone, Otten, Engels, Vermulst, & Janssens, 2010). Those authors have also confirmed the internal consistency, test-retest reliability, concurrent validity, predictive validity, and inter-rater agreement of the SDQ. According to the CFA results, acceptable Cronbach's alpha values, validation efforts from previous studies, and measurement invariance models, the problem behavior measure was judged to be sufficiently reliable for this study.

3.4.3. DEPENDENT VARIABLE: INTERNALIZING PROBLEMS

The second dependent variable examined for this study is internalizing problems, aiming to observe at greater depth the patterns of internalizing problem development within high SES children. The sub dimension of 'emotional symptoms' within the SDQ was selected to represent this construct as a latent variable. Although many researchers utilize the 'peer problems' sub dimension in addition to the emotional symptoms dimension when operationalizing internalizing problems with the SDQ, this study deliberately only included the emotional symptoms items on the basis of the existing

literature, which highlights problems in emotional symptoms within the high SES population (Lyman & Luthar, 2014; Luthar & Latendresse, 2005). This scale is based on the sum of the five indicators, each measured using five questionnaire items. The descriptive statistics of the five items are presented separately for each quintile in table 2 and 3.

Table 2

[Quintile 5] Means, standard deviations, skew, and kurtosis of internalizing problem indicators at sweep 2

Items	Quintile 5 Boys				Quintile 5 Girls			
	Mean	SD	Skew	Kurtosis	Mean	SD	Skew	Kurtosis
Complains of headaches/stomachaches/sickness	1.07	0.29	4.42	20.58	1.1	0.34	3.66	13.68
Often seems worried	1.07	0.28	3.78	14.46	1.06	0.24	4.54	21.56
Often unhappy	1.04	0.20	5.68	34.4	1.04	0.21	5.52	32.8
Nervous or clingy in new situations	1.6	0.67	0.68	-0.63	1.61	0.66	0.62	-0.65
Many fears, easily scared	1.28	0.51	1.54	1.44	1.28	0.52	1.69	1.97

Table 3

[Quintile 1] Means, standard deviations, skew, and kurtosis of internalizing problem indicators at sweep 2

Items	Quintile 1 Boys				Quintile 1 Girls			
	Mean	SD	Skew	Kurtosis	Mean	SD	Skew	Kurtosis
Complains of headaches/stomachaches/sickness	1.22	.512	2.34	4.55	1.26	.55	2.02	3.03
Often seems worried	1.18	.451	2.50	5.69	1.13	.40	3.28	10.51
Often unhappy	1.14	.402	2.90	8.13	1.13	.39	3.15	9.78
Nervous or clingy in new situations	1.76	.755	.43	-1.14	1.79	.76	.38	-1.19
Many fears, easily scared	1.45	.661	1.17	.13	1.52	.68	.94	-.34

As observed in tables 2 and 3, the problematic skew and kurtosis were corrected by converting the four items into a single latent construct. This decision was approved by the CFA results (see Appendix B), and the measurement invariance results (see Appendix C) indicated weak but acceptable longitudinal and group invariance (Cieciuch et al., 2014). The Cronbach alpha values for sweeps 2, 3, 4, 5, and 6 were, .51, .59, .65, .71, and .72 respectively, establishing internal consistency. Once again, recent studies (He et al., 2013; Croft et al., 2015) confirm the consistency and validity of all subscales of the SDQ, including the dimension of emotional symptoms used in this study. According to the CFA results, acceptable Cronbach's alpha values, validation efforts from previous studies, and measurement invariance models, the internalizing problem measure was judged to be sufficiently reliable for this study.

3.4.4. INDEPENDENT VARIABLE: SOCIOECONOMIC STATUS

The independent variable examined for this study is socioeconomic status, aiming to examine some of the routes through which SES gradients affect problem behavior development in the early years up to age 14. To measure socioeconomic inequalities, the single indicator of OECD income quintiles was used. This measure adjusted family income by accounting for the number of people in the household (Hansen, 2008; OECD, 2013). This single indicator was selected to represent socioeconomic status on the contextual basis and research interests of the study (see section 2.2.1). The variable OECD income quintiles divide the sample into five separate income quintiles. Quintile five represents children from the highest income level, and quintile one represents children from the lowest income level. In the third part of the analysis, differences in internalizing problems between the top and bottom quintiles are examined, in addition to if and how student-teacher relationships could act to moderate the negative trajectories present within different groups of children. The frequencies and percentages of this single indicator are presented in table 4.

Table 4

Frequency and percentage of each quintile at sweep 1

	OECD Income Quintile	Frequency	Percent	Valid Percent
Valid	1	2335	19.8	20.5
	2	2365	20	20.8
	3	2232	18.9	19.6
	4	2299	19.5	20.2
	5	2139	18.1	18.8
	Total	11370	96.4	100
Missing		426	3.6	
Total		11796	100	

As seen in table 4, the MCS sample is distributed evenly across the five income quintiles, with approximately 2200 children in each group. Further validation tests for internal consistency were unnecessary because of the nature of a single indicator construct. As for construct validity, Goisis, Sacker, and Kelly (2015) used the OECD income quintile variable from the MCS in the same ways as intended in this study, to measure socioeconomic status. Other studies (Patalay, Moulton, Goodman, & Ploubidis, 2017; Waldfogel, 2013) have also used the OECD income quintiles to represent socioeconomic status, supporting its validity to measure SES.

3.4.5. MODERATING VARIABLE: STUDENT-TEACHER RELATIONSHIP

The moderating variable of student-teacher relationship is a construct represented using two child questionnaire items from MCS sweep 5. One indicator was reverse coded for consistency, and a higher value on the construct mean represents a positive relationship between the student and teacher. Both indicators, which were collected only at MCS sweep 5, are presented with their means, standard deviations, skew, and kurtosis values in 5.

Table 5

Means, standard deviations, skew, and kurtosis for student-teacher relationship indicators at sweep 5

Item	Mean	SD	Skew	Kurtosis
How much do you like your class teacher? (Reverse Coded)	2.24	2.05	-4.437	19.352
How often do you think your class teacher is getting at you?	3.32	.825	-1.117	.606

Once again, the problematic skew and kurtosis values were addressed by transforming the two indicators into a latent variable. This decision was supported by the CFA results (see Appendix B). Internal consistency is demonstrated by the Cronbach alpha values, for which the student-teacher relationship measures had the value of .51 at MCS sweep 5. The acceptable Cronbach's alpha values and CFA values rendered the student-teacher relationship measure acceptable for this study.

Neither the two student-teacher relationship indicators nor the latent measure has been validated in previous studies, precluding confirmation of construct validity. However, content validity was confirmed instead (Punch, 2009), which means the items associated with student-teacher relationship match theoretical definitions of student-teacher relationship used previously (Hughes, Luo, Kwok, & Loyd, 2008; Konishi, Hymel, Zumbo, & Li, 2010; Rudasill, Reio Jr, Stipanovic, & Taylor, 2010). Nonetheless, previous research has yet to validate the measure of student-teacher relationship. Therefore, findings corresponding to the measure of student-teacher relationship should be interpreted with discretion.

3.5 RESEARCH QUESTIONS AND HYPOTHESIS

The research questions guiding this dissertation will be presented below, in conjunction with a hypothesis that stems from theory and research.

3.5.1. HOW DOES PROBLEM BEHAVIOR DEVELOP BETWEEN THE AGES OF THREE, FIVE, SEVEN, ELEVEN, AND FOURTEEN?

This study first aims to study the developmental trajectories of problem behavior from the ages of 3 to 14 among children. Based on past research which demonstrates that problem behavior levels decrease over time as children develop self-regulation and language capacities (Bongers, Koot, Ende, & Verhulst, 2008), it is hypothesized that problem behavior will show a generally linear and negatively declining trend. There is also a prediction for wide inter-individual variation across the sample, as developmental trajectories occur as cumulative consequences of multiple factors that result in extensive effects (Drabick & Kendall, 2010; Schonberg & Shaw, 2007). Lastly, it is hypothesized that the initial status and growth rate of problem behavior will have a positive relationship. This means that children with higher initial status of problem behavior at age 3 will experience steeper growth trajectories in comparison to children who started with a lower initial status, who will experience a relatively moderate trajectory. This is called the “launch model” hypothesis (Skinner, Zimmer-gembeck, & Connell, 1998), tested with the aim to examine growth trajectories of problem behavior between children. This launch model is presented in figure 2.

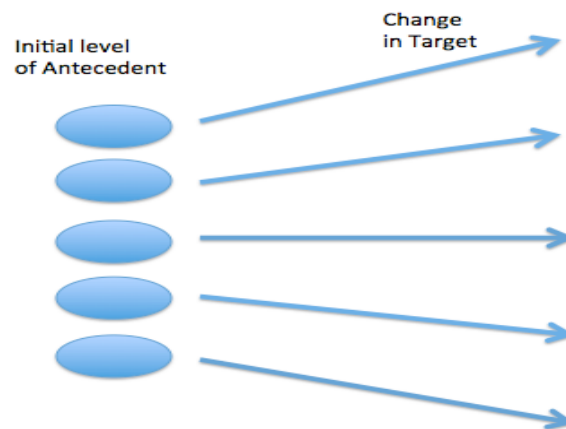


Figure 2. Launch model of development (Skinner et al., 1998)

3.5.2. HOW TO STUDENT-TEACHER RELATIONSHIPS MODERATE THIS PROBLEM BEHAVIOR DEVELOPMENT BETWEEN THE AGES OF ELEVEN AND FOURTEEN?

The second research question aims to examine the transactional effects between student-teacher relationships and problem behavior. Since student-teacher relationships were only measured at sweep five, effects were only observable at two time points, sweeps five and six. Student-teacher relationships are expected to reciprocally and negatively affect problem behavior development, with better student-teacher relationships predicted to be associated with less problem behavior.

This model is based on Sameroff and Chandler's transactional model (1975), which posits that development occurs through the transactional or reciprocal interactions of two or more factors. Transactional models are common ways to explain and understand behavior in social interactional situations, including behavior problems. To illustrate, an individual begins a transactional exchange by acting a certain way, which impacts those who are exposed to the behavior in some way. People exposed to the behavior react, which could include reacting positively, negatively, or by ignoring the action altogether. Depending on the response, the individual who began the exchange will react again. Thus, a transactional process develops between the individual and his or her social context, with each part influencing the other. The adapted model is shown in figure 3.

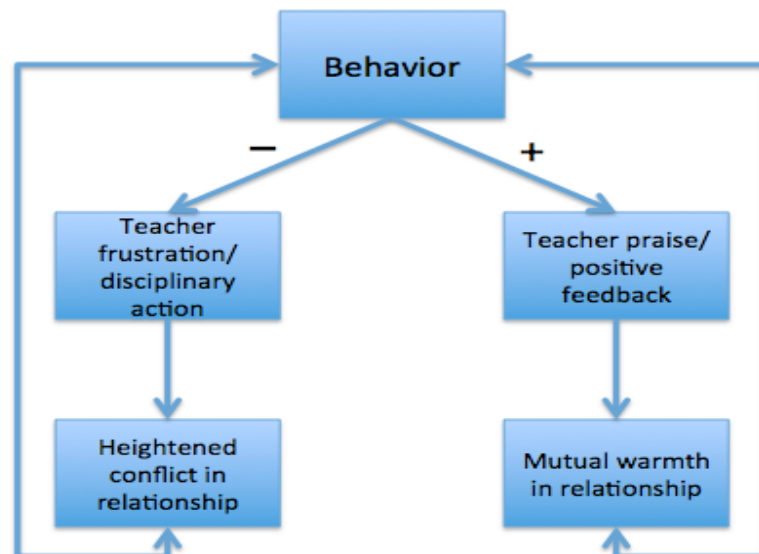


Figure 3. Adapted from the transactional model of behavior (Sameroff & Chandler, 1975)

Figure 3 demonstrates that behavior transacts with student-teacher relationship to form an either negative or positive system of interaction. For example, depending on the positive or negative nature of the behavior, either disciplinary action or positive feedback is initiated. Depending on the feedback, the child responds by perceiving either warmth or conflict, in turn responding with positive or negative behavior. This process repeats itself continuously, as child behavior and quality of student-teacher relationship shape one another through reciprocal interaction. This model is applied to answer the second research question, in order to examine the transactional process between student-teacher relationships and problematic behavior between the ages of 11 and 14. The effects of this moderator are hypothesized to influence the growth of problem behavior, in turn bearing implications for interventions. Student-teacher relationships and problem behavior are hypothesized to have a negative relationship, which means lower levels of problem behavior are predicted to evoke better student-teacher relationships, which are in turn expected to reduce levels of future problem behavior. This research question was answered by extending the basic latent growth model, by adding an additional relationship variable to investigate reciprocal effects. The portion from the full model that will be examined to answer this research question is shown in figure 4.

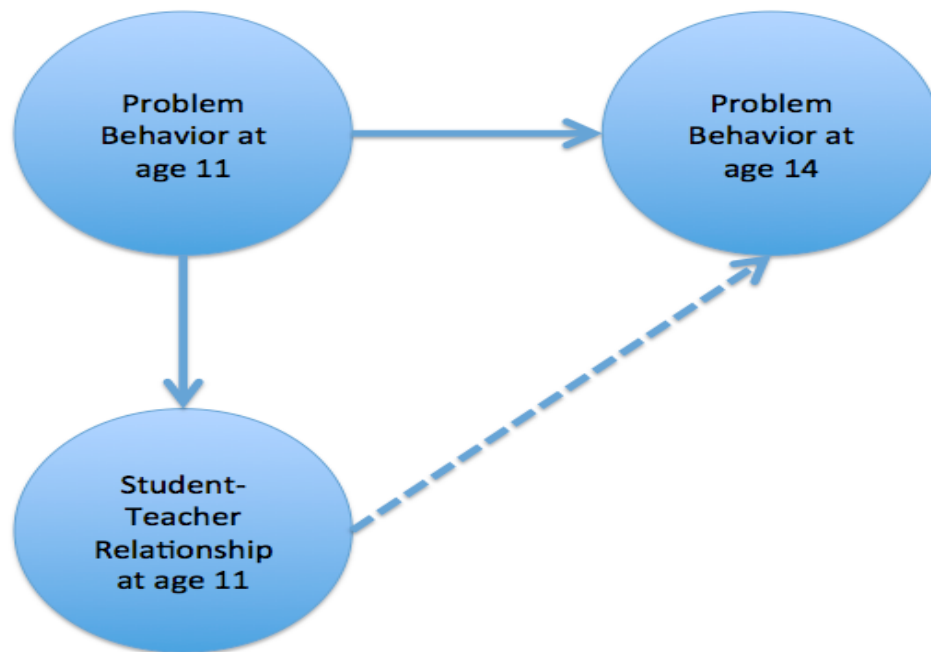


Figure 4. Direct and indirect effects of student-teacher relationships and problem behavior

As shown in figure 4, the direct effect of problem behavior on student-teacher relationships will first be observed. Then, the indirect effects of student-teacher relationships on problem behavior three years later at age 14 will in turn be examined. As such, the reciprocal interaction effects between problem behavior and student-teacher relationships will be investigated.

3.5.3. HOW DO INTERNALIZING PROBLEMS DEVELOP ACROSS GENDER AND SES GROUPS BETWEEN THE AGES OF THREE, FIVE, ELEVEN, AND FOURTEEN?

This study then aims to examine children from high-socioeconomic backgrounds in further detail. Previous studies indicate that high SES adolescents and adults are more at risk of some problem behaviors even more so than low SES adults and adolescents. Past research also shows that of the various types of problem behaviors, high SES adults and adolescents are more susceptible to internalizing problems (Aknin, Norton, & Dunn, 2009; Luthar & Latendresse, 2005; Quoidbach, Dunn, Petrides, & Mikolajczak, 2010). Internalizing problems have been found to be particularly prevalent among high SES adolescent girls, which have prompted further examination of this phenomenon across gender and socioeconomic groups (Lyman & Luthar, 2014; Luthar & Latendresse, 2005). Thus, the second research question aims to examine high SES children in closer detail, by observing the trends in internalizing problems across girls and boys over time. An autoregressive model is specified to examine this, presented in figure 5.

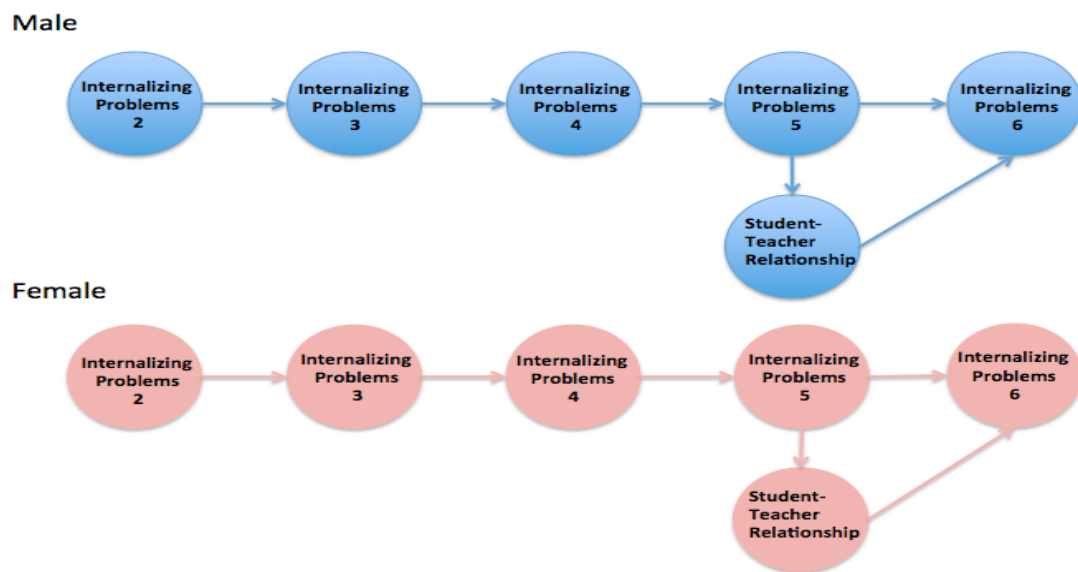


Figure 5. Patterns of internalizing problems across boys and girls

Figure 5 is the model used to observe gender and SES differences in internalizing problems over time. The same model in figure 5 will be run on both quintiles 1 and 5, to observe the patterns of internalizing problems and the effects of student-teacher relationships across disparate population groups. It is hypothesized that children in poverty will exhibit highest levels of problem behaviors, because of the cumulative and multidimensional risks of poverty that negatively affect behavior. Aside from the aforementioned hypothesis, patterns of antecedents, early signs of potential problems, or implications for intervention design associated with high SES children between the age of three, five, seven, eleven, and fourteen are hoped to be identified through the analysis of this research question.

3.6 STATISTICAL APPROACH: STRUCTURAL EQUATION (SEM)

To analyze the relationship between socioeconomic status and problem behavior trajectories over time, secondary data analysis was conducted using the data collected in the Millennium Cohort Study. All structural equation modeling was conducted using Mplus, which is regarded as one of the most advanced software to conduct the structural equation modeling specified in this dissertation (Duncan et al., 2006). The latent growth curve (LGC) modeling within the SEM was employed in order to analyze the problem behavior trajectories of children, and if these patterns can be moderated by an educational variable, student-teacher relationships.

LGC modeling is considered to be among the most effective procedure when analyzing longitudinal data (Byrne, 2012). The LGC model parameterizes time by relating the latent variables that are measured over multiple time points as intercept and slope (Byrne, 2012). Of the numerous different types of LGC models capable of being tested with Mplus, the current model represents a curvilinear growth model with continuous outcomes and autoregressive parameters between each time point.

LGC modeling tests the hypotheses of how latent growth features interact over time to produce a combined effect on subsequent growth outcomes. The first step in specifying a LGC model is to analyze the intra-individual growth trajectory, which means determining the direction and extent to which scores for problem behavior change across 9 months, 3 years, 5 years, 7 years, 11 years, and 14 years after birth, for each child. An intercept-slope model is specified representing a growth model in which individual differences in initial status (intercept) and rate of change (slope) of problem behaviors are estimated. To test for curvilinear trends, a minimum of four time points of data is needed. Since this study observes problem behavior over five time points, curvilinear trends were

explored. This allowed the LGC model to include three growth parameters: an intercept parameter representing a child's score on problem behavior at 9 months; a slope parameter representing their rate of change over the course of an approximately 14-year period; and a quadratic factor capable of capturing any curvature that might be present in the trajectories of problem behavior. The factor loadings have been fixed at a value of 0, 2, 4, 8, and 11, which represent the number of years from the initial measurement time (i.e., ages 3, 5, 7, 11, and 14).

3.6.1. COVARIATES

The statistical models tested in this dissertation controlled for the nine MCS strata referred to in section 3.1.1 in order to separate the exclusive effect of SES and student-teacher relationships on problem behavior and internalizing problems. Controlling for strata made sure that the over-sampling undertaken during sample recruitment did not affect the results, as found in past studies (Flouri, Tzavidis, & Kallis, 2010; Malmberg & Flouri, 2011).

3.7 GOODNESS-OF-FIT (GOF) INDICES

Specifying a model that fits the data well is the overarching aim of statistical modeling (Maruyama, 1998). Many goodness-of-fit (GOF) indices exist for researchers to compare and measure the level of appropriateness of different models. In this analysis, the chi-squared statistic (including the degrees of freedom and significance value), Comparative Fit Index (CFI), and Standardized Root Mean Square Residual (SRMR) are reported.

3.7.1. CHI-SQUARED STATISTIC

The most frequently employed GOF index for structural equation modeling is the chi-squared statistic (Blunch, 2008). The chi-squared statistic indicates model fit via the associated p -value, with a non-significant p -value (i.e., $p > .05$) indicating acceptable model fit (Field, 2009).

The most important limitation of the chi-squared statistic is its sensitivity to large sample sizes, as significant p -values are often generated in data sets with a large sample size. Since significant p -values indicate rejection of a model fit, this could result in a Type I error (i.e., incorrectly rejecting a model that fits well). In spite of this limitation, the chi-squared statistic is used

to compute several other model fit indices (Byrne, 2009), remaining as a practical and useful GOF index.

3.7.2. COMPARATIVE FIT INDEX (CFI)

The CFI measures model fit by comparing the specified model against an unconstrained model that assumes all of the variables to be uncorrelated (Bryne, 2009). The CFI is robust to the limitation of the chi-squared statistic by not being sensitive to sample size (Bryne, 2009). All CFI values range between 0 and 1, with a value close to 1 indicating strong model fit. Values of .0 and .95 are common cut-off values that indicate acceptable and superior model fit, respectively (Blunch, 2008).

3.7.3. STANDARDIZED ROOT MEAN SQUARE RESIDUAL (SRMR)

The SRMR is an absolute measure of fit, which means it is not reliant on a different model to determine model fit. Rather, model fit is entirely based on the extent to which the specified model fit the data, and is calculated as the standardized difference between the predicted and observed correlation (Byrne, 2012). Thus, values below .08 is typically agreed as good fit, with values decreasing as model fit improves (Byrne, 2012; Hu & Bentler, 1999).

3.8 MISSING DATA

When using the MCS with such a large sample size missing data and attrition are unavoidable. Several options were considered for the treatment of missing data (Enders, 2010). Listwise/pairwise deletion omits all missing data, resulting in reduced statistical power (Field, 2009). Single imputation does not accurately represent the uncertainty caused by the missing data (Enders, 2010). Multiple imputation might underestimate the standard error, increasing the estimate's bias, which may misrepresent the results of studies with small effect sizes which are common in the social sciences (Larsen, 2011). Given these limitations, listwise/pairwise deletion, single imputation, and multiple imputation were not used for this analysis. The full information maximum likelihood (FIML) is suggested to be robust to such shortcomings, and particularly suitable for longitudinal data in educational research (Larsen, 2011). As such, the main analyses of this study utilize the full information maximum likelihood (FIML) estimator to address missingness based on continuous data.

CHAPTER 4: RESULTS

This chapter presents the findings for each of the three research questions. First, results from the latent growth curve (LGC) model examining problem behavior development over time will be presented. Second, results corresponding to the transactional model that explores the differential effects between student-teacher relationship and problem behavior will be analyzed. Finally, results of the autoregressive model regarding patterns of internalizing problems across gender and SES groups will be reviewed. Table 6 contains the means and standard deviations of all of the measures of interest, and table 7 (see Appendix D), the correlations.

Table 6

Mean and standard deviations of all measures of interest

	Mean	Standard Deviation
OECD Income Weighted Quintiles (age 9 months)	2.96	1.41
Internalizing Problems (age 3)	1.34	1.48
Internalizing Problems (age 5)	1.36	1.58
Internalizing Problems (age 7)	1.51	1.75
Internalizing Problems (age 11)	1.84	1.97
Internalizing Problems (age 14)	2.01	2.12
Child Gender (male = 1, female = 2)	1.5	0.5
Problem Behavior (age 3)	9.4	5.21
Problem Behavior (age 5)	7.13	4.87
Problem Behavior (age 7)	7.28	5.35
Problem Behavior (age 11)	7.57	5.72
Problem Behavior (age 14)	7.99	5.88
Student-Teacher Relationship	5.94	1.16

4.1 RESEARCH QUESTION 1: HOW DOES PROBLEM BEHAVIOR DEVELOP THROUGHOUT THE DEVELOPMENTAL COURSE AMONG CHILDREN?

4.1.1. SUMMARY OF PROBLEM BEHAVIOR DEVELOPMENT TRENDS OVER TIME

Although curvilinear trends were explored, no curvature in the growth model was discovered. Curvatures should be “smoother” than the examined trajectories of problem behavior in this study. Instead, results show that problem behavior has a generally linear and negatively declining trend within children, as hypothesized in section 2.7.1. That is, children’s exhibition of problem behavior decreased as they grew older. This hypothesis was tested using the latent growth curve model, which indicated the average change in problem behavior over time from ages 3 to 14. The model fit the data well ($\chi^2 = 26648.603$; $p < 0.001$, CFI = .998, SRMR = .01). The significant χ^2 value is not considered to be an indication of poor model fit because it is nearly always below .05 in large samples (Byrne, 2012). The average problem behavior trajectory is shown in figure 6.

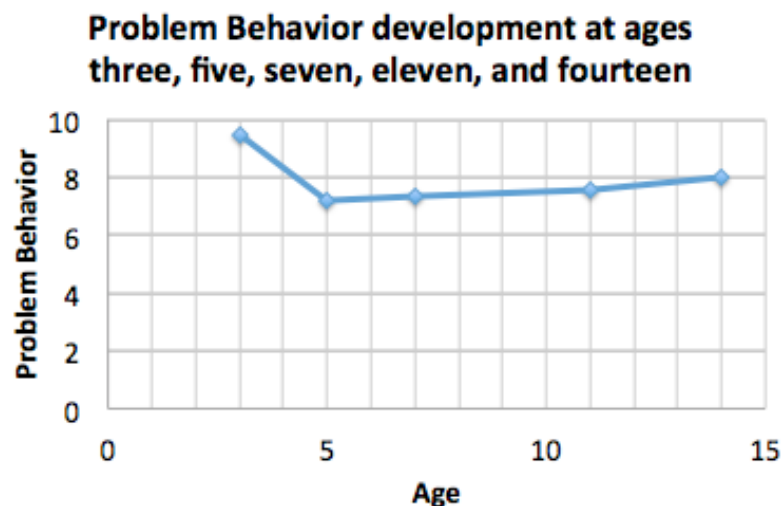


Figure 6. Estimated sample means for problem behavior at ages three, five, seven, eleven, and fourteen

Figure 6 indicates that, on average, problem behavior linearly decreased over time between the ages of three and fourteen. The y-axis represents the average latent problem behavior score, with decreasing values indicating less problem behavior over time. The figure shows a sharp fall in problem behavior from age 3 to age 5, but increases again as children approach middle childhood and preadolescence. Thus, the data moderately supports the hypothesis of a negative and linear trajectory in problem behavior development.

4.1.2 VARIABILITY OF PROBLEM BEHAVIOR TRAJECTORIES BETWEEN CHILDREN

While figure 6 shows the average trajectory of problem behavior, the latent growth model also analyzes individual variability in problem behavior development. The model results indicate significant variability ($p < .001$) in the developmental trajectories of problem behavior between the children in the study sample. Some children started off with high values and stayed high, other children started low and stayed low, and still others started low but increased over time, and so on. Thus, the hypothesis for significant individual differences in developmental trajectories across children was confirmed. Figure 7 illustrates the various developmental trajectories for a sub-sample of 250 children over five time points (i.e., MCS sweeps 2, 3, 4, 5, and 6).

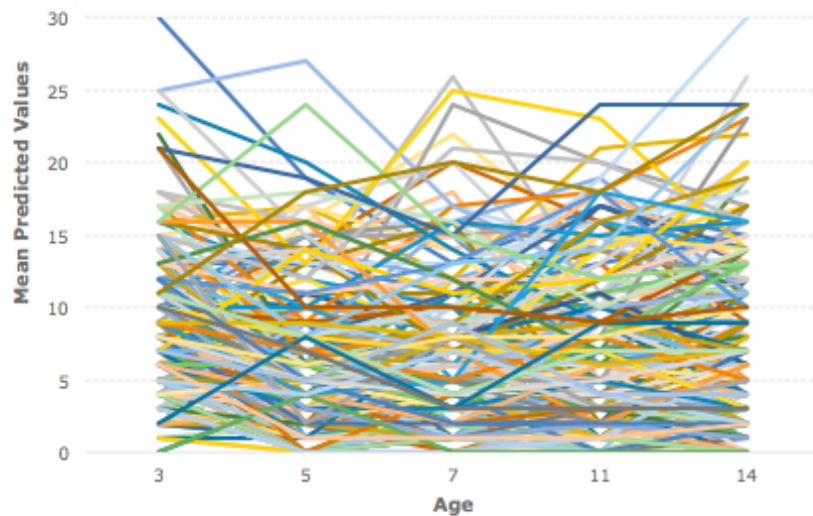


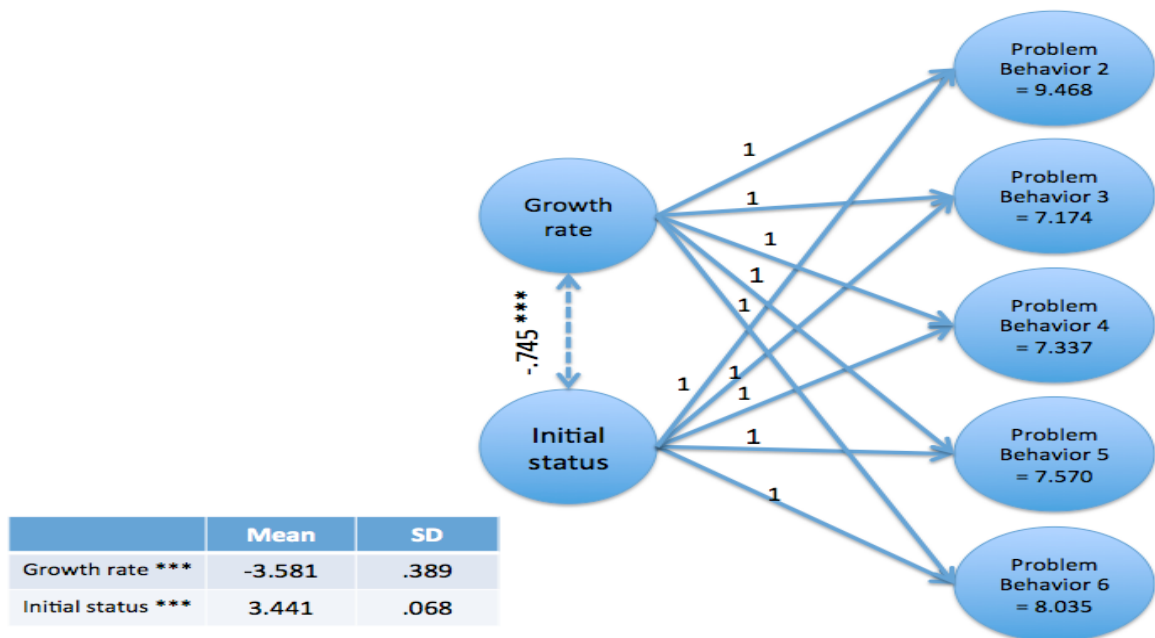
Figure 7. Variability in problem behavior developmental trajectories of a sub-sample of 250 children

The lines in figure 7 illustrate the individual differences across children's initial level of problem behavior along with the growth rates. However, the linearity of individual growth rates should not be presumed, as some children's exhibition of problem behavior may increase and decrease intermittently. Nonetheless, figure 7 illustrates the significant variability in the trajectories of problem behavior development.

4.1.3 ASSOCIATION BETWEEN THE INITIAL STATUS AND GROWTH RATE OF PROBLEM BEHAVIOR

The last topic of interest for this research question is the relationship between the initial status and growth rate of problem behavior. In section 2.7.1, it was hypothesized that initial status and growth rate will have a positive relationship. This means that children with a high initial status of problem behavior at age three were expected to have a steeper growth rate, whereas those who started low were expected to have a comparatively moderate growth trajectory.

In order to test this “launch model” hypothesis (Skinner et al., 1998), a value of 0 was assigned to the association between growth rate and problem behavior at age three, marking age three as the initial time point from which problem behavior will be “launched” (see figure 1). The remaining arrows are specified at the values of 2, 4, 8, and 11, which represent the number of years from the initial measurement time. The basic LGC model was extended by adding change factors to specify a model with curvilinear trajectories to examine any curvatures in the growth trends in problem behavior (Duncan & Duncan, 2009; Duncan et al., 2006). The arrows extending from initial status to each problem behavior time point are labeled likewise, which generates the latent means displayed in the problem behavior circles in figure 8 (Byrne, 2012; Kline, 2011).



Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 8. Latent growth curve model of problem behavior

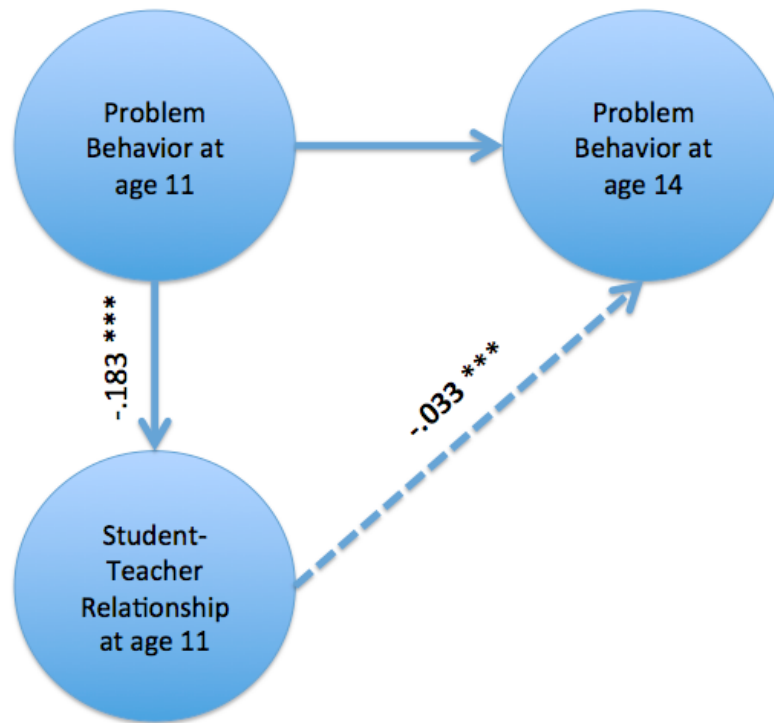
Figure 8 demonstrates a significantly negative association ($r = -.745, p < .001$) between initial status and growth rate of problem behavior. Initial status represents the average “onset” of problem behavior, and standard deviation the individual differences in onset. The significantly negative association between the initial status and growth rate means that children with higher levels of problem behavior at onset show steeper drops. Conversely, children with lower levels of problem behavior at onset experience a more gradual drop. Figure 8 also shows the mean and standard deviation of the growth rate and initial status. The average growth rate is the amount of change per year, and the standard deviation is the individual differences in change over time. The next step is to look for predictors of onset and change.

4.2 RESEARCH QUESTION 2: HOW DO STUDENT-TEACHER RELATIONSHIPS MODERATE THIS PROBLEM BEHAVIOR DEVELOPMENT BETWEEN THE AGES OF ELEVEN AND FOURTEEN?

In section 2.7.2 it was hypothesized that student-teacher relationships are expected to negatively affect problem behavior development (i.e., the better the relationship the more problem behavior would drop). The applied transactional model examined reciprocal effects of student-teacher relationships on problem behavior between the ages of 11 and 14.

4.2.1. EFFECTS BETWEEN STUDENT-TEACHER RELATIONSHIP AND PROBLEM BEHAVIOR

Transactional effects between student-teacher relationship and problem behavior was examined with the model shown in figure 9 ($\chi^2 = 26648.603, p < 0.001, CFI = .998, SRMR = .01$). Results support the predicted existence of a negative relationship between student-teacher relationships and problem-behavior development. Specifically, lower problem behavior at age eleven predicted better student-teacher relationships at age eleven ($\beta = -.183, p < .001$), which then predicted lower problem behavior at age fourteen ($\beta = -.033, p < .001$). The portion of the model representing this relationship with the standardized beta coefficients is depicted in figure 9.



Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 9. Effects of student-teacher relationship on problem behavior development between age 11 and 14.

Figure 9 indicates the negative relationship between and student-teacher relationships at age 11 and problem behavior. Problem behavior at age 11 predicted the quality of student-teacher relationship at age 11, which then exerted indirect effects on future problem behaviors three years later at age fourteen. All effects are shown to be significant; the negative beta coefficients indicate that lower levels of problem behavior at age 11 predicted better relationships between student and teacher at age 11. This relationship was then shown to predict levels of problem behavior at age fourteen; negative beta coefficients demonstrating once again that better relationships at age 11 predict lower levels of problem behavior at age 14. Lastly, the path from student-teacher relationship to problem behavior at 14 means there is less increase in problem behavior between 11 and 14, controlling for problem behavior.

4.3 RESEARCH QUESTION 3: HOW DO INTERNALIZING PROBLEMS DEVELOP ACROSS GENDER AND SES GROUPS BETWEEN THE AGES OF THREE, FIVE, SEVEN, ELEVEN, AND FOURTEEN?

4.3.1. SUMMARY OF INTERNALIZING PROBLEM DEVELOPMENT TRENDS FOR CHILDREN FROM HIGH AND LOW SES FAMILIES

In the previous section, problem behavior development for all children was observed. In this section, internalizing problems between gender and SES groups were examined to hone in on the particular problems highlighted in literature. In section 2.7.3, it was hypothesized that children in poverty will exhibit highest levels of problem behaviors, because of the cumulative and multidimensional risks associated with poverty that negatively affect behavior. However, this study aimed to examine children from high-socioeconomic backgrounds in further detail. This hypothesis was tested using an application of the transactional model (Sameroff & Chandler, 1975), which indicates that transactional interactions between student-teacher relationships and children's behavior reciprocally shape each other between the ages of 11 and 14. The model was run as a multigroup autoregressive model analyses specified to observe patterns in internalizing problems across high and low SES boys and girls (Duncan et al., 2006). The same model was specified twice each for quintile 1 and quintile 5, and both models fit the data well ($\chi^2 = 2100.962$; $p < 0.001$, CFI = .921 SRMR = .059 for quintile 1 and $\chi^2 = 2668.394$; $p < 0.001$, CFI = .921, SRMR = .065) for quintile 5. Again, the significant χ^2 value is not considered to be an indication of poor model fit because it is nearly always below .05 in large sample (Byrne, 2012).

The predicted sample means of internalizing problems for children from income quintiles 1 and 5 are shown in figure 10a. Figure 10a indicates that, on average, internalizing problems decrease linearly between the ages of three and fourteen. The y-axis indicates the predicted latent internalizing problem score, with decreasing values indicating less internalizing problems over time. Similar to the trajectories for problem behavior, internalizing problems decrease over time for both quintile groups. This preliminary exploration moderately supports my hypothesis of a negative and linear trajectory of internalizing problems between the ages of three and fourteen for both income quintiles. It also supports the hypothesis that children from lower income families will have higher levels of internalizing problems.

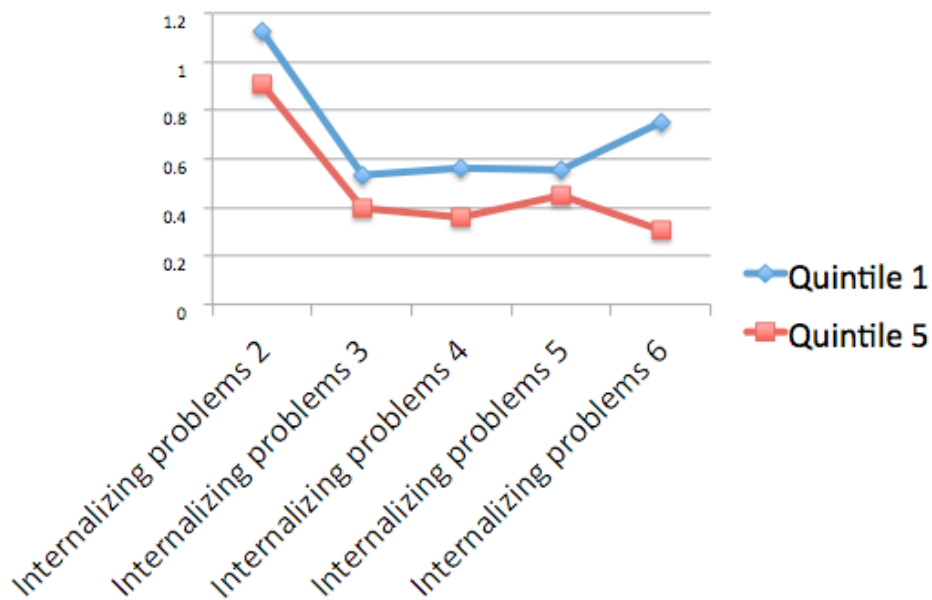


Figure 10a. Predicted sample means for internalizing problems for income quintiles 1 and 5.

After this initial inspection of internalizing problem development between the two quintile groups, gender groups within each quintile were examined in order to investigate patterns in internalizing problems across gender and SES groups. Among other maladjustment problems, internalizing problems in particular have been shown to be prevalent among high SES girls. It is hoped that this study will add to the literature in investigating and identifying patterns of such problems at an earlier age before the problems develop in complexity and severity. Figure 10b and 10c are the predicted sample means for internalizing problems across girls and boys over five time points.

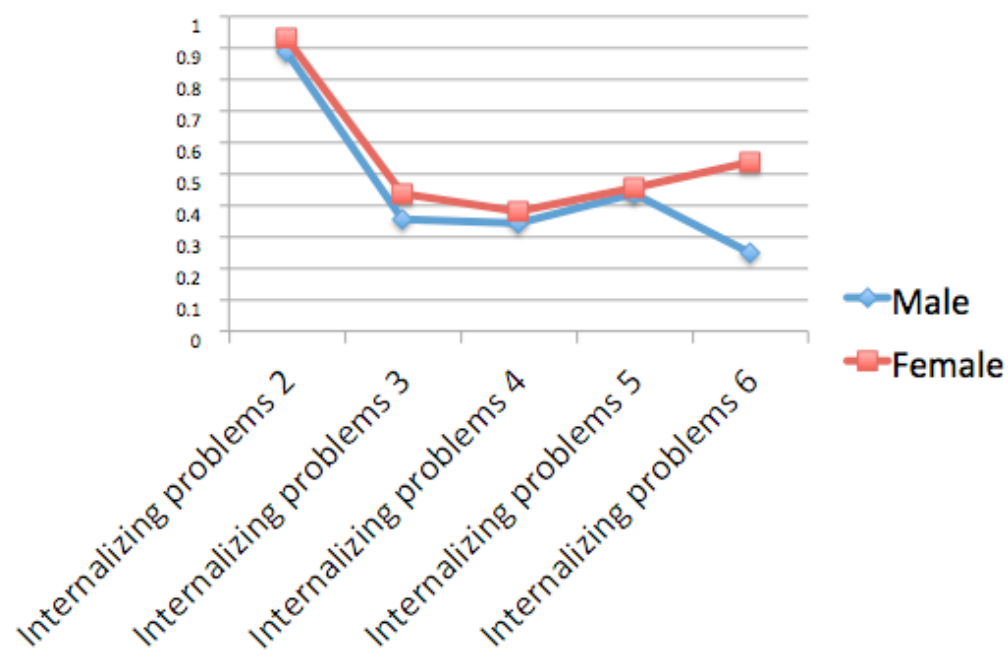


Figure 10b. [Quintile 5] Predicted sample means for internalizing problems across boys and girls

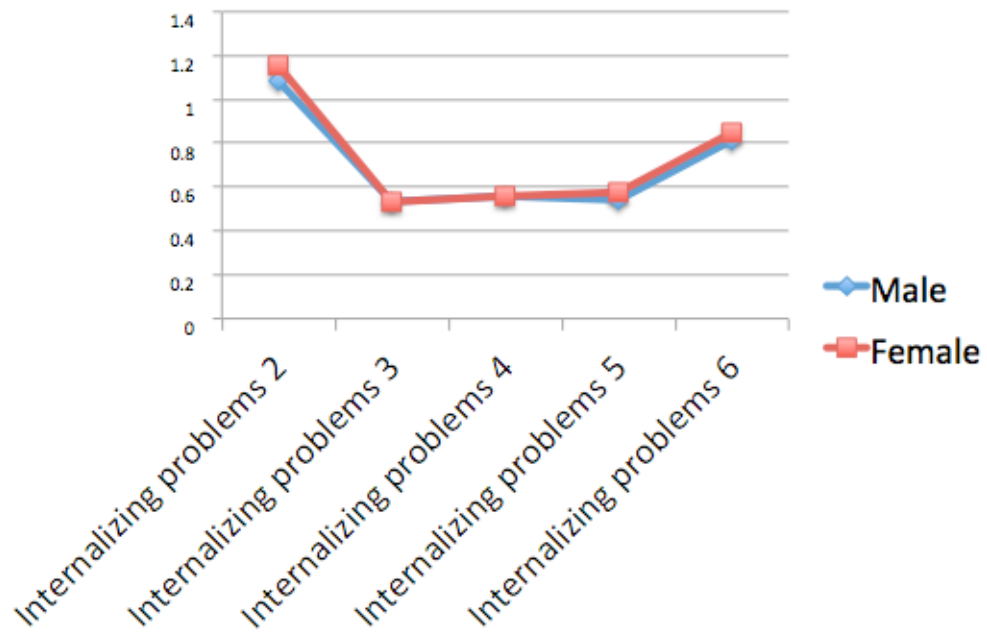
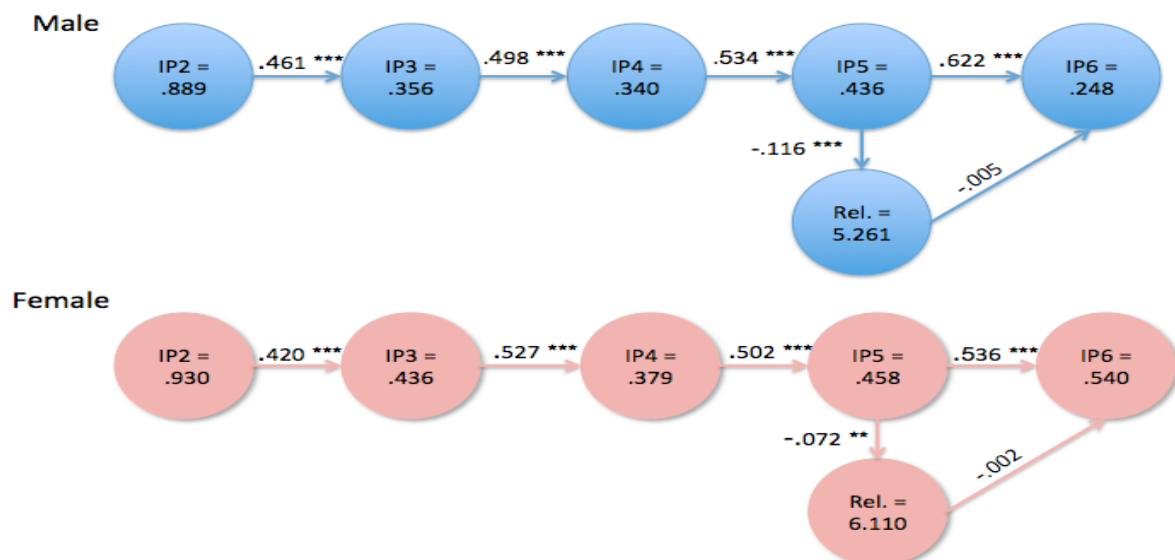


Figure 10c. [Quintile 1] Predicted sample means for internalizing problems across boys and girls

Figures 10b and 10c illustrate the average changes in internalizing problems across boys and girls from quintiles 1 and 5. In general, internalizing problems are shown to decrease over time until age fourteen, when problems steadily increase. This is an observable trend across all SES and gender groups, excluding high SES boys, who exhibit a drop in average levels of internalizing problems.

4.3.2. HOW IS THE TRANSACTIONAL RELATIONSHIP OF INTERNALIZING PROBLEMS AND STUDENT-TEACHER RELATIONSHIPS FOR MALE AND FEMALE CHILDREN FROM QUINTILE 1 AND 5?

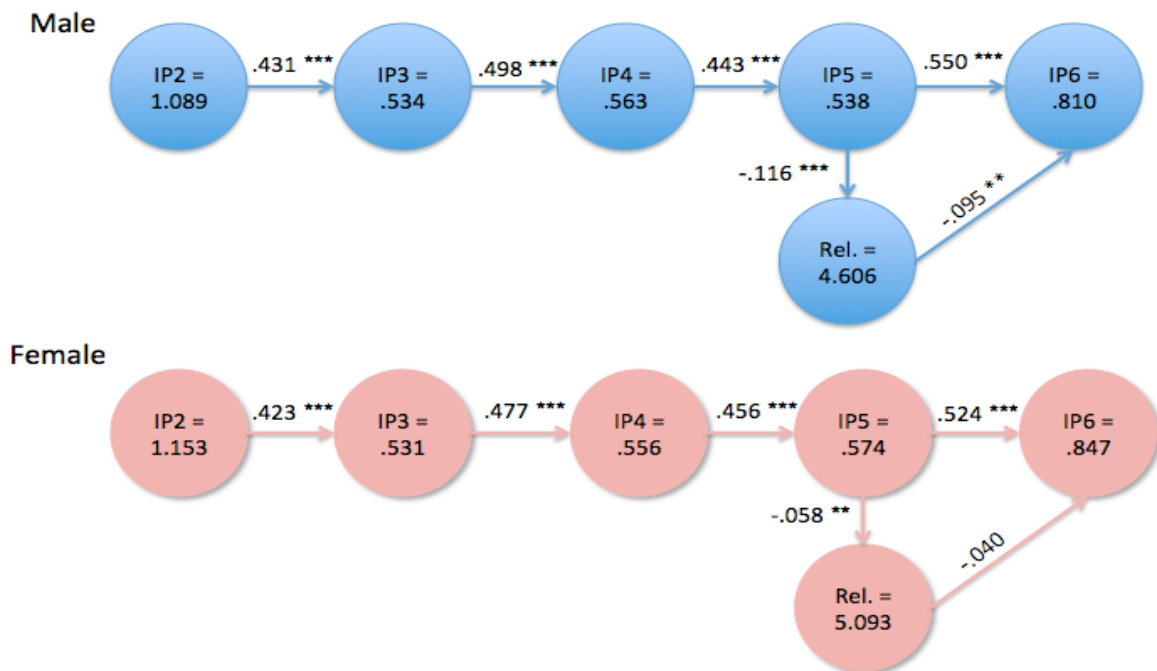
The next element of this research question explores the transactional relationship of internalizing problems and student-teacher relationships. To test this relationship, auto-regressive parameters were specified where children's internalizing problems were regressed on internalizing problems from the previous sweep. In addition, student-teacher relationships were regressed on internalizing problems at age 11 to examine patterns in the effects of student-teacher relationships for different SES and gender groups. In turn, internalizing problems at age 14 have been regressed on student-teacher relationships. Figure 11a and 11b illustrate the results. The values in the circles indicate the predicted sample means of internalizing problems at each point, and the values on the arrows are the standardized beta coefficients.



Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 11a. [Quintile 5] Autoregressive parameters for internalizing problems between girls and boys.

Figure 11a shows the autoregressive parameters for internalizing problems between girls and boys from quintile 5 families. The standardized beta coefficients on the arrows represent the unit change associated between the two variables. For example, the $\beta = .461$ ($p < .001$) on the first arrow between internalizing problems sweep 2 and 3 means that one unit of internalizing problems at sweep 2 is associated with .461 more internalizing problems at sweep 3 at the significant level. For both boys and girls, the stability of internalizing problems become stronger as children grow older, indicated by the significantly increasing standardized beta coefficients at each time point. Figure 11a also demonstrates the negative effects of internalizing problems on student-teacher relationships, as one unit increase in internalizing problems elicit a .116 and .072 unit decrease in student-teacher relationships for boys and girls, respectively. The indirect effects of student-teacher relationship on internalizing problems at age 14 were not significant for children from quintile 5.



Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 11b. [Quintile 1] Autoregressive parameters for internalizing problems between girls and boys.

Figure 11b shows the same autoregressive parameters for children from quintile 1. Similar to the standardized beta coefficients of children from quintile 5, the stability of internalizing problems become stronger as children grow older. For quintile 1 boys, a .116 unit decrease in internalizing problems is shown to predict a one unit increase in the quality of student-teacher relationships ($p < .001$). Similarly, a .058 unit decrease in quintile 1 girls' internalizing problems are expected to predict a one unit increase in the quality of student-teacher relationships ($p < .01$). Lastly, the effects

of student-teacher relationships at age 11 were carried over to internalizing problems at age 14 for boys ($\beta = .095, p < .01$), although the same could not be said for girls.

4.3.3. DO THE DIFFICULTIES PRESENT AMONG WEALTHY ADULTS AND ADOLESCENTS BEGIN EMERGING DURING MIDDLE CHILDHOOD AND PREADOLESCENCE?

From the current analyses, it is hard to say that the difficulties present in high SES adults and adolescents emerge in early and middle childhood. When compared as a whole, quintile 1 children were shown to exhibit consistently higher levels of internalizing problems across all five sweeps ($p < .001$), demonstrating higher levels of difficulty across time.

CHAPTER 5: DISCUSSION

This chapter will interpret the findings from chapter 4 and analyze how the findings fit in with previous literature. It will then conclude with the strengths, limitations, and implications of the study

5.1 HOW DOES PROBLEM BEHAVIOR DEVELOP BETWEEN THE AGES OF THREE, FIVE, SEVEN, ELEVEN, AND FOURTEEN?

5.1.1. SUMMARY OF PROBLEM BEHAVIOR DEVELOPMENT

Results from section 4.1.1 indicate that on average, children between ages three and fourteen show linear and negative growth trajectories for problem behavior. This finding is consistent with previous studies, which indicate problem behavior to progressively decrease around age 4 and then rise around 15 years of age near adolescence (Brennan, Shaw, Dishion, & Wilson, 2012; Mesman et al., 2009). Literature attributes the decreasing trend to advances in self-regulation, perspective-taking, and frustration tolerance capacities (Brennan et al., 2012; Mesman et al., 2009). In line with current findings, research on adolescent development indicates that behavior problems begin to rise around 15 years of age in response to stressful transition that characterizes puberty (Bongers et al., 2008).

5.1.2. VARIABILITY OF PROBLEM BEHAVIOR TRAJECTORIES BETWEEN CHILDREN

Results from section 4.1.2 establish the significant variability in behavioral trajectories across children. Findings again align with previous research (De Pauw et al., 2009; Murray & Farrington, 2010; O'Connor et al., 2011; Williams et al., 2009) that suggests several possible trajectories of problem behavior development during early and middle childhood.

Variability in problem behavior trajectories could be attributable to a number of factors that influence behavior, which include temperamental differences, moral judgment, and agreeableness (De Pauw et al., 2009; Murray & Farrington, 2010). Family factors such as parental childrearing practices, exposure to child abuse, parental conflict and disrupted families, siblings and peer influences all contribute to the variability in problem behavior development (Murray & Farrington, 2010). Future studies should include such variables as additional “launchers” of developmental trajectories.

5.1.3. ASSOCIATION BETWEEN THE INITIAL STATUS AND GROWTH RATE OF PROBLEM BEHAVIOR

Results from section 4.1.3 indicate a significantly negative association between the initial status and growth rate of problem behavior. These results indicate that children with higher levels of problem behavior at onset show steeper drops, while children with lower levels of problem behavior at onset have more gradual drops. Results from section 4.1.3 suggest the necessity to find predictors of onset, or launchers' of behavior problems, in order to foster positive behavioral change. Such predictors of onset can be both environmental and individual factors, working in complex and multidimensional paths to initiate and change behavior. For example, environmental predictors largely exist in the family context for young children and include factors such as family socioeconomic status (Neville et al., 2013), parenting practices (Smith, Dishion, Shaw, Wilson, Winter, & Patterson, 2014), fathers' involvement (Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008), and parents' marital satisfaction (Brobst, Clopton, & Hendrick, 2009). Individual factors such as temperamental dispositions (De Pauw et al., 2009), genetic variations in brain function (Bogdan, Hyde, & Hariri, 2013), and childhood disabilities (Mirza, Tareen, Davidson, & Rahman, 2009) act as biological predictors of onset for problem behavior as well. As such, predictors of onset that launch behavior problems are laid down very early in life through dynamic interactions of genetic, biological, and environmental influences. To illustrate, onsets can occur as early as prenatally, as maternal stress is known to affect the fetal brain (Walker et al., 2011). Such examples assert the significance of early experience, stability of social contexts, and continuity in development. Moreover, risks associated with such early launchers are many times co-occurring and cumulative, inducing persistence of difficulties over time (Walker et al., 2011).

As such, research shows that early problem behaviors are disposed to a steady and consistent trend over time. Previous studies (Flouri, Midouhas, & Joshi, 2014; Mesman et al., 2009) have also used the LGC model to assess initial problem behavior status and growth rate. These studies align with the findings from this dissertation, showing that children who had higher behavioral difficulty scores made larger reductions in difficulties four years later (Flouri et al., 2014; Mesman et al., 2009). Previous studies also examined predictors of onset and change, and found that having more siblings were associated with the inverse relation to slope (i.e., a stronger decrease for high onset) for externalizing problems (Mesman et al., 2009). As such, results align with the existing literature and indicate that children with initially high problem behavior levels may be able to reduce their maladjustive trajectories to match their better adjusted peers who had lower levels of problem behavior at onset.

5.2 HOW DO STUDENT-TEACHER RELATIONSHIPS MODERATE THIS PROBLEM BEHAVIOR DEVELOPMENT BETWEEN THE AGES OF ELEVEN AND FOURTEEN?

5.2.1. EFFECTS BETWEEN STUDENT-TEACHER RELATIONSHIP AND PROBLEM BEHAVIOR

Results from section 4.2 suggest that problem behavior and student-teacher relationships have transactional effects between the ages of eleven and fourteen, demonstrating that lower problem behavior at age eleven significantly predicted higher quality of student-teacher relationships at age eleven, which then predicted significantly lower problem behavior at age fourteen. Other studies (Bub et al., 2007; O'Connor et al., 2011; Pianta, La Paro, Payne, Cox, & Bradley, 2002) have also confirmed the existence this relationship whereby teachers and children influence one another's behavior. These results demonstrate that problem behavior and student teacher relationships reciprocally affect each other, suggesting the importance of searching out ways to foster higher quality student-teacher relationships. Research suggests that goodness-of-fit between the child's temperamental characteristics (Vitiello, Moas, Henderson, Greenfield, & Munis, 2012), teachers' skills to adhere to such individual differences (Churchill, 2003), high-quality feedback (Pianta, Hamre, & Allen, 2012), and providing positive emotional support (Wentzel, 2009) are elements that promote such relationships. Many studies also support the importance of relationships with the teacher during early childhood for future achievement and behavioral adjustment (Myers & Pianta, 2008). Moreover, based on the knowledge that children's behavioral patterns influence the quality of interactions between the child and teacher, active supports for children's prosocial behavior during early childhood are needed as well.

5.3 HOW DO INTERNALIZING PROBLEMS DEVELOP ACROSS GENDER AND SES GROUPS BETWEEN THE AGES OF THREE, FIVE, SEVEN, ELEVEN, AND FOURTEEN?

5.3.1. SUMMARY OF INTERNALIZING PROBLEM DEVELOPMENT TRENDS FOR CHILDREN FROM HIGH AND LOW SES FAMILIES

Results from section 4.3.1 indicate that children from higher income families on average have lower levels of internalizing problems compared to their low-income counterparts. This finding is consistent with previous studies that establish children from higher income families overall exhibit lower levels of internalizing problems (Conger et al., 2010; Ponnet, 2014; Miller & Taylor, 2012; Santiago, Etter, Wadsworth, & Raviv, 2012; Wadsworth, Rindlaub, Hurwich-Reiss, Rienks, Bianco,

& Markman, 2013). Results also show that internalizing problems are shown to decrease across children from high and low SES families between ages three and eleven, then increase again at age fourteen, with the exception of high SES boys who exhibit a drop in average levels of internalizing problems. These findings align with previous literature that establishes internalizing problems tend to increase during adolescence, because early adolescence is a period of major physical, cognitive, and socio-emotional transitions (Bowker & Rubin, 2009; Bakker, Ormel, Verhulst, & Oldehinkel, 2009). Puberty is a critical period of time that onsets many psychological problems beginning at early adolescence. Self-conscious feelings and emotions peak in frequency and intensity during this time for many individuals, which are perceptions associated with internalizing problems (Bowker & Rubin, 2009; Negri & Susman, 2011). During adolescence, peer relationships are characterized as an emotional experience, yielding higher interpersonal demands, peer stress, and heightening the risk for internalizing problems (Bakker et al., 2009).

5.3.2. HOW DO INTERNALIZING PROBLEMS DEVELOP ACROSS GENDER AND SES GROUPS BETWEEN THE AGES OF THREE, FIVE, SEVEN, ELEVEN, AND FOURTEEN?

Results from section 4.3.2 demonstrate that the stability of internalizing problems grew stronger as children grew older, across all four observed groups. This finding fits well with the existing literature, which reports internalizing problems remain stable from the ages of 5 to 13 (Sterba, Prinstein, & Cox, 2007). Results also indicate the negative relationship between internalizing problems and student-teacher relationships for all four groups. This conveys that more internalizing problems cause lower quality student-teacher relationships at age 11. Examination of a transactional relationship, which tested whether student-teacher relationships indirectly affected internalizing problem behavior at age 14 revealed the indirect effect only to be significant for quintile 1 boys. This could indicate that the effects of student-teacher relationships last longer for low SES boys, entailing implications for intervention, which should promote fostering high quality relationships within low SES boys as a factor for positive change.

As an extension to results found in section 4.3.1, findings from 4.3.2 explore further into the patterns of internalizing problems for each quintile and gender group. A closer look at predicted mean values reveal that quintile 5 boys show a drop in the average levels of internalizing problems between ages 11 and 14. The same trend is not seen in other groups, as they all show increases in internalizing problems between these time points. These findings can partially be explained by studies that establish girls exhibit higher levels of internalizing disorders compared to boys, beginning in early adolescence (Rosenfield & Mouzon, 2012; Thoits, 2010). However, this does not explain why the

same trend was not observable in quintile 1 boys, or the decrease in internalizing problems, since research establishes girls' comparatively larger manifestations of internalizing problems but not necessarily the decrease in boys'. Moreover, since this is the first study to explore internalizing problems specifically within high SES children, findings could not be compared against other studies. Nevertheless, such findings provide implications for further research, which should focus on the predictors that might have caused this drop within high SES boys.

5.3.3. DO THE DIFFICULTIES PRESENT AMONG HIGH SES ADULTS AND ADOLESCENTS BEGIN EMERGING DURING MIDDLE CHILDHOOD AND PREADOLESCENCE?

To date, studies focusing on the problem behavior trajectories of affluent children before they reach adolescence are not prominent in the field of developmental research. As such, it is difficult to compare the results of this research question to other previous studies. From the current scope of evidence, children from low SES families show significantly higher levels of internalizing problems. This aligns with literature that proposes that difficulties observed in high SES adults and adolescents will not be present during childhood because of the safety nets provided by financial assets and resources (Luthar & Ansary, 2005; Luthar & Burack, 2000). Future studies should follow the longitudinal growth of high SES samples from early childhood throughout adulthood, in order to identify common childhood predictors that are associated with high SES adults on maladjustive paths.

5.4 STRENGTHS OF THE DISSERTATION

The strengths of the dissertation are fourfold: 1) contribution and novelty of the study, 2) the breadth of the MCS data, 3) rigorous assessment of the study's measures, and 4) state-of-the-art statistical analyses.

5.4.1. CONTRIBUTION AND NOVELTY OF THE STUDY

The novelty of this dissertation's research topic adds to the gap in child development research. Research on the maladjustment paths of high SES children is not prominent in the field of educational research, and calls for further examination. This research provides a preliminary analysis of patterns observed in high SES children's internalizing problems and the effects of student-teacher relationships over time. The new information presented by the results of the dissertation thus provides a starting point for further research by shedding light on the difficulties present among high SES children and the possible methods to intervene such difficulties. In addition, this dissertation gives direction to guide future studies by presenting methodological and research implications.

5.4.2. THE MCS DATA

The MCS is a nationally representative longitudinal survey following the development of over 19,000 UK children from birth to fourteen years of age. Containing information on over 4000 variables including information on problem behavior, socioeconomic status, student-teacher relationships, and internalizing problems, the MCS suffices as an ideal dataset for this study. The longitudinal nature of the MCS is also advantageous in light of its suitability to match the interests of this study, but also because it enables observation of within and between differences in development (Selig & Preacher, 2009).

5.4.3. RIGOROUS ASSESSMENT OF OUTCOME MEASURES

It was necessary to assess the reliability and validity of all measures in order to ensure the generalizability of findings in regards to problem behavior, socioeconomic status, and student-teacher relationships. For all latent variables, CFAs and Cronbach's alpha statistics were tested to evaluate the representation of a single trait via multiple observable indicators, as well as the internal consistency. Moreover, measurement invariance models were tested to verify whether the latent variables consistently measured the underlying construct over time. Each assessment established the reliability and validity of the measures, as well as the internal consistency over time.

Supplementary to the statistical tests of validation, the construct validity of each measure was approved through validation studies from the literature. For example, the SDQ, which was used to represent the construct of problem behavior, has been validated by several studies, proving strong evidence of the SDQ's validity and reliability across several ages (Croft et al., 2015; Petermann, Petermann, & Schreyer, 2010; Stone et al., 2010; Riso et al., 2010). Studies also demonstrated the SDQ's predictive validity, as the SDQ subscales have been to diagnose clinical disorders in the "real world" (Goodman, Lamping, & Ploubidis, 2010; Goodman, Renfrew, & Mullick, 2000; Russell, Rodgers, & Ford, 2013). Lastly, research has yet to validate the measure of student-teacher relationship. Therefore, findings corresponding to the measure of student-teacher relationship should be interpreted with discretion. Nonetheless, the reliability and validity of the measures have been rigorously assessed.

5.4.4. STATE-OF-THE-ART STATISTICAL ANALYSES

This dissertation employs state-of-the-art statistical procedures to manage the MCS dataset and answer the research questions. The missing data was managed using full information maximum

likelihood, which is suggested to be robust to the shortcomings of other missing data treatment and particularly suitable for longitudinal data in educational research (Larsen, 2011).

Moreover, the observable indicators of each measure were estimated into latent constructs and confirmed reliable and valid through CFA. The consistency of appropriate constructs over time was tested and accepted using measurement invariance models. These statistical procedures depict complex structural equation modeling (SEM) which surpass basic statistical practice (Tabachnick & Fidell, 2013).

As for the actual analyses, LGC models is a part of structural equation modeling and offer several advantages over traditional methods of assessing change. First, inclusion of all available measurement points in outcome assessments, LGC models reflect advanced reliability. This in turn yields increased sensitivity to detect behavioral change. Moreover, growth curves avoid the inflation of Type 1 error associated with repeated measures analysis of variance. Finally, LGCs allow multiple outcome measures to be combined in a single analysis (Beauchaine, Webster-Stratton, & Reid, 2005).

In addition, the basic LGC model was extended by adding an additional change factor to specify a model with curvilinear change (McArdle, 1988). This allows for the researcher to fit a growth curve to represent what various problem behaviors have in common at each time point. This model was created to determine the relations among SES and problem behaviors at different ages. Within the model a growth curve was fitted to factor scores and specify reciprocal relationships. In fitting the curve-of-factors LGM, model fit was improved (Duncan, Duncan, Strycker, 2001). Thus, the applied statistical models were shown to be most appropriate to examine individual change over time as well as the reciprocal effects between problem behavior and student-teacher relationships. Collectively, the use of state-of-the-art statistical techniques enhanced the reliability, validity, and scope of this dissertation's results.

5.5 LIMITATIONS OF THE DISSERTATION

The limitations of this dissertation are classified into two categories: limitations of the MCS data and limitations of the statistical analyses.

5.5.1. LIMITATIONS OF THE MCS DATA

Despite the many strengths of the MCS dataset, it also has its limitations. The first limitation of the data is related to the age of the study sample. At the time this dissertation was written, data was only available up to the 6th sweep, when the children were 14 years old. Since this dissertation aimed to examine the potential signs of emerging problems within high SES children, longitudinal data of

high SES samples from early childhood throughout adulthood would have been helpful to identify common childhood predictors of problems associated with high SES adults who are on maladjustive pathways.

The second limitation of the data was related to the indices of the latent variable of teacher-student relationship. Although the CFA and Cronbach's alpha value indicated the validity of the construct, student-teacher relationship measure has never been validated in previous research.

Lastly, the lack of student-teacher relationship data from MCS sweep 4 disables analysis of how the bidirectional relationship started. Student-teacher relationship data existing at more sweeps would have allowed examination of further reciprocal and transactional effects over a longer period of time. For instance, questions concerning the stability of the quality of student-teacher relationships over time could not be answered without student-teacher relationship data from the earlier years.

5.5.2. LIMITATIONS OF THE STATISTIC ANALYSES

The limitation of the analyses is found within the SEM methods. SEM can only prove the extent to which a specified model fits the data (Blunch, 2008). This means that models can be falsified, but not proven right. Even when model fit is "perfect," this does not mean it accurately depicts reality. In fact, other model specifications may produce equally well fitting indices, and those "equivalent models" may indicate the actual relationship between SES, student-teacher relationships, problem behavior, and internalizing problems (Kline, 2011).

5.6 IMPLICATIONS

This dissertation's findings provide implications for parents, teachers, and practitioners who seek to prevent behavior problems and further difficulties in their children. It provides a closer understanding of the developmental trajectories of problem behaviors that can advance the development of interventions, particularly for contemplating effective elements of intervention programs (Mesman et al., 2009).

Results demonstrate that the development of problem behaviors can be both intensified and prevented, and that teachers' relationship with students are reciprocally affected by children's problem behavior levels. As such, teacher interventions could promote high-quality relationships between children and teachers, designed with the aim to decrease problem behavior levels and maladjustment pathways. Teachers and school staff should particularly be trained to identify children who exhibit problem behaviors at early school age and provide intervention and support in order to alleviate extreme levels of future behavior problems.

Since the nature of internalizing behaviors makes identification more difficult, it may be harder to detect problems of girls than problems of boys. Training programs that highlight strategies to identify the warning signs and symptoms of internalizing behaviors may be helpful as well (O'Connor et al., 2011). In doing so, teachers will initiate a positive cycle whereby better relationships improve children's behavior and vice versa. Conversely, teachers that are unable to build a positive relationship with their students are more likely to spur a negative cycle that intensifies students' problem behavior levels.

Results demonstrating the significant effect of positive student-teacher relationships provide particularly promising aspects for intervention, especially because many factors affecting problem behaviors are not readily mendable. For example, factors such as difficult temperamental dimensions (Rothbart, Sheese, Rueda, & Posner, 2011) with a strong biological basis are generally difficult to manipulate through interventions. In contrast with such factors, children's relationships with teachers provide an easier channel for flexibility and change, since teachers can manage children's behavior using developmentally appropriate strategies that adhere to their different needs (Webster-Stratton, Reid, & Hammond, 2001).

It is further hoped that interventions for children from diverse parts of the income spectrum will be given attention as well, especially before the problem trends become too serious. Results associated with income levels reflect the attention needed for children not only from low-income families, but also from high-income families as well. If children at risk for behavior problems are identified at an early stage in development, preventive interventions that address the distinct pathways that lead to heightened and persistent problems can be designed. While absolute values of problem behavior levels show more difficulties for children from low-income households, children that are more financially advantaged show comparable difficulties as well. The results that indicate behavioral change via student-teacher relationships imply a platform and starting point for change.

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Appendix A: Departmental Research Ethics Committee's (DREC) confirmation of ethical approval

The following is the DREC email received from Laura Molway on April 12, 2018 that granted ethical approval for this dissertation.

Dear ----,

Title: Moderating effects of education on the problem behaviour trajectories of high SES children: a secondary data analysis of the millennium cohort study

The above application (reference number ED-CIA-18-168) has been considered on behalf of the Departmental Research Ethics Committee (DREC) in accordance with the procedures laid down by the University for ethical approval of all research involving human participants.

I am pleased to inform you that, on the basis of the information provided to DREC, the proposed research has been judged as meeting appropriate ethical standards, and accordingly, approval has been granted.

If your research involves participants whose ability to give free and informed consent is in question (this includes those under 18 and vulnerable adults), then it is advisable to read the following NSPCC professional reporting requirements for cases of suspected abuse

http://www.nspcc.org.uk/Inform/research/questions/reporting_child_abuse_wda74908.html

Should there be any subsequent changes to the project which raise ethical issues not covered in the original application you should submit details to research.office@education.ox.ac.uk for consideration.

Good luck with your research study.

Yours sincerely,
Laura Molway

Member of DREC

Laura Molway
PGCE Curriculum Tutor & D.Phil Candidate in Education
University of Oxford, Department of Education
Tel: 01865 611008

Please note that Thursdays are usually my research days and I may not be in my office

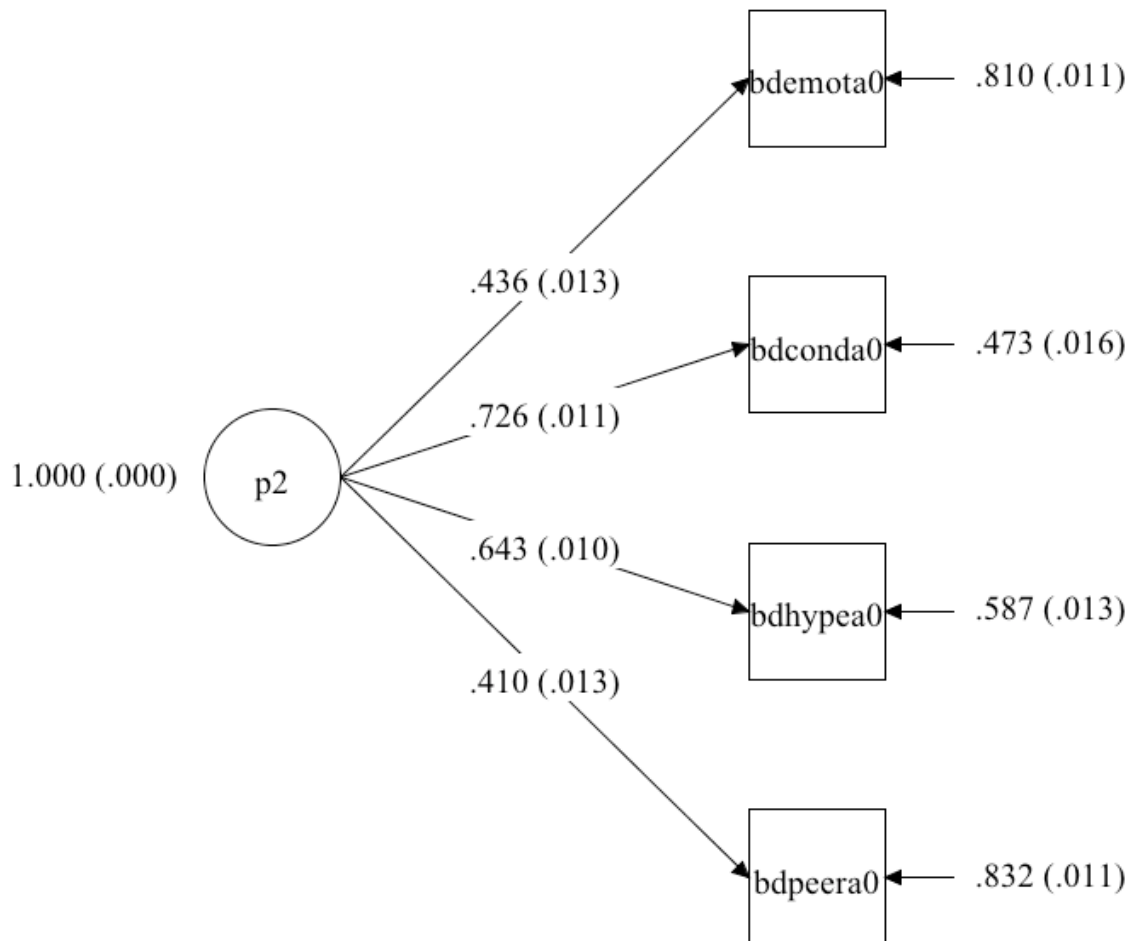
Are you a teacher in your first three years of teaching? You might be interested in the [Oxford Early Career Teachers Professional Development Conference](#) on Saturday 23rd June

Appendix B: CFA models for each latent variable

Appendix B shows the CFA diagrams and model fit indices for the latent measures. The values shown are the standardized factor loadings for each item of the construct. Although high values indicate better loadings onto the construct, no minimum cut-off is specified for standardized factor loadings (Tabachnick & Fidell, 2013). The overall model fit is perceived as more important. Analogous to the other SEM models, well-fit model indices were: SRMR < .08 and CFI > .9. The chi-squared statistic and *p*-value were not reported because all values were significant given the large sample size. Nevertheless, the models all exhibit acceptable model fit as shown below.

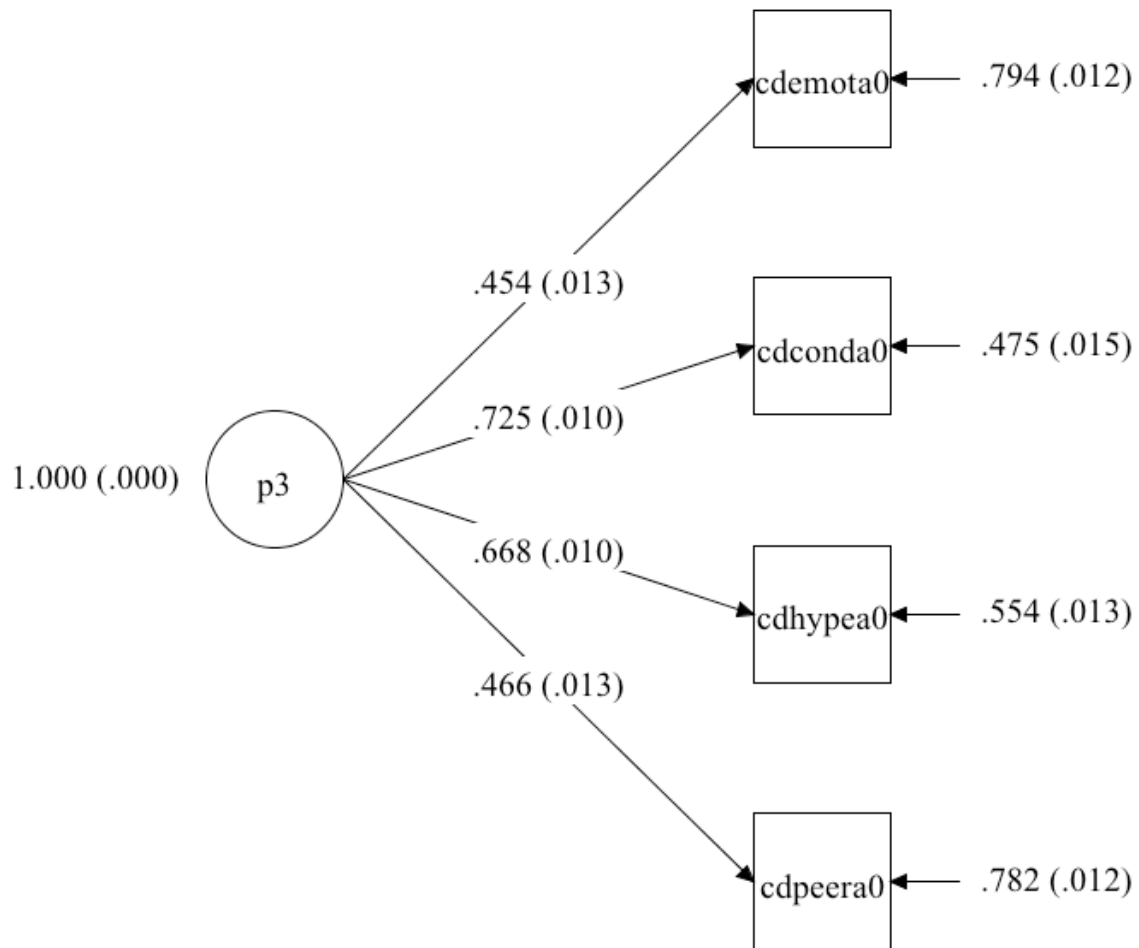
Problem Behavior at age three

Model fit indices: CFI = .92, SRMR = .044



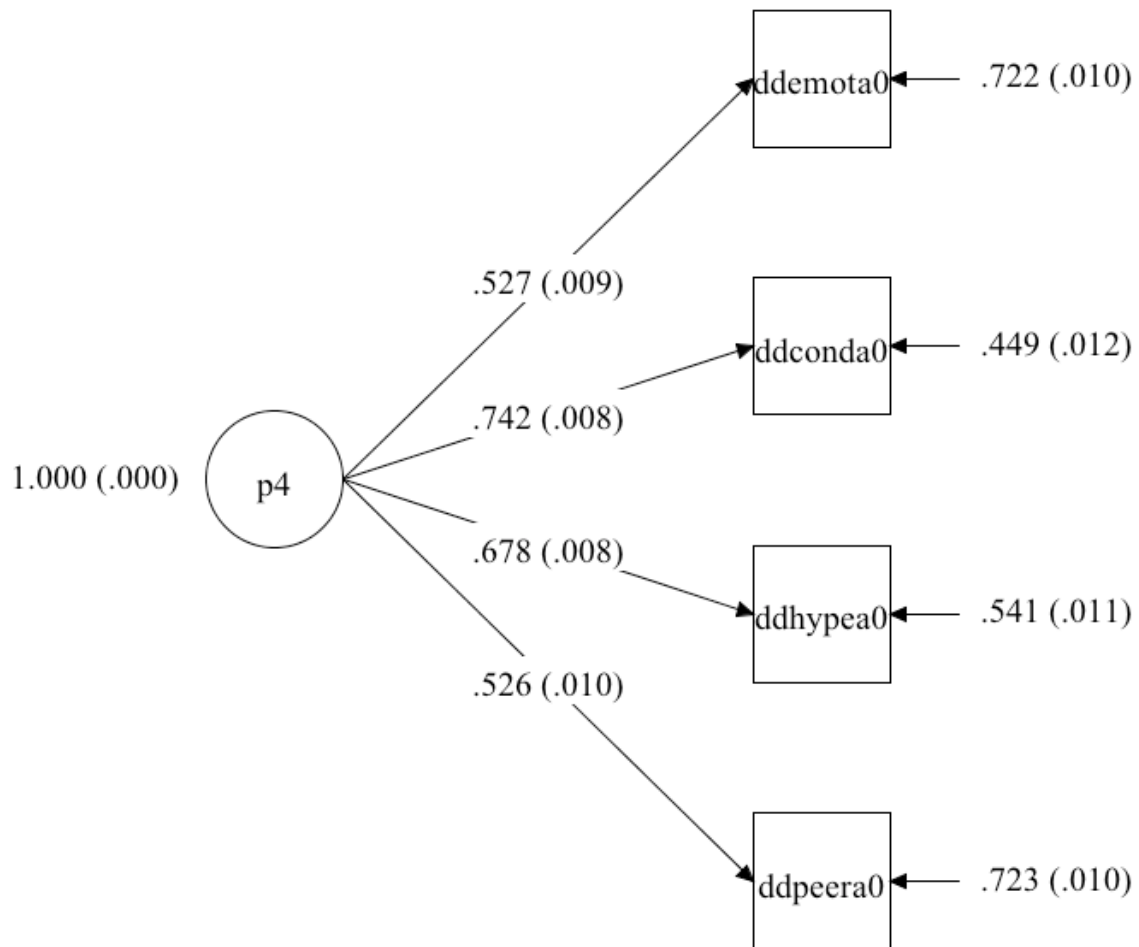
Problem Behavior at age five

Model fit indices: CFI = .886, SRMR = .052



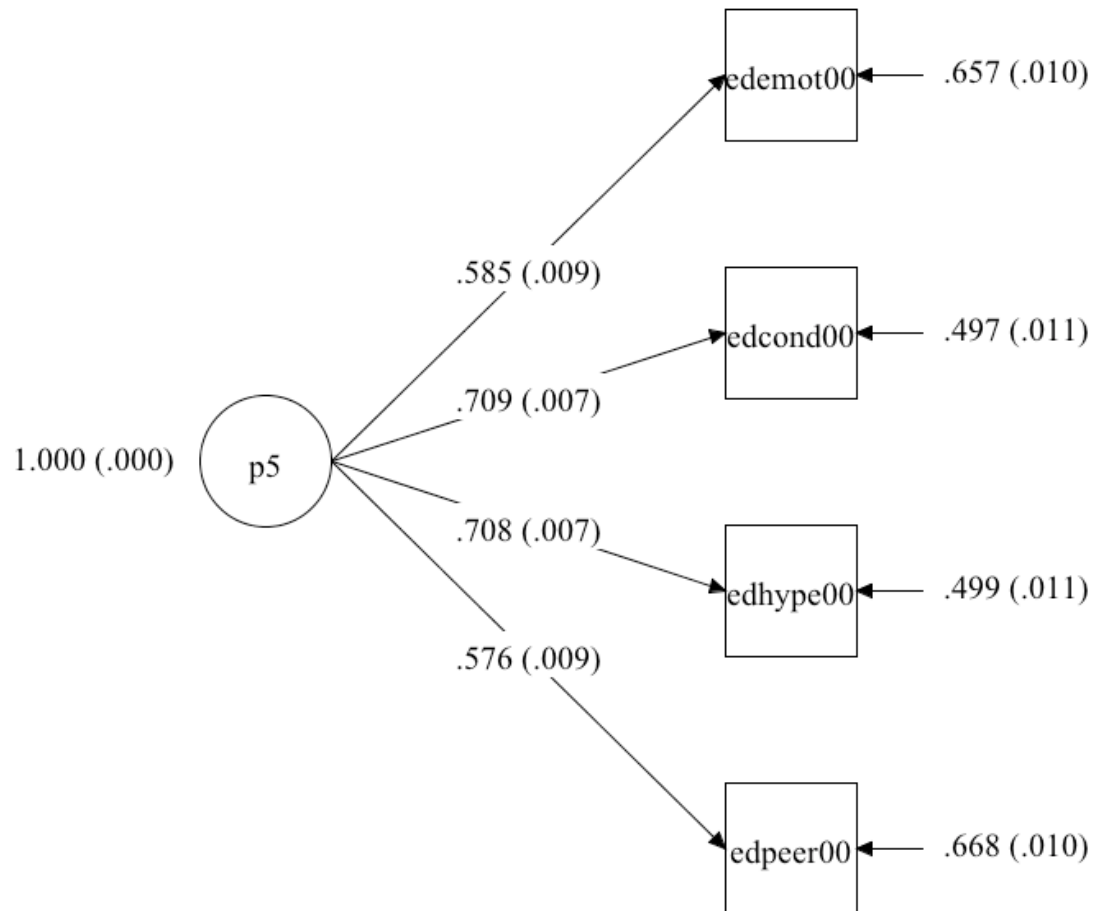
Problem Behavior at age seven

Model fit indices: CFI = .918, SRMR = .046



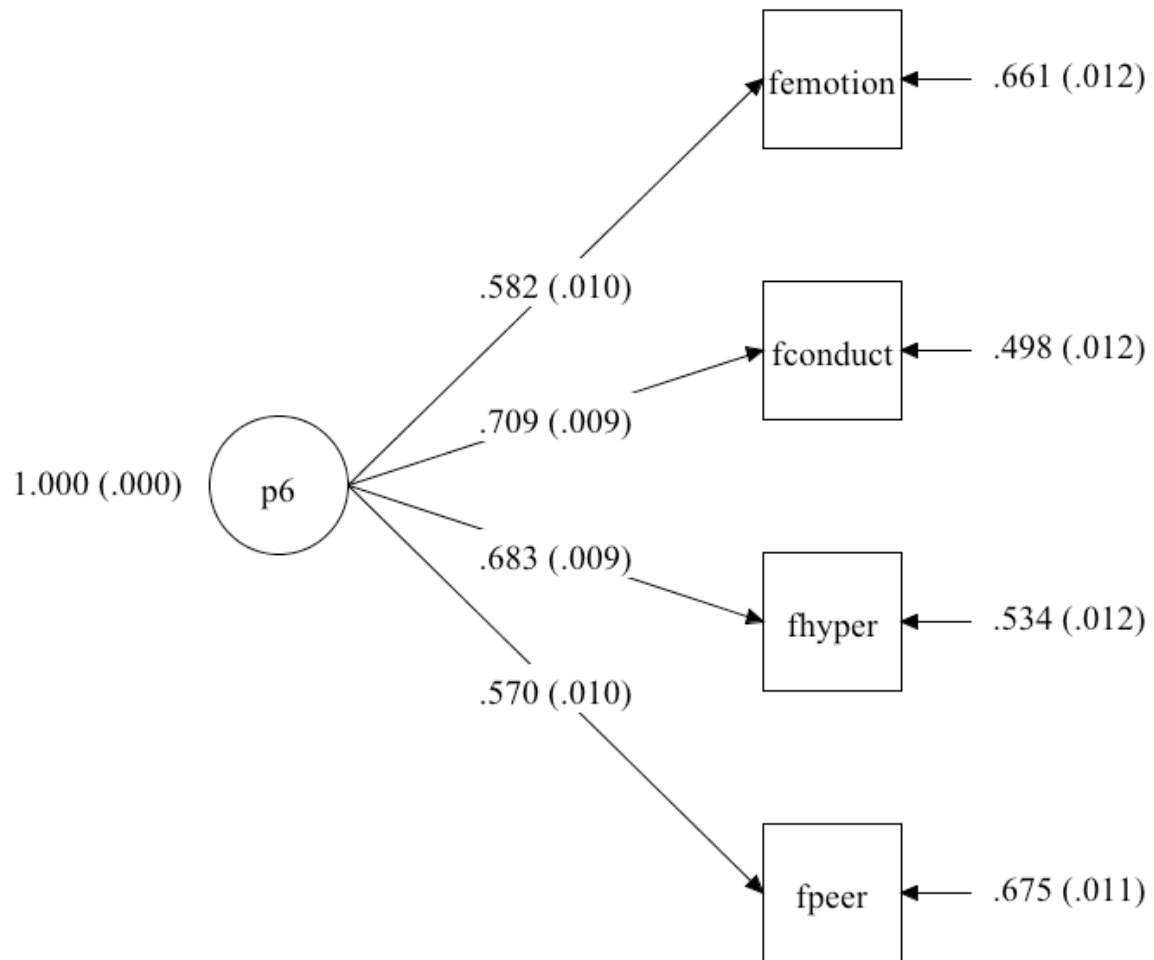
Problem Behavior at age eleven

Model fit indices: CFI = .922, SRMR = .045



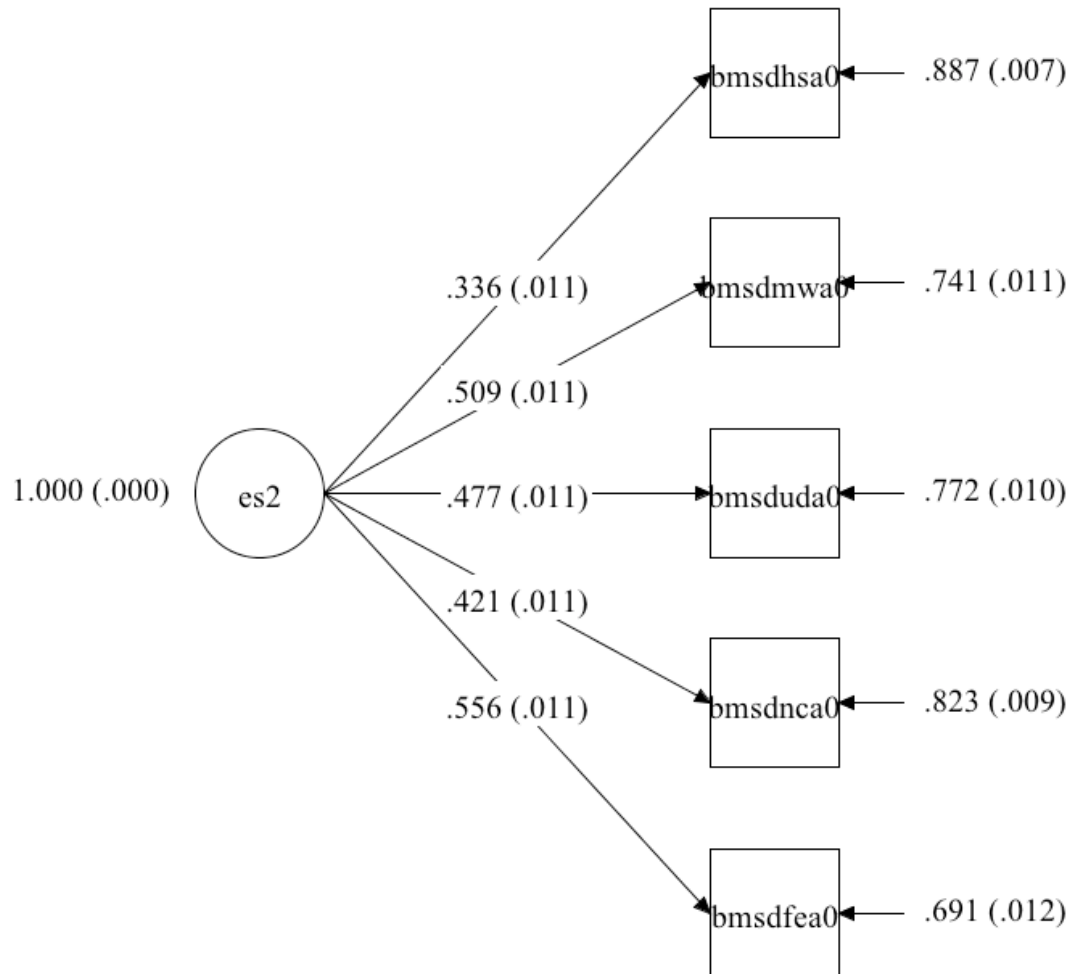
Problem Behavior at age fourteen

Model fit indices: CFI = .894, SRMR = .052



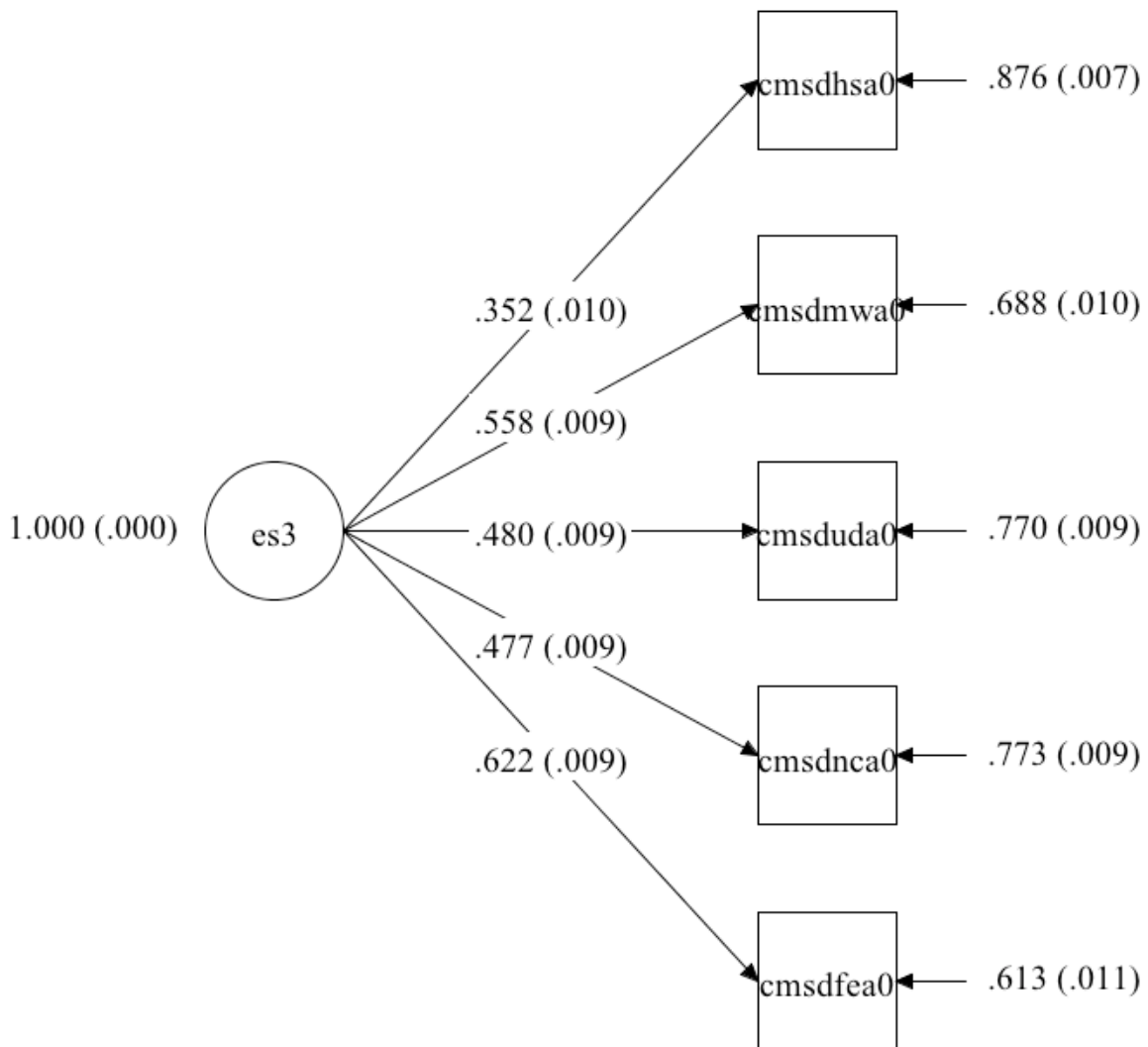
Internalizing problems at age three

Model fit indices: CFI = .915, SRMR = .032



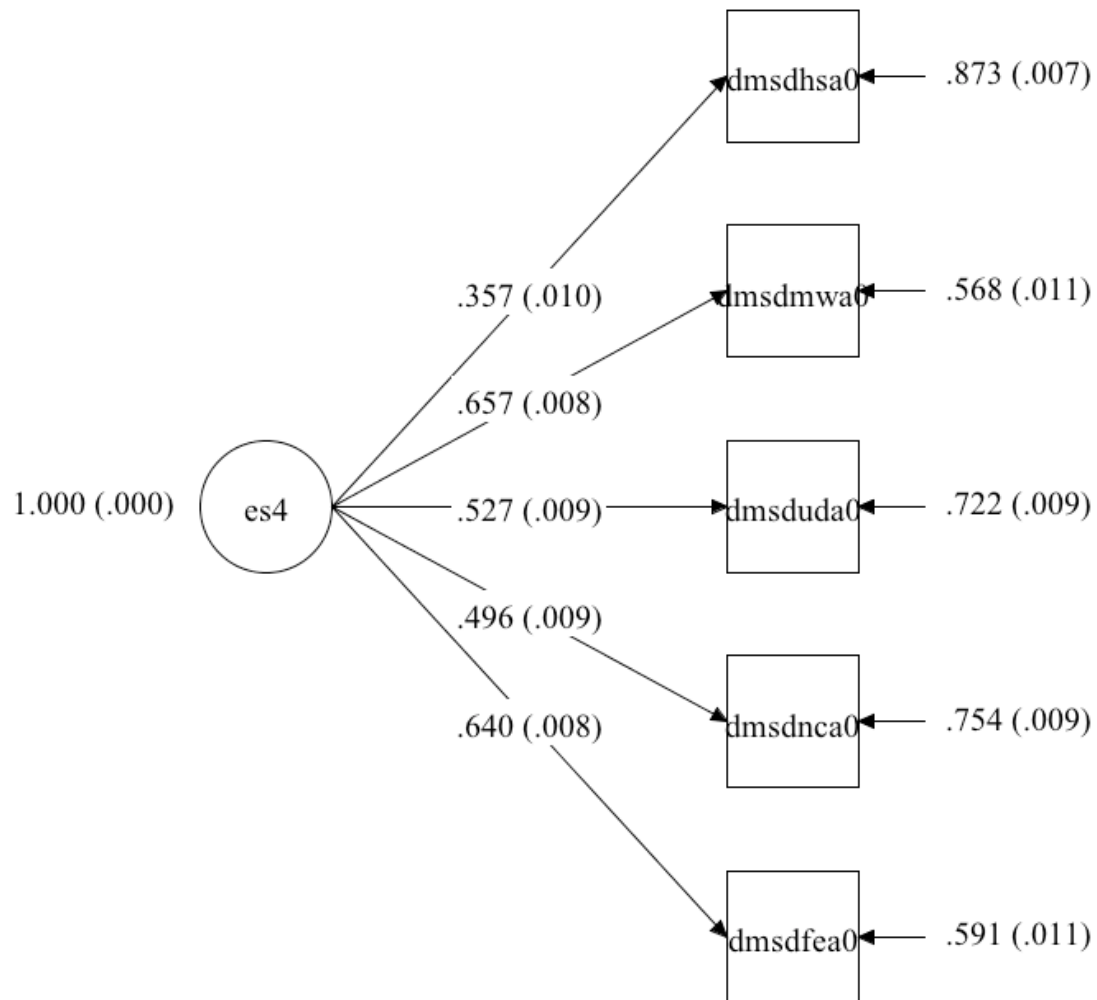
Internalizing problems at age five

Model fit indices: CFI = .963, SRMR = .023



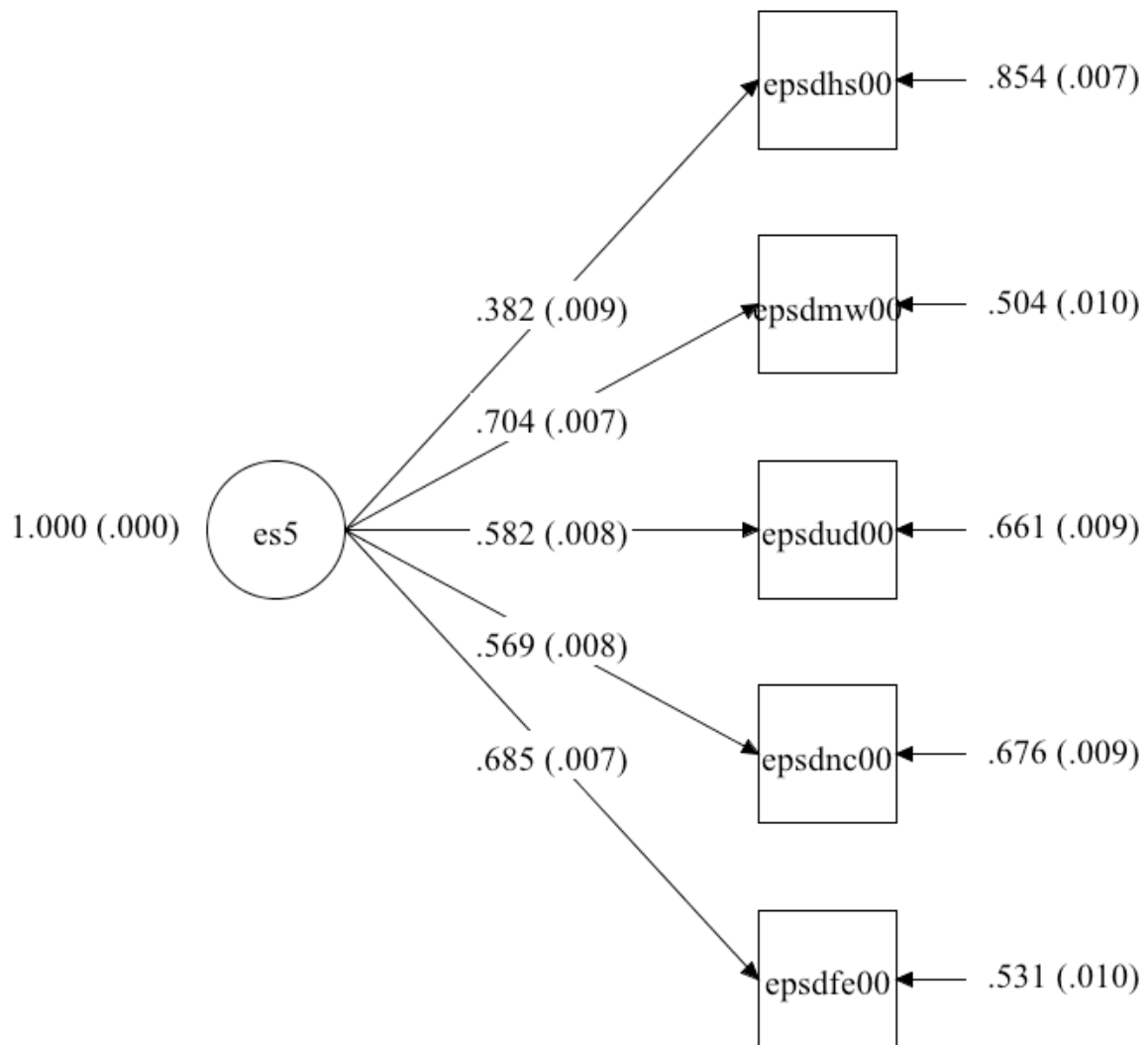
Internalizing problems at age seven

Model fit indices: CFI = .966, SRMR = .024



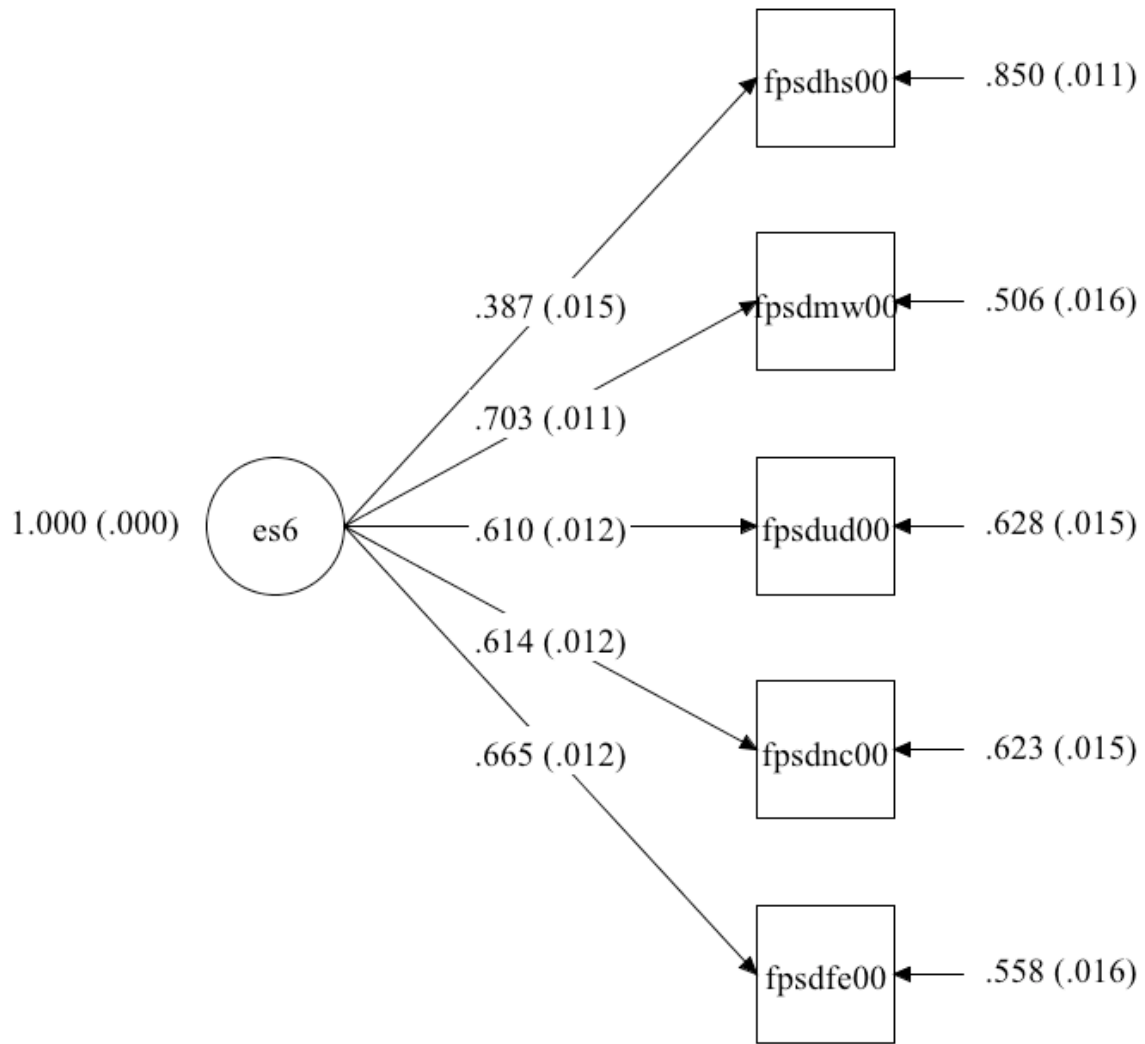
Internalizing problems at age eleven

Model fit indices: CFI = .966, SRMR = .024



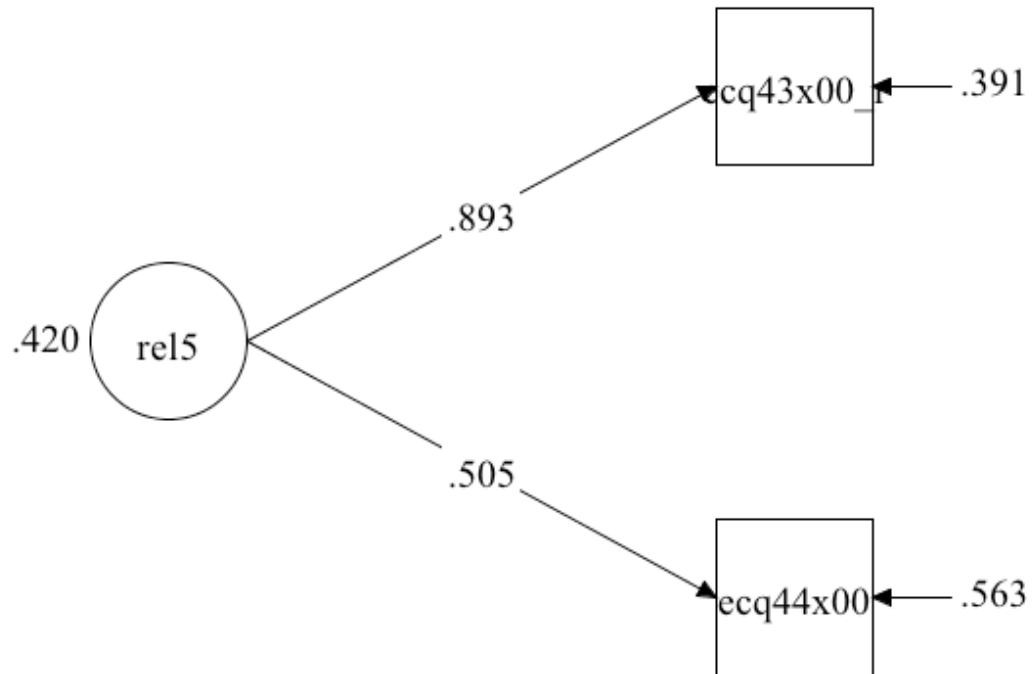
Internalizing problems at age fourteen

Model fit indices: CFI = .964, SRMR = .026



Student-teacher relationships at age eleven

Model fit indices: CFI = .998, SRMR = .000

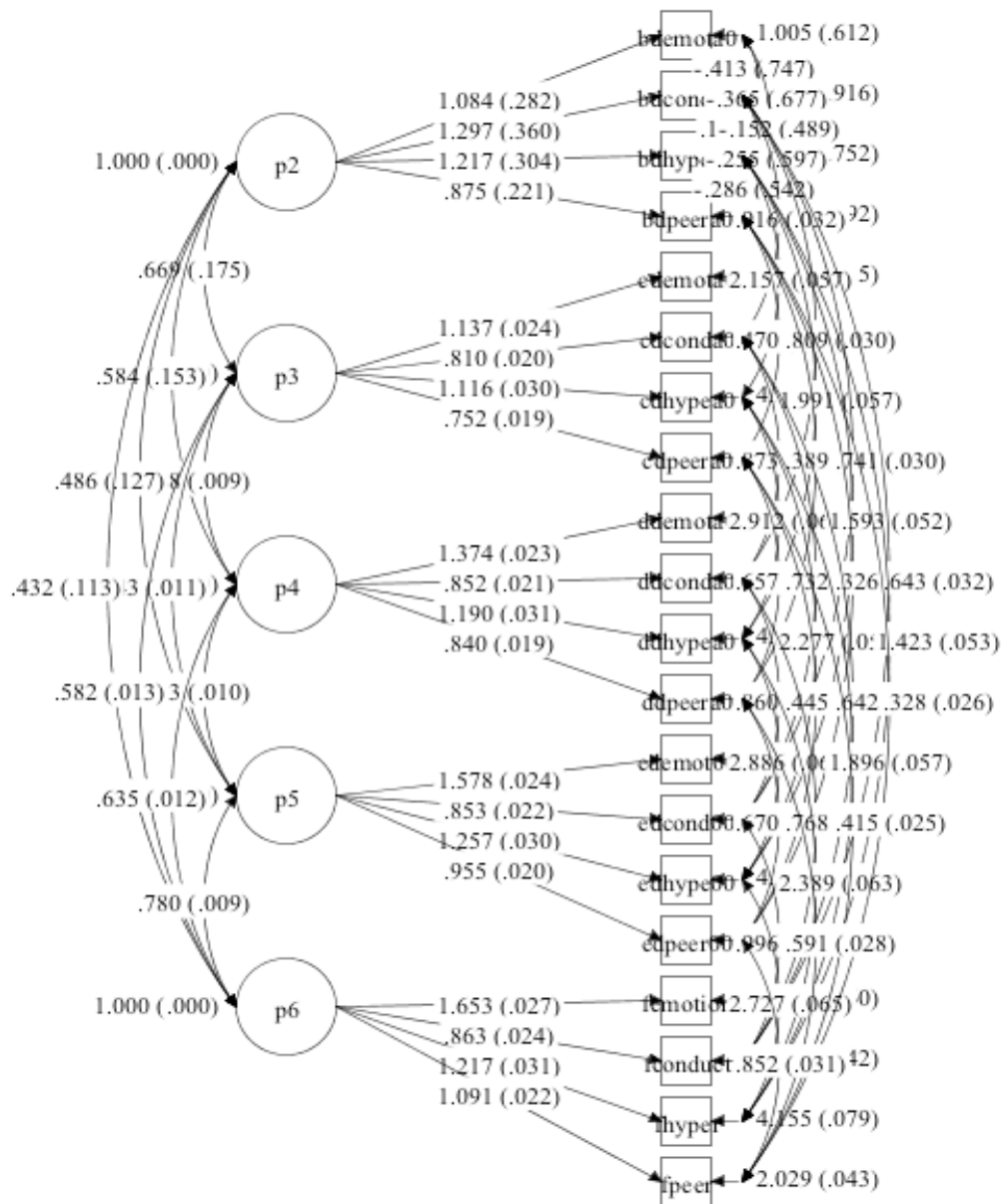


Appendix C: Measurement invariance model

The measurement invariance models for problem behavior and internalizing problems at sweeps 2, 3, 4, 5, and 6 are illustrated below. The measurement invariance models are displayed with their unstandardized beta coefficients to allow factor loadings to be compared across time points.

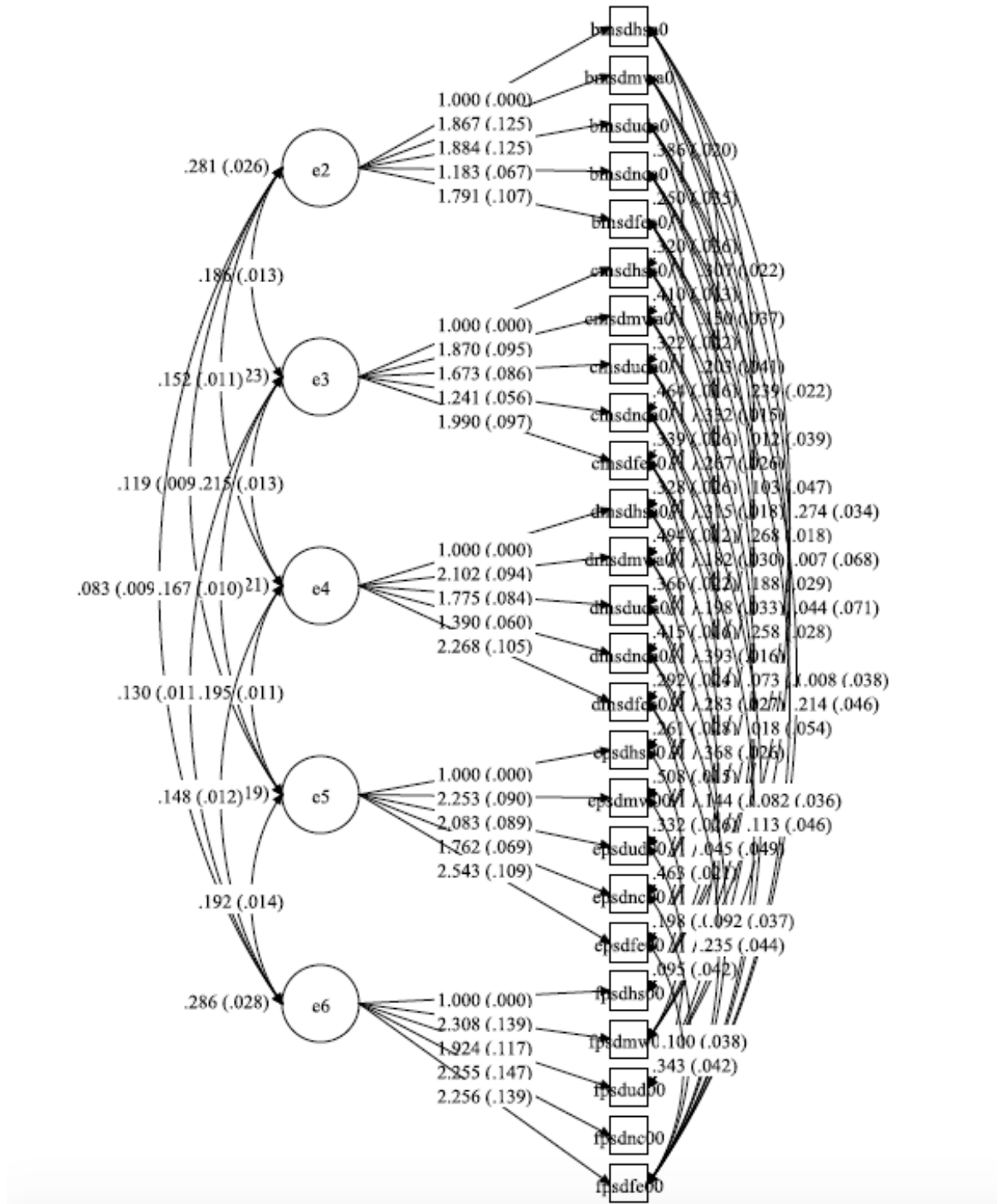
Measurement invariance for problem behavior at ages three, five, seven, eleven, and fourteen

Model fit indices: CFI = .93, SRMR = .078



Measurement invariance for internalizing problems at ages three, five, seven, eleven, and fourteen

Model fit indices: CFI = .98, RMSEA = .022



Appendix D: Correlation matrix with covariates, socioeconomic status, problem behavior, internalizing problem, and student-teacher relationship measures

The correlation matrix shown in table 7 includes the Pearson's r scores between the covariates, problem behavior, internalizing problem, and student-teacher relationship measures. In order to ensure some consistency, all of the data for the correlation matrix come from the first measured sweep in the analysis.

Table 7

Correlation matrix with all measures of interest

	OECD Income Weighted Quintiles (age 9 months)	Internalizing Problems (age 3)	Child Gender (1 = male, 2 = female)	Problem Behavior (age 3)	Student-Teacher Relationship (age 11)
Student-Teacher Relationship	-	-	-	-	-
Problem Behavior (age 3)	-	-	-	-	-.102**
Child Gender (1 = male, 2 = female)	-	-	-	-.094**	.154**
Internalizing Problems (age 3)	-	-	0.014	.604**	-.041**
OECD Income Weighted Quintiles (age 9 months)	-	-.185**	-0.018	-.296**	.071**

Note: * $p < .05$, ** $p < .01$, *** $p < .001$