A Longitudinal Examination of Problem Behaviors in Children with Incarcerated Fathers Using Latent Growth Curve Analyses

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ABSTRACT

Research has found that children with an incarcerated parent are at greater risk for externalizing behaviors (e.g., Kjellstrand & Eddy, 2011), which are associated with a plethora of developmental consequences including poorer family function (Donenberg & Baker, 1992), less academic achievement (Breslau et al., 2010), and later delinquency (Fergusson & Horwood, 1995). The present study modeled externalizing behaviors for individuals with and without incarcerated fathers.

Utilizing latent growth curve analysis (LGCA) models and data from a large, multisite study, we modeled mother-reported problem behaviors from ages 54 months to 15 years. As predicted, on average, externalizing behaviors decreased over time. Initial externalizing behavior levels were associated with behavioral trajectories; individuals with higher scores at 54 months saw faster decreases over time. We found sex differences in externalizing behaviors with mothers reporting fewer behaviors at 54 months for females compared with males. We found that paternal incarceration at either 54 months or in 3rd grade was associated with greater initial levels externalizing behaviors. We also found that paternal incarceration at 54 months, but not in 3rd grade, was associated with externalizing behaviors occurring at the same time.

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This M.S. is dedicated to my brother Aaron,
who continues to inspire me in research and in life.

Chapter 1

Introduction

From the 1970s to 2010, rates of incarceration in the United States have quintupled (Wildeman, 2010). About 1 in 28 children in the United States have an incarcerated parent (The Pew Charitable Trusts, 2010). This growth has left many children and families to deal with consequences of parental incarceration. Children's experiences with an incarcerated parent contribute to the development of externalizing problems (Dallaire et al., 2015; Murray et al., 2012), delinquency, and patterns of intergenerational incarceration (Foster & Hagan, 2007). Early identification and management of externalizing behaviors in children with incarcerated parents requires understanding the etiology and course of these behaviors within this specific population and more generally.

Externalizing behaviors are behaviors characterized by their consequences on individuals' external environment (Campbell et al., 2000). Specifically, these behaviors are disruptive, hyperactive, and/or aggressive (Hinshaw, 1987). Externalizing behaviors are often referred to as problem behaviors, and in this review, these terms will be used interchangeably. Problem behaviors are the basis for diagnoses of externalizing disorders (i.e., oppositional-defiant disorder, conduct disorder, attention-deficit/hyperactivity disorder, intermittent explosive

disorder). Incidence for diagnoses of externalizing disorders in school-aged children is 13.8% (Carter et al., 2010). Lifetime prevalence for externalizing disorders is 24.8% (Kessler et al., 2005).

Across both individuals and communities, externalizing behaviors impose great costs. Externalizing behaviors are linked with poorer social, academic, and professional outcomes across the lifespan. Children with externalizing behaviors suffer reduced academic achievement (Breslau et al., 2011), and their problem behaviors may hinder teaching and prevent other students from learning effectively (Sun & Shek, 2012). Children with externalizing behaviors often struggle with observing boundaries set by adults and peers (McMahon, 1994), which can be a barrier to making friends or having healthy relationships with adults. Parents of children with behavior problems report greater stress related to parenting and less positive feelings about parenting (Donenberg & Baker, 1993). Externalizing behaviors in middle childhood are associated with delinquent behaviors in adolescence (Fergusson & Horwood, 1995). In addition to legal and social consequences for the individual, approximately 52% of all crimes are committed by 6% of all people (Wolfgang, 1983), and this overrepresentation of criminality is due to chronic antisocial behaviors (Elliott, 1994). The chronicity and severity of externalizing behaviors warrants critical consideration, especially for

individuals of populations that may be at heightened risk of developing problems. The current study used latent growth curve analyses to examine externalizing behaviors from ages 54-months to 15 years in individuals with and without incarcerated fathers, and initial levels and trends of these problem behaviors are described.

The Development of Externalizing Behaviors During Childhood

Problem behaviors are present in individuals across the lifespan (Deater-Deckard et al., 1998). However, these behaviors vary greatly in frequency and composition over the lifespan (Bongers et al., 2004). Specifically, aggressive, oppositional, and destructive behaviors decrease over time, while law breaking increases from ages 4 to 18 (Bongers et al., 2004).

There are well-researched gender differences in the frequency and composition of externalizing problems. Boys display greater teacher-reported externalizing behaviors than girls (Deater-Deckard et al., 1998). Parents also report more problem behaviors in elementary school-aged boys compared with girls of the same age (Miner & Clarke-Stewart, 2008). One study found differences in type of externalizing behaviors by gender: From ages 9 to 17, boys and girls did not differ in frequency of oppositional or status violation behaviors, but males displayed greater levels of aggressive behavior and property violations (Lahey, 2000). These differences may be due to gender

informing emotional reactivity, relationships with parents and peers, and sensitivity to criticism (Leadbeater et al., 1999).

In addition to gender, there are racial disparities in the reporting of problem behaviors. Dodge, Petit, and Bates (1994) found higher teacher-reported externalizing behavior for African American children, compared to white children. However, this discrepancy may be due to cultural expectations, as mothers of African American children report fewer problem behaviors than mothers of white children (Keiley et al., 2003). While gender and race may account somewhat for differing rates of externalizing behaviors, there are numerous factors that contribute to the development of problem behaviors.

Externalizing behaviors share common features of under-control. Poor emotion regulation, in addition to inattention, predicts externalizing problems in girls (Hill et al., 2006). Emotional lability and poorer emotion regulation is associated with greater externalizing problems in male and female adolescents (Silk et al., 2003). Specifically, overall dysregulation of negative emotions (i.e., sadness, anger, and anxiety) is related to problem behaviors.

Developmental precursors to externalizing behaviors are often researched, and there appear to be a variety of child-specific, sociocultural, and socialization risk factors that collectively contribute to problem behaviors in children. Twin studies suggest genetic

vulnerability in the development of externalizing behaviors, with as much as 62% of variation explained by shared genes (Jaffee et al., 2002). This genetic influence extends across disorders, but attention-deficit/hyperactivity disorder (ADHD), conduct disorder (CD), and oppositional-defiant disorder (ODD) appear to have unique genetic factors that influence their development (Dick et al., 2005). Genetic influences also explain variation in children's temperaments.

Some of the earliest indicators of externalizing behavior lie in individual temperament. Adverse temperamental characteristics (e.g., impulsivity) contribute to the development of externalizing behaviors (Rothbart & Bates, 2007). One study found that children rated higher on Surgency/Extraversion (i.e., more active, more pleasure-seeking, less shy, and more impulsive) in pre-kindergarten were more likely to display hyperactive and aggressive behaviors in kindergarten (Berdan et al., 2008). However, temperaments alone do not predict behavioral problems; temperaments inform behavioral consequences in specific environments. For example, infants and toddlers with more resistant (i.e., socially unresponsive, dominating, or impulsive) temperaments and with less restrictive (i.e., less prohibitive or scolding to manage children's bad behavior) mothers had greater externalizing problems in middle childhood than children with more restrictive mothers (Bates et al., 1998).

In addition to child temperament, socialization greatly impacts children's externalizing behaviors. Proactive parenting that provides children with support and structure predicts lower levels of problem behaviors (Denham et al., 2000). Conversely, hostile parenting behavior, including the use of harsh punishments, can exacerbate externalizing problems (Keiley et al., 2003). Socialization influences extend to those outside of the home. Children and adolescents with low-quality friendships or antisocial friends are more likely to display these problem behaviors (Lansford et al., 2003). Peer rejection also predicts children's externalizing behaviors (Deater-Deckard et al., 1998), and it may explain comorbid internalizing and externalizing problems (Keiley et al., 2003).

Risk Populations

Genetic vulnerability, temperament, and emotion regulation all contribute to the development of externalizing behaviors. However, beyond individual attributes, environmental influences impact the development of behavior problems. Specifically, sociocultural risk factors contribute to the development of externalizing behaviors. Socioeconomic status predicts mother-reported and teacher-reported externalizing problems (Keiley et al., 2003). Jaffee and colleagues (2002) found that beyond genetic influences, witnessing adult domestic

violence accounted for 5% of variation in children's externalizing behaviors, controlling for genetic factors.

Children of incarcerated parents are particularly susceptible to developing externalizing behaviors. As many as 2.7 million children in the United States presently have a parent in jail or prison (The Pew Charitable Trusts, 2010). More than 5 million children have had a parent incarcerated at some time during their childhoods (Poehlmann-Tynan et al., 2019). Children of incarcerated parents are likely to experience multiple sources of risk, both general and incarceration-specific (Dallaire et al., 2015). Children with incarcerated parents are more likely to commit crimes (Aaron & Dallaire, 2010) and suffer poor school outcomes, such as increased rates of school dropout (Kejllstrand & Eddy, 2011; Trice & Brewster, 2004). Children of incarcerated parents are at risk for greater externalizing problems (Trice & Brewster, 2004), as incarceration-specific risk experiences (ISREs), beyond general environmental risks (GERs), uniquely predict internalizing and externalizing problems in children (Dallaire et al., 2015).

Children with incarcerated parents display more externalizing behaviors than their peers (Murray et al., 2012), and these behaviors often appear in school or social contexts (Shlafer & Poehlmann, 2010). These behavior problems may be the result of parent-child separation

or stigma related to having an incarcerated parent. For children of incarcerated mothers, perceptions of caregiver warmth and acceptance are associated with lower levels of both internalizing and externalizing behaviors (Mackintosh et al., 2006). However, the directionality of the relationship between caregivers' behavior and children's behavior is unclear. Caregivers' behavior may impact children's behavior, caregivers' perceptions of children's difficultness may affect their expression of warmth and acceptance, or this relationship may be bidirectional. The relationship between caregiver behavior and child behavior may also be determined by a third variable.

Several studies have undertaken longitudinal examinations of externalizing behaviors in children of incarcerated parents. Murray and Farrington's seminal study (2005) assessed antisocial and delinquent behaviors in males from adolescence through adulthood (ages 14-40), and they compared these behaviors among those that had experienced parental separation before the age of 10 due to incarceration, hospitalization or death, or other reasons. They also included boys who had never experienced parental separation. They found that parental incarceration was uniquely associated with problem behaviors compared to other sources of separation. More adolescents with incarcerated parents endorsed antisocial or delinquent behavior in

adolescence and adulthood than individuals separated from parents for other reasons than incarceration. They found that incarceration best predicted problem behaviors out of all sources of separation. Furthermore, incarceration predicted antisocial and delinquent behavior, even with other risks, such as parents' convictions, included in the model. Kjellstrand and Eddy (2011) also evaluated adolescents' problem behaviors, considering youths' experiences with parental incarceration before the age of 10. They included other variables (i.e., social advantage, parent health, and effective parenting) as mediators between parental incarceration and antisocial behaviors, and they found that their model explained 60% of the variation in adolescents' problem behaviors.

These studies' results provide cogent evidence for enduring consequences of parental incarceration on children. The goal of the present study was to build upon these influential works by considering parental incarceration before the age of 10 as a unique risk factor but also by evaluating the influence of parental incarceration on externalizing behaviors concurrently.

Present Study

There are major limitations to studying developmental phenomena cross-sectionally (Kraemer, 2000), and these concerns are especially relevant for behaviors that fluctuate in number and type,

as externalizing behaviors do (Bongers et al., 2004). For this reason, we evaluated trajectories of externalizing behaviors longitudinally using latent growth curve analysis (LGCA) models. We utilized LGCA models to answer our research questions since LGCA models allow for estimation of group differences within individual change (Curran et al., 2010). LGCAs have several advantages to other longitudinal models. Firstly, time points do not need to be evenly spaced. Data can be partially missing, and imputation can be used to account for these missing data. Latent growth curves also allow for time-varying covariates (TVCs), which are of import for our question of how incarceration predicts externalizing behaviors as they occur contemporaneously. Lastly, some studies suggest that growth models have higher levels of statistical power than traditional longitudinal models (Muthén & Curran, 1998).

We applied LGCA models to investigate how externalizing behaviors changed over time and how this change was influenced by parental incarceration. Data for the current study is from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD). We considered externalizing behaviors, measured using the Child Behavior Checklist (CBCL; Achenbach, 1991), in individuals from 54 months to 15 years of age. We formed five hypotheses. First, we expected that

externalizing behaviors would, on average, decrease over time. This hypothesis is consistent with prior research (e.g., Bongers et al., 2004) that overall externalizing behaviors decrease in frequency from early child to adolescence. Secondly, we hypothesized that child participants' initial levels of problem behaviors would predict their trajectories. We did not predict whether this relationship would be positive or negative. Thirdly, we predicted that child sex, which was reported as male or female at birth, would predict differing initial levels of problem behaviors; we expected that males would have higher initial levels of problem behaviors. Fourthly, we hypothesized that children with incarcerated parents would have higher initial levels of problem behaviors relative to their peers because of stressors associated with paternal incarceration. Lastly, we expected that parental incarceration would predict levels of problem behaviors at a given time. All of our hypotheses were evaluated in models of total externalizing behaviors. However, we assessed models of delinquent and aggressive behaviors to see if patterns held for these subscales of externalizing behavior.

Chapter 2

Method

Participants

The present study used longitudinal data from the National Institute of Child Health and Human Development (NICHD) Study on Early Child Care and Youth Development (SECCYD). In 1991, families from 10 locations across the United States were recruited in hospitals following the birth of their child. Children and families participated throughout four phases, ranging from infancy to adolescence.

The current study utilized data from all four phases and from 10 time points. Children were assessed at 54 months of age; in kindergarten; in 1st, 3rd, 4th, 5th, and 6th grade; and at age 15. Study retention was high: Phase I had 1,364 participating children and families; Phase II had 1,226 children; Phase III had 1,061 children; and Phase IV had 1,009 children. Using full information maximum likelihood estimation gave us sample sizes of 1141 for models 1a, 1b, and 1c; 1141 for models 2a, 2b, and 2c; and 962 for models 3a, 3b, and 3c.

Demographic information collected during Phase I indicated that most child participants were White (80.4%; 12.9% Black; 4.7% Other; 1.6% Asian or Pacific Islander; 0.4% American Indian, Eskimo, or Aleutian). Most of the sample (93.9%) was non-Hispanic. About half of

the children in the sample were male (51.7%). Almost half of the children (44.8%) were first-born; second-born children comprised 34.8% of the sample, third-born 14.6%, and fourth- through seventh- 5.7%.

Average age for mothers was 28.11 (*SD* = 5.63). Mothers were mostly White (82.6%; 12.8% Black; 1.8% Other; 2.2% Asian or Pacific Islander; 0.6% American Indian, Eskimo, or Aleutian). Mothers reported education level, and 21.0% of mothers had completed high school or equivalent, 33.4% had some college or an associate's degree, 20.8% had a bachelor's degree, 11.8% had some graduate work or a master's degree, and 2.7% had a doctoral degree.

Most mothers were married (76.5%), and most mothers and fathers were living together at the time of the child's birth (85.0%). Mothers reported on father demographic information, and fathers' ages were not reported. Fathers were mostly white (81.5%; 14.0% Black; 2.1% Other; 1.9% Asian or Pacific Islander; 0.4% American Indian, Eskimo, or Aleutian). Mothers reported fathers' education levels, and 20.8% of fathers had completed highs school or equivalent, 27.1% had some college or an associate's degree, 19.9% had a bachelor's degree, 10.9% had some graduate work or a master's degree, and 5.1% had a doctoral degree.

Measures

Parental incarceration. Incarceration was assessed at three time points. When children were 54-months-old and again when they were in third grade, the mothers reported whether their husband or partner had been incarcerated (i.e., “Husband/partner has been detained in the last 6 months”) on the Life Events Checklist (LEC; National Center for PTSD). Mothers also reported whether their husband or partner had been absent due to jail when the child was 6-months-old. For two reasons we excluded the 6 month data collection points from the present study: (1) there was only one mother who answered “yes” to this question at 6 months, and (2) the wording of this question differed from the wording of the questions provided at 54-months and third grade.

At 54-months, 20 mothers said their partner had been detained, 1054 said their partner had not been detained, one mother refused to answer, and in two cases the question was not applicable. In third grade, 24 mothers answered “yes,” and 1004 answered “no;” there were no refusals or N/A categorizations. Three children experienced paternal incarceration at both times. Taking these repeat cases into consideration, there were a total of 41 children that had experienced paternal incarceration at a given time.

Problem behaviors.

Problem behaviors were assessed using the Externalizing Behavior subscale of the Child Behavior Checklist (CBCL; Achenbach, 1991), which is a well-standardized and highly valid tool for measuring individuals' problem behaviors longitudinally. Mothers were asked to report how often their children displayed problem behaviors over the previous 2 months on a 3-point scale (0 = *not true [as far as you know],* 1 = *somewhat true or sometimes true*, 2 = *very true or often true*).

The CBCL contains broad-band and narrow-band scores for child behavior problems. Narrow-band syndrome scores include social problems, depression, delinquency, aggression, and attention problems. Broad-band scores (i.e., externalizing, internalizing, and total problem) are comprised of these narrow-band scores. The narrow-band Aggressive and Delinquent subscales make up the broad-band Externalizing Behavior subscale.

Total scores for Aggressive, Delinquent, and Externalizing Behavior subscales were included in our models. Means and standard deviations of total Externalizing Behavior scores at all times are included in Table 1.

Plan of analysis

We used LGCA models to examine inter- and intra-individual changes in children's externalizing behaviors over time. All models were estimated using the lavaan package in R, which is a flexible,

commercial-quality package for latent factor modeling. We used the growth() function in lavaan, which assumes a mean structure. Models 1a, 2a, and 3a included total externalizing behaviors as dependent variables. Dependent variables for models 1b, 2b, and 3b consisted of delinquent behavior scores. Models 1c, 2c, and 3c assessed aggressive behaviors as dependent variables.

In all models, we assessed trajectories of mother-reported externalizing behaviors for individuals from ages 54 months to 15 years (i.e., 54 months, kindergarten, 1st grade, 3rd grade, 4th grade, 5th grade, 6th grade, and 15 years). We included a latent intercept, which predicted the endogenous outcome variables of interest. We set all intercept coefficients to 1, which allowed for only one model intercept estimate. We specified a linear slope, so we set all the path coefficients from the latent slope to the endogenous outcome variables as a successive series. Not all time points were evenly spaced, so slope coefficients were scaled so that the separation between points approximated the time differences (i.e., 0, 1.5, 2.5, 4.5, 5.5, 6.5, 7.5, 10.5). The growth() function in lavaan automatically constrained the means of the endogenous variables to 0 and allowed the latent variable intercepts and means to be freely estimated. The exogenous variables' residual means were also constrained to 0, so only

exogenous variances were estimated. All exogenous variables were automatically covaried in lavaan.

All exogenous variable included in the models were coded to be dichotomous. Child sex was coded so that male = 0, female = 1. Maternal education was also dichotomized with less maternal education (high school or equivalent or less) being coded as a 0 and more maternal education (some college or associate's degree or more) being coded as a 1. Child race was dichotomized with White being 0, and Non-White being 1. Child sex, maternal education, and child race were all included as time-invariant covariates in models 1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, and 3c.

For models 2a, 2b, and 2c, we combined incarceration at 54 months and in 3rd grade to create a total incarceration variable. Incarceration was included as a time-invariant covariate for models 2a, 2b, and 2c, and model intercepts and slopes were regressed onto it. Children experiencing incarceration at either or both time points were coded as 1. If mothers answered "no," or refused to answer they were coded as 0. For models 3a, 3b, and 3c, paternal incarceration at both 54 months and in 3rd grade was coded so that 1 indicated "yes," and 0 indicated "no" or any other response. Paternal incarceration statuses at 54 months and in 3rd were included in models 3a, 3b, and 3c as time-

varying covariates, and behaviors at 54 months and in 3rd grade were regressed onto their respective incarceration variables.

Models 1a, 1b, 1c. We tested our first three hypotheses within model 1a. We expected to see a negative mean slope, which would suggest that total externalizing behaviors were decreasing over time. We expected that the slope-intercept covariance in the model would be significant, suggesting that the severity of problem behaviors at 54-months would inform the trajectory of problem behaviors over time. We also anticipated that the latent intercept would be predicted by sex and that males would have larger intercepts than females.

In model 1a, observed outcomes were scores of total externalizing behaviors. In models 1b and 1c, we included endogenous narrow-band scores of delinquent and aggressive behaviors respectively. We included these subscales to see if patterns held for delinquent and aggressive behaviors specifically.

Models 2a, 2b, and 2c. In models 2a, 2b, and 2c, we evaluated differences between group trajectories of children with and without incarcerated fathers by treating paternal incarceration as a time-invariant covariate. We expected that paternal incarceration would predict the latent intercept in model 2a. We expected that initial levels of externalizing behaviors would be greater for individuals experiencing parental incarceration.

In model 2a, observed outcomes were scores of total externalizing behaviors. In models 2b and 2c, we included endogenous narrow-band scores of delinquent and aggressive behaviors respectively. We included these subscales to see if patterns held for delinquent and aggressive behaviors specifically.

Model 3a, 3b, and 3c. We evaluated our final hypothesis that paternal incarceration at 54 months would significantly predict contemporaneous externalizing behavior scores, and paternal incarceration in 3rd grade would predict contemporaneous problem behaviors as well. We included paternal incarceration both time points (i.e., 54-months and third grade) and treated it as a time-varying covariate in our LGCA. In models 3b and 3c, we included endogenous narrow-band scores of delinquent and aggressive behaviors respectively. We included these subscales to see if patterns held for delinquent and aggressive behaviors specifically.

Chapter 3

Results

Descriptive Statistics

Chi-square tests of independence established that there was no relationship between child sex and paternal incarceration ($\chi^2(1, N = 1{,}141) = 0.024$, $p = .877$). However, there was a significant relationship between maternal education and total paternal incarceration. Children of less educated mothers were more likely to have an incarcerated father ($\chi^2(1, N = 1{,}141) = 11.762$, $p = .000$). There was also a significant relationship between child race, coded as White or non-White, and total paternal incarceration. Non-white children were more likely to have an incarcerated father ($\chi^2(1, N = 1{,}141) = 8.496$, $p = .004$).

We compared Externalizing Behavior, Aggressive Behavior, and Delinquent Behavior scores for children of incarcerated parents and children without incarcerated parents at 54-months and in 3rd grade. Welch two sample t-tests with unequal variances assumed revealed no significant difference in mean externalizing behavior scores at 54-months ($t(19.675) = .930$, $p = .364$) for children with incarcerated fathers ($M = 11.450$, $SD = 7.045$) and those without ($M = 9.973$, $SD = 6.701$). Welch two sample t-tests with unequal variances assumed revealed a significant difference in mean externalizing behavior scores

in 3rd grade ($t(23.583) = 3.436$, $p = .002$) for children with incarcerated fathers ($M = 13.333$, $SD = 8.726$) and those without ($M = 7.175$, $SD = 6.179$). Table 1 includes means, standard deviations, and Pearson correlations for sex, maternal education, race, total paternal incarceration and total externalizing behaviors scores.

Model Fit

Model fit indices for all models ranged from acceptable to excellent (Table 2). However, chi-square indices of model fit were poor for all models, with all chi-square test statistics being large and significant ($p = .000$). Comparative fit index (CFI) values range from 0 to 1, with higher values indicating better fit. CFI values above 0.95 indicates that the user-constructed model is better than the independence model (Schermelleh-Engel et al., 2003). All models except model 3b (CFI = .938) had CFI values above 0.95 indicating acceptable fit. Tucker-Lewis Index (TLI) values of 0.95 or above indicate good fit with values of 0.90 or above indicating acceptable fit. All TLI values were above 0.90, though models 1b, 2b, and 3b had values under 0.95 (Table 2). Root-mean square error of approximation values of 0.01, 0.05, and 0.08 indicate excellent, good, and mediocre fit, respectively (MacCallum et al., 1996). All RMSEA values were under .08 except the measurement model. All other models had RMSEA values ranging from .055 to .068 (Table 2). Standardized root

mean square residual (SRMR) values of under 0.08 indicate good fit (Hu & Bentler, 1999), and all SRMR values fell under this metric.

Model Interpretation

All models had positive intercept estimates and negative slope estimates (Table 3), suggesting that, on average, scores decreased over time. Intercept variances were large, while slope variances were small (Table 3), suggesting that there was great variability in initial scores but not in trajectories.

We were especially interested in the slope-intercept covariance in model 1a, which was negative (b = -1.216, p = .000). This negative covariance, coupled with the negative slope estimate in model 1a (b = -.371, p = .003) suggests that people with higher scores saw faster decreases in behavior scores over time on average; those with lower scores saw smaller declines. All models had negative slope estimates and negative slope-intercept covariances (Table 3).

Covariances between exogenous variables were automatically estimated in lavaan. Covariance estimates between maternal education and sex (b = .012), maternal education and race (b = -.033), and sex and race (b = .003) were the same for models 1a, 1b, 1c, 2a, 2b, and 2c. Covariances between paternal incarceration and maternal education (b = -.009), paternal incarceration and sex (b = .001), and paternal incarceration and race (b = .007) were the same for models 2a, 2b, and

2c. Models 3a, 3b, and 3c had the same covariance estimates between maternal education and sex (*b* = .014), maternal education and race (*b* = -.032), and sex and race (*b* = .004).

Covariates in the Model

In Model 1a, sex significantly predicted the model intercept (*b* = -.943, *p* = .012) with females having lower total externalizing behavior scores relative to males. Maternal education significantly predicted the intercept (*b* = -2.141, *p* = .000) with children of more educated mothers having less problem behaviors. Maternal education also predicted model slope (*b* = -.101, *p* = .026) with children of more educated mothers seeing greater decreases in behaviors over time.

In Model 1b, sex significantly predicted the model intercept (*b* = -.248, *p* = .002) with females having lower delinquent behavior scores compared to males. Maternal education significantly predicted the intercept (*b* = -.350, *p* = .000) with children of more educated mothers having lower delinquent behavior scores. Maternal education also significantly predicted the model slope (*b* = -.040, *p* = .001) with children of more educated mothers seeing greater decreases in behaviors over time.

In Model 1c, sex significantly predicted the model intercept (*b* = -.691, *p* = .031) with females having lower aggressive behavior scores compared with males. Sex also significantly predicted the slope (*b* =

.065, *p* = .043). The model's positive slope suggests that females saw slower decreases in behaviors over time. Maternal education significantly predicted the intercept (*b* = -1.802, *p* = .000) with children of more educated mothers having lower aggressive behavior scores.

In model 2a, incarceration status significantly predicted the intercept (*b* = 3.470, *p* = .001) with children of incarcerated fathers having greater externalizing behaviors. Sex significantly predicted the intercept (*b* = -.959, *p* = .011). Maternal education significantly predicted the model intercept (*b* = -2.003, *p* = .000) with children of more educated mothers having less total externalizing behaviors. Maternal education also significantly predicted model slope (*b* = -.100, *p* = .027) with children of more educated mothers seeing greater decreases in externalizing behaviors over time.

In model 2b, incarceration status significantly predicted the intercept (*b* = .813 *p* = .000) with children of incarcerated fathers having higher initial levels of delinquent behaviors. Sex significantly predicted the intercept (*b* = -.253, *p* = .001) with females having lower delinquent behavior scores compared with males. Maternal education significantly predicted both the intercept (*b* = -.317, *p* = .000) and the slope (*b* = -.041, *p* = .001). These results indicate that children of more highly educated mothers have lower delinquent behavior scores, and these scores decrease more drastically over time.

In model 2c, paternal incarceration status significantly predicted the model intercept (*b* = 2.670, *p* = .002) with children of incarcerated fathers having higher aggressive behavior scores. Sex significantly predicted the intercept (*b* = -.704, *p* = .027) with females having lower scores relative to males. Maternal education significantly predicted the intercept (*b* = -1.696, *p* = .000) with children of more educated mothers having lower initial levels of aggression.

In model 3a, sex significantly predicted the model intercept (*b* = -.953, *p* = .018) with females having lower total externalizing behavior scores compared with males. Maternal education significantly predicted the intercept (*b* = -2.267, *p* = .000) with children of more educated mothers having lower initial levels of problem behaviors. Paternal incarceration at 54 months predicted problem behaviors at 54 months (*b* = .391, *p* = .000). However, paternal incarceration in 3rd grade did not predict co-occurring problem behaviors (*b* = .163, *p* = .156).

In model 3b, sex significantly predicted the model intercept (*b* = -.254, *p* = .003) with females having lower total externalizing behavior scores compared with males. Maternal education also significantly predicted the intercept (*b* = -.368, *p* = .000) and the slope (*b* = -.036, *p* = .005), indicating that children of more educated mothers had lower initial levels of delinquent behaviors and that these behaviors

decreased more over time. Paternal incarceration at 54 months predicted delinquent behaviors at 54 months (*b* = .088, *p* = .000). However, paternal incarceration in 3rd grade did not predict co-occurring delinquent behaviors (*b* = .063 *p* = .056).

In model 3c, sex significantly predicted the model intercept (*b* = -.695, *p* = .043) with females having lower aggressive behavior scores compared with males. Maternal education significantly predicted the intercept (*b* = -1.907 *p* = .000) with children of more educated mothers having lower initial levels of aggressive behavior. Paternal incarceration at 54 months predicted aggressive behaviors at 54 months (*b* = .289, *p* = .000). However, paternal incarceration in 3rd grade did not predict aggressive behaviors at the same time (*b* = .101, *p* = .288).

Chapter 4

Discussion

This study was conducted to evaluate five hypotheses. First, we hypothesized that total externalizing behaviors would decrease over time. This hypothesis was supported for all models with total externalizing behaviors as dependent variables. Our second hypothesis was that initial levels of problem behaviors would be associated with trajectories of problem behaviors. We found that baseline problem behaviors, measured at 54-months, were significantly related to the shape of trends over time with individuals with greater initial behaviors seeing faster declines. Thirdly, we hypothesized that child sex would significantly predict initial levels of total externalizing behaviors, and this hypothesis was supported; in all models with total externalizing behaviors, sex significantly predicted the initial levels of behavior. Fourthly, we hypothesized that paternal incarceration, at either 54 months or in 3rd grade, would predict initial levels of problem behaviors. This hypothesis was supported. Lastly, we predicted that paternal incarceration at a given time would predict co-occurring externalizing behaviors. This hypothesis was not fully supported, as paternal incarceration at 54 months predicted concurrent problem behaviors, but incarceration in 3rd grade did not significantly predict problem behaviors occurring at the same time.

Though our hypotheses were formed with total externalizing behaviors as our outcomes of interest, we investigated trends of delinquent and aggressive behaviors specifically. Perhaps unsurprisingly, these models, which included narrow-band subscales as observed items, closely resembled the models that used the broad-band scale which they make up. Like models of externalizing behavior, delinquent and aggressive behavior models showed decreases in average behaviors over time. Findings from one large survey study suggest that aggression peaks in early adolescence before declining into late adolescence (Lahey et al., 2000), but we did not find the same trends for aggressive behaviors. Slope estimates for models with delinquent behaviors were negative, but they were also non-significant. Though externalizing behaviors decrease for most individuals from childhood to adolescence (Bongers et al., 2004), property violations and status offenses are more prevalent for adolescents compared with children (Lahey et al., 2000). The delinquent behavior subscale of the CBCL includes both property violations (e.g., theft) and status violations (e.g., underage drinking), which may explain the non-significant slope estimates in models of delinquent behaviors. In all models of aggressive behavior, initial levels of aggressive behavior were associated with trends over time; individuals with greater aggressive behaviors at 54 months saw faster decreases over time.

The delinquent behavior model, which considered paternal incarceration's effects on co-occurring behaviors, also saw an association between initial level of behavior and trajectory. Sex significantly predicted both delinquent and aggressive behaviors, and females had lower scores relative to males. Interestingly, sex also predicted trajectories of aggressive behaviors in our models with no paternal incarceration covariate and in our model with paternal incarceration as a time-invariant covariate. In both models, females saw slower declines in aggressive behaviors. Paternal incarceration predicted delinquent and aggressive behaviors in models with total incarceration as a covariate, as it similarly predicted total externalizing behaviors. One notable finding is that paternal incarceration did not predict delinquent, aggressive, or total externalizing behavior trends in individuals with and without incarcerated fathers, meaning that these behaviors declined similarly for individuals with and without incarcerated fathers.

Results from the present study both support and contrast with findings of previous studies. Higher maternal education has been associated with fewer problem behaviors in children (Shaw et al., 1994). In all models included in this study, maternal education predicted initial levels of externalizing behaviors. On average, individuals with more educated mothers had fewer delinquent,

aggressive, and total externalizing behaviors. Maternal education also predicted model slope in several models with individuals with more educated mothers seeing sharper declines in delinquent and total externalizing behaviors over time. The link between maternal education and problem behaviors has been found in prior research. One study of behavioral outcomes of 6- and 7-year-old African American children found that higher maternal education was associated with greater maternal sensitivity and less controlling behavior, which were in turn associated with more positive behaviors and fewer problem behaviors in children (Tamis-LeMonda et al., 2009). Another study, which used SECCYD data to examine problem behaviors in children from preschool age to preadolescence, found the same association between maternal education and maternal sensitivity, though they noted a bidirectional relationship between maternal sensitivity and the occurrence of problem behaviors (Wang et al., 2013). Beyond this link of maternal education and positive parenting behaviors, maternal education may indicate the presence of other factors that contribute to fewer externalizing behaviors, such as higher family income (Harding, 2015). Race did not significantly predict the levels or the course of problem behaviors, though racial disparities in maternal reporting of problem behaviors have been documented

(Keiley et al., 2003). Our study's sample was mostly white (80.4%), which may contribute this lack of variation.

The results of the present study support the contention that problem behaviors, on average, decline over time (Bongers et al., 2004). We found that total externalizing behaviors, as well as delinquent and aggressive behaviors, decreased in frequency from 54 months to 15 years. Our findings that females had fewer delinquent, aggressive, and total problem behaviors also aligned with previous findings that mothers report fewer problem behaviors for female children (Miner & Clarke-Stewart, 2008). Our results corroborate those of cross-sectional studies, which found associations between parental incarceration and externalizing behaviors. Children of incarcerated parents have greater externalizing behaviors relative to their peers (e.g., Wilbur et al., 2007). Adolescents that experienced parental incarceration before the age of 10 also see elevated externalizing behaviors in adolescence when compared with youth that have not experienced parental incarceration (Kjellstrand & Eddy, 2011; Murray & Farrington, 2005). This study's findings support the contention that parental incarceration predicts offspring problem behaviors. However, our results also suggest that changes in levels of problem behaviors over time are similar between individuals with and without incarcerated parents. To our knowledge, other studies have not elucidated the

nature of problem behavior trends, which is a strength of the present study.

Major strengths of this study include is its utilization of a nationally representative sample. One in every 28 children in the United States have an incarcerated parent, and about 90% of incarcerated parents are fathers (The Pew Charitable Trusts, 2010); the rate of paternal incarceration in this study's sample was close to this figure at 3.59% in models 2a, 2b, and 2c. Generating growth models with these data allowed for us to investigate not only levels of problem behaviors but also trajectories of these behaviors for children and adolescents. For this reason, the application of latent growth curve analyses was a strength of this study. Including paternal incarceration as both a time-invariant and time-varying covariate allowed us to consider paternal incarceration as a predictor of externalizing behaviors overall and at specific time points.

Despite its strengths, this study had several limitations. Firstly, sex, not gender was utilized as a predictor in our models. Studies emphasize gender differences in the type and frequency of problem behaviors (e.g., Miner & Clarke-Stewart, 2008). However, only child sex at birth, not child gender, was available in our datasets. This study's examination of the effects of incarceration is also limited by the sample used. Mothers only reported on paternal incarceration at three

time points (i.e., when their child was 6 months, 54 months, and when their child was in 3rd grade). Because only one child experienced paternal incarceration at 6 months, the present study only included data from 54 months and 3rd grade. Because of limited information regarding paternal incarceration, it is possible that individuals categorized as not having an incarcerated father had an incarcerated father at an unmeasured time point. No other information about incarceration was included in the dataset and therefore could not be included in this study. Lastly, we did not investigate possible underlying mechanisms of paternal incarceration's influence on problem behaviors. For instance, children of incarcerated parents often experience peer stigmatization (Myers et al., 2013), which may contribute to the development of externalizing behaviors. We also did not include in our models factors related to parenting, such as parental warmth, which is associated with lower levels of externalizing behaviors in children of incarcerated parents (Mackintosh et al., 2006).

Conclusion

In this study, we considered the role of paternal incarceration on individuals' externalizing behaviors from ages 54 months to 15 years. We found that children who had experienced paternal incarceration at either 54 months or in 3rd grade had higher levels of total externalizing behaviors, as well as greater delinquent and aggressive behaviors.

Incarceration status also predicted contemporaneously occurring problem behaviors but only when children were 54 months old. Initial levels of problem behaviors predicted course, and individuals with greater externalizing behaviors at 54 months saw faster average decline over time. This difference in average slope may be explained by children with greater externalizing problems at 54 months catching up to peers in behavioral self-regulation. It is important to acknowledge that paternal incarceration itself was not a significant predictor of problem behavior trajectories.

This study's findings, its strengths, and its limitations should serve to inform future research. First, it would be important to measure paternal incarceration at all time points. Doing so would ensure a more accurate measurement of paternal incarceration and would allow for paternal incarceration to be included as a time-varying covariate for all time points in the model. Second, maternal incarceration was not included in the present study. Though paternal incarceration is more prevalent than maternal incarceration, the consequences of maternal incarceration on children's development merit its inclusion in models such as ours. Lastly, the inclusion of other factors related to incarceration may serve useful in models similar to those of the present study. Parental incarceration has unique risks, and the inclusion of these risks as well as protective factors may enrich our

understanding of the relationship between parental incarceration and offspring's' development of problem behaviors.

Results of this study indicate behavioral consequences of paternal incarceration on young children. The finding that paternal incarceration predicting initial levels of problem behaviors, coupled with the finding that incarceration predicted co-occurring problem behaviors at 54 months, suggest that young children are especially susceptible to risks associated with paternal incarceration. Since externalizing behaviors bear numerous consequences for children, families, and classrooms, it is crucial to support young children experiencing parental incarceration, who are at increased risk for developing problem behaviors. School-based interventions may be effective for reducing problem behaviors (Wilson et al., 2001), and a school-based intervention may be especially appropriate for children of incarcerated parents, who display greater problem behaviors at school and in social contexts (Shlafer & Poehlmann, 2010). Successful intervention programs should aim to include caregivers, since externalizing behaviors impair family functioning (Donenberg & Baker, 1993), and positive caregiver behaviors (e.g., warmth) are associated with diminished rates of problem behaviors (Mackintosh et al., 2006). Paternal incarceration predicted higher initial levels of problem behaviors, but paternal incarceration did not predict trajectories of

problem behaviors. Paternal incarceration also did not predict co-occurring problem behaviors in 3rd grade. These findings may indicate greater resiliency to paternal incarceration at older ages; they may also indicate individuals developing greater behavioral inhibition. Though these findings are positive, they do not undermine the importance of addressing problem behaviors in children of incarcerated parents.

This study's findings contribute to an understanding of externalizing behaviors in children and adolescence with incarcerated fathers. The application of latent growth curve analyses to behavior problems in individuals of incarcerated fathers is novel, and its use allowed us to describe behavior trajectories as well as behavior frequencies. Previous studies have documented differences between children and youth with and without incarcerated fathers, and we expanded upon this work by considering differences in trends of externalizing behaviors. The current study's findings that individuals with incarcerated parents have greater initial levels of delinquent, antisocial, and overall externalizing behaviors underscore the consequences of paternal incarceration on children and youth's development of problem behaviors.

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Tables

Table 1

Means, Standard Deviations, and Pearson Correlation Matrix for Endogenous and Exogenous Variables

Variable	*M* (*SD*)	1	2	3	4	5	6	7	8	9	10	11	12
1. Child sex	-	-	.053	.013	.009	-.047	-.067*	-.074*	-.064*	-.053	-.066*	-.055	-.011
2. Maternal education	-		-	-.189**	-.107**	-.136**	-.160**	-.165**	-.184**	-.234**	-.205**	-.214**	-.185**
3. Child race	-			-	.092**	.060	.036	.076*	.070*	.087**	.073*	.084**	.067*
4. Paternal Incarceration	-				-	.107**	.104**	.110**	.146**	.145**	.135**	.141**	.117**
5. EXT 54	10.016 (6.707)					-	.719**	.692**	.601**	.607**	.600**	.578**	.483**
6. EXT K	8.933 (6.661)						-	.757**	.657**	.648**	.633**	.622**	.499*
7. EXT 1	8.136 (6.554)							-	.730**	.719**	.676**	.669**	.532**
8. EXT 3	7.331 (6.318)								-	.798**	.727**	.698**	.592**
9. EXT 4	6.828 (6.133)									-	.801**	.761**	.623**
10. EXT 5	6.522 (6.316)										-	.797**	.621**
11. EXT 6	6.192 (6.177)											-	.664
12. EXT 15	5.345 (6.511)												-

Note: For child sex, 0 = male, 1 = female; for maternal education, 0 = high school or less, 1 = some college or more; for child race, 0 = non-White, 1 = White; paternal incarceration, 0 = no, 1 = yes; Externalizing Behavior subscores taken from the Child Behavior Checklist (CBCL; Achenbach, 1991); EXT 54 = Total Externalizing Behavior subscore, 54 months; EXT K = Total Externalizing Behavior subscore, kindergarten; EXT 1 = Total Externalizing Behavior subscore, 1st grade; EXT 3 = Total Externalizing Behavior subscore, 3rd grade; EXT 4 = Total Externalizing Behavior subscore, 4th grade; EXT 5 = Total Externalizing Behavior subscore, 5th grade; EXT 6 = Total Externalizing Behavior subscore, 6th grade; EXT 15 = Total Externalizing Behavior subscore, age 15

$p^* < .05$, $p^* < .01$

Table 2

Fit Indices for Models

Model	N (Used/ Total)	χ^2	*df*	CFI	TLI	RMSEA	SRMR
Measurement	1152/1165	299.949**	31	.958	.962	.087	.061
1a	1141/1165	309.995**	49	.960	.957	.068	.047
1b	1141/1165	236.017**	49	.950	.947	.058	.047
1c	1141/1165	301.492**	49	.961	.958	.067	.051
2a	1141/1165	311.557**	55	.960	.957	.064	.043
2b	1141/1165	243.896**	55	.950	.940	.055	.044
2c	1141/1165	305.344**	55	.961	.958	.063	.047
3a	962/1165	324.961*	63	.957	.953	.066	.054
3b	962/1165	282.455**	63	.938	.933	.060	.040
3c	962/1165	313.161**	63	.958	.955	.064	.055

Note: CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root-Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; AIC = Akaike information criterion.
a. Linear growth curve model—Total Externalizing Behavior scores as exogenous variables
b. Linear growth curve model—Total Delinquent Behavior subscores as exogenous variables
c. Linear growth curve model—Total Delinquent Behavior subscores as exogenous variables
*p < .05, **p < .01

Table 3

Selected Results of Growth Models of Externalizing Behaviors

	Models									
Estimates	Measur.	1a	1b	1c	2a	2b	2c	3a	3b	3c
Intercept estimate	9.576**	13.839**	2.241**	11.636**	10.180**	1.384**	8.821**	13.960**	2.261**	11.733**
Slope estimate	-.448**	-.371**	-.020	-.357**	-.396*	-.025	-.376**	-.412**	-.021	-.398**
Intercept variance	34.642**	33.332**	1.193**	24.194**	32.917**	1.171**	23.949**	32.999**	1.211**	23.876**
Slope variance	.216**	.215**	.011**	.117**	.215**	.011**	.147**	.215**	.010**	.148**
Intercept on sex	-	-.943*	-.248**	-.691*	-.959*	-.253**	-.704*	-.953*	-.254**	-.695*
Slope on sex	-	.073	.005	.065*	.072	.005	.065*	.073	.006	.065
Intercept on mom edu.	-	-2.141**	-.350**	-1.802**	-2.003**	-.317**	-1.696**	-2.267**	-.368**	-1.907**
Slope on mom edu.	-	-.101*	-.040**	-.057	-.100*	-.041**	-.057	-.061	-.036**	-.023
Intercept on race	-	.694	.147	.546	.566	.116	.448	.552	.108	.446
Slope on race	-	-.009	.021	-.032	-.012	.021	-.034	.000	.022	-.023
Intercept on father incarc.	-	-	-	-	3.470**	.813**	2.670**	-	-	-
Slope on father incarc.	-	-	-	-	.027	.006	.020	-	-	-
Incarc. on behavior (54 months)	-	-	-	-	-	-	-	.391**	.088**	.289**
Incarc. on behavior (3rd grade)	-	-	-	-	-	-	-	.163	.063	.101
Slope-intercept covariance	-1.187**	-1.216**	-.039**	-.954**	-1.220*	-.039**	-.956**	-1.190**	-.036**	-.936**

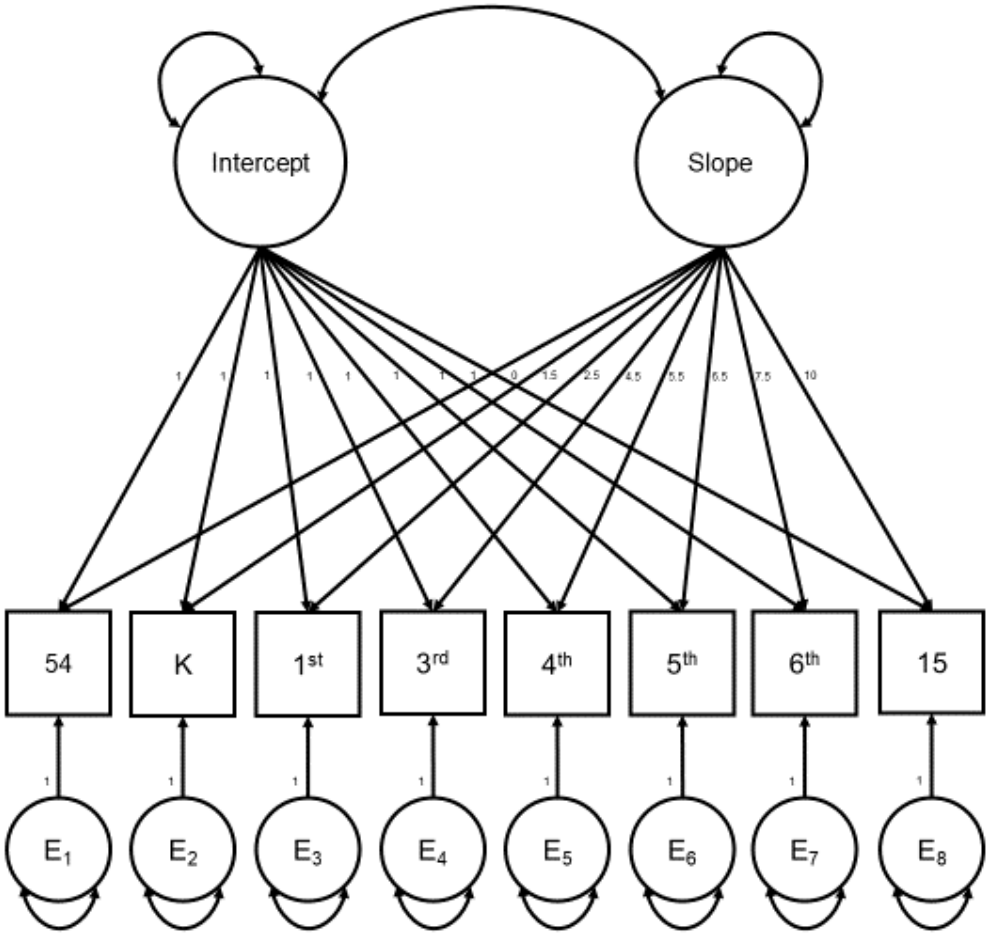
Note: For child sex, 0 = male, 1 = female; Mom edu. = maternal education, 0 = high school or less, 1 = some college or more; for child race, 0 = non-White, 1 = White; paternal incarceration, 0 = no, 1 = yes; all dependent variables of interest are total scores from the Child Behavior Checklist (CBCL; Achenbach, 1991), and the Total Externalizing Behavior subscale was used in model 1a, Total Delinquent Behavior was used in model 1b, and Total Aggressive Behavior subscale was used in model 1c; 54 = 54 months; K = kindergarten; 1st = 1st grade; 3rd = 3rd grade; 4th = 4th grade; 5th = 5th grade; 6th = 6th grade; 15 = 15 years; Measur. = measurement model

1. Linear growth curve model with child sex, maternal education, and child race as time-invariant covariates
2. Linear growth curve model with child sex, maternal education, child race, and paternal incarceration as time-invariant covariates
3. Linear growth curve model with child sex, maternal education, and child race as time-invariant covariates and paternal incarceration
   at 54 months and in 3rd grade as a time-varying covariate
a. Linear growth curve model—Total Externalizing Behavior scores as exogenous variables\
b. Linear growth curve model—Total Delinquent Behavior subscores as exogenous variables
c. Linear growth curve model—Total Delinquent Behavior subscores as exogenous variables

*p < .05, **p < .01

Figure 1

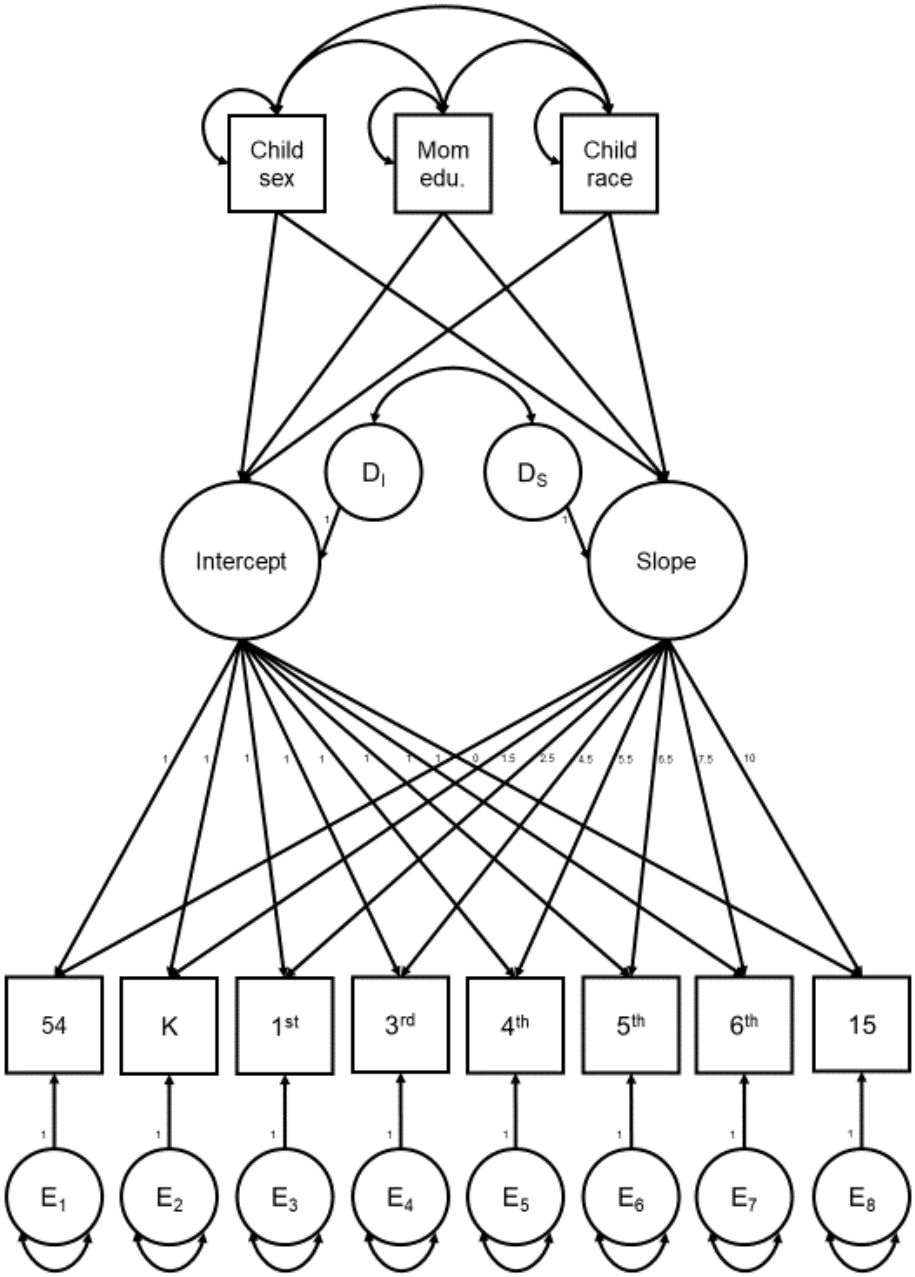
Path Diagram for Measurement Model



Note: Externalizing Behavior subscores taken from the Child Behavior Checklist (CBCL; Achenbach, 1991); all dependent variables of interest are total scores from the Child Behavior Checklist (CBCL; Achenbach, 1991), and the Total Externalizing Behavior subscale was used in the measurement model; 54 = 54 months; K = kindergarten; 1st = 1st grade; 3rd = 3rd grade; 4th = 4th grade; 5th = 5th grade; 6th = 6th grade; 15 = 15 years

Figure 2

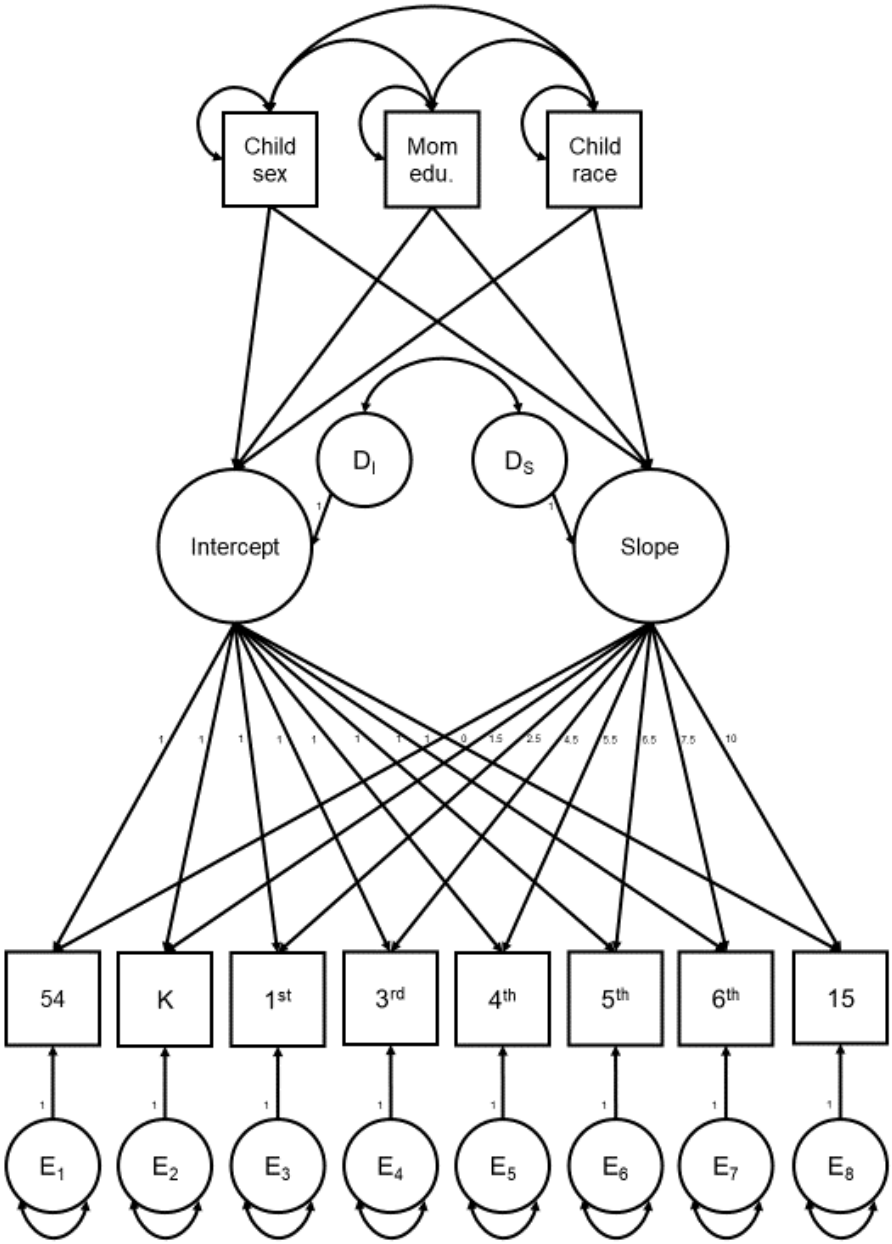
Path Diagram for Model 1



Note: For child sex, 0 = male, 1 = female; Mom edu. = maternal education, 0 = high school or less, 1 = some college or more; for child race, 0 = non-White, 1 = White; paternal incarceration, 0 = no, 1 = yes; all dependent variables of interest are total scores from the Child Behavior Checklist (CBCL; Achenbach, 1991), and the Total Externalizing Behavior subscale was used in model 1a, Total Delinquent Behavior was used in model 1b, and Total Aggressive Behavior subscale was used in model 1c; 54 = 54 months; K = kindergarten; 1st = 1st grade; 3rd = 3rd grade; 4th = 4th grade; 5th = 5th grade; 6th = 6th grade; 15 = 15 years

Figure 3

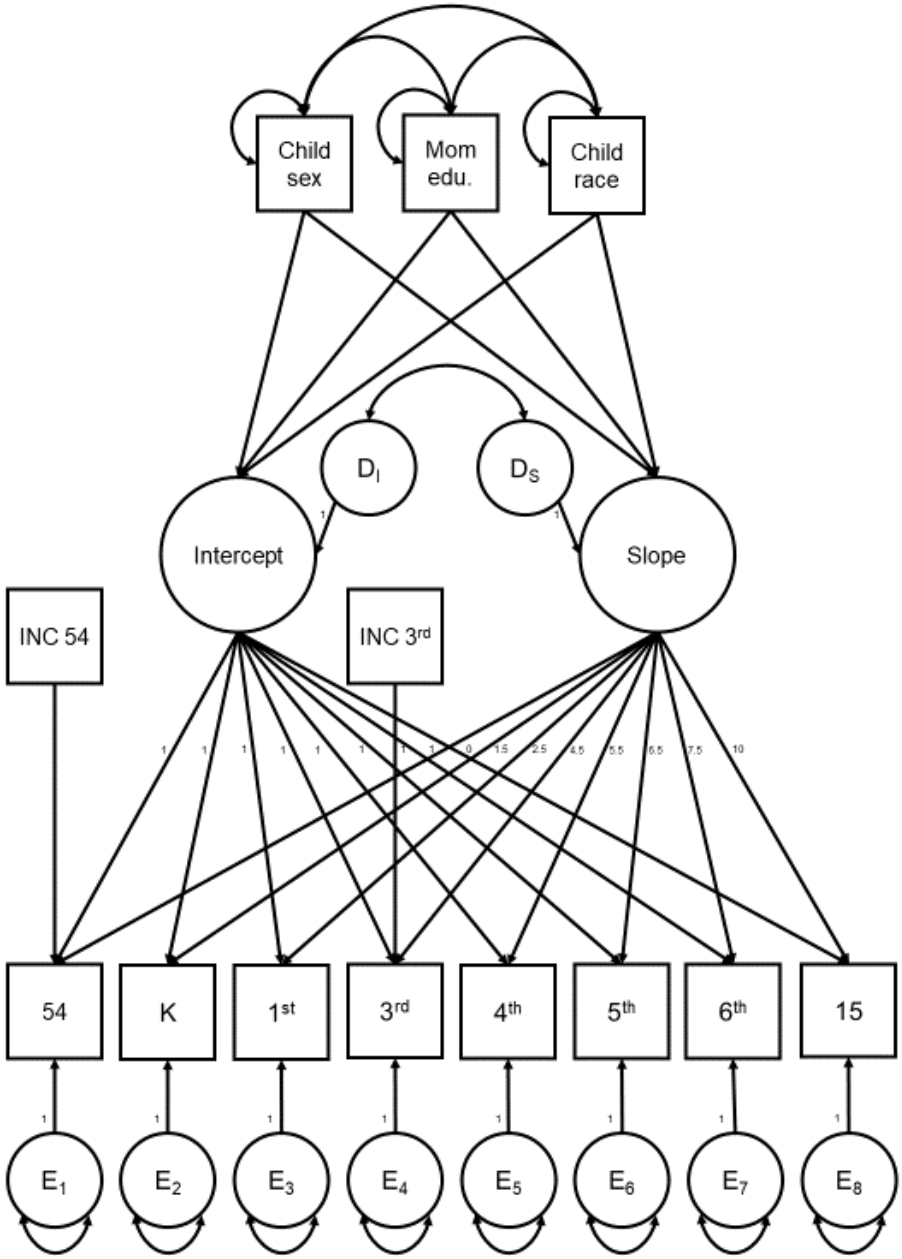
Path Diagram for Model 2



Note: For child sex, 0 = male, 1 = female; Mom edu. = maternal education, and for maternal education, 0 = high school or less, 1 = some college or more; for child race, 0 = non-White, 1 = White; Father incarc. = paternal incarceration, 0 = no, 1 = yes; all dependent variables of interest are total scores from the Child Behavior Checklist (CBCL; Achenbach, 1991), and the Total Externalizing Behavior subscale was used in model 1a, Total Delinquent Behavior was used in model 1b, and Total Aggressive Behavior subscale was used in model 1c; 54 = 54 months; K = kindergarten; 1^{st} = 1^{st} grade; 3^{rd} = 3^{rd} grade; 4^{th} = 4^{th} grade; 5^{th} = 5^{th} grade; 6^{th} = 6^{th} grade; 15 = 15 years

Figure 4

Path Diagram for Model 3



Note: For child sex, 0 = male, 1 = female; Mom edu. = maternal education, and for maternal education, 0 = high school or less, 1 = some college or more; for child race, 0 = non-White, 1 = White; INC 54 = paternal incarceration at 54 months, 0 = no, 1 = yes; INC 3rd = paternal incarceration in 3rd grade, 0 = no, 1 = yes; all dependent variables of interest are total scores from the Child Behavior Checklist (CBCL; Achenbach, 1991), and the Total Externalizing Behavior subscale was used in model 1a, Total Delinquent Behavior was used in model 1b, and Total Aggressive Behavior subscale was used in model 1c; 54 = 54 months; K = kindergarten; 1st = 1st grade; 3rd = 3rd grade; 4th = 4th grade; 5th = 5th grade; 6th = 6th grade; 15 = 15 years