Cumulative Father Presence and Children's Academic Performance: the Role of Behavior Problems

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Abstract

Though the role of father in child development has received considerable attention, little is known about whether and how cumulative father presence affects children's academic performance. Using data from the National Longitudinal Survey of Youth 1979 (NLSY79) and the NLSY79 Children and Young Adults, this study assesses the relationship between cumulative father presence and academic performance for children ages 7 to 14 years and examines potential mechanisms via externalizing and internalizing behavior problems. Three findings are drawn from the multilevel structural equation modeling results. First, cumulative father presence has a direct and positive effect on children's academic performance, even after accounting for potential changes in household and maternal characteristics, as well as children's development over time. Second, the relationship between cumulative father presence and children's academic performance is mediated through externalizing behavior problems in a way that cumulative father presence decreases children's externalizing behavior problems, and subsequently increases academic performance. Third, little evidence is obtained for the mediating pathway through internalizing behavior problems. These results remain robust even when we use different approaches to measuring cumulative father presence or include the quality of the father-child relationship in the analysis. Our findings shed light on how father presence is critical to children's achievement.

Keywords: father presence; children's academic performance; children's behavior problems; multilevel structural equation modeling

Introduction

A growing proportion of children born in the U.S. spends some time living apart from one of their parents, usually their fathers. Since the 1950s, the traditional nuclear households consisting of one father, one mother and children have declined and more complex and unstable family structures have emerged (Andersson 2002). Children today are more likely to be born out of wedlock (Martin et al. 2007) and raised within cohabiting unions (Amato and Patterson 2017), which potentially increases the chance of children experiencing union disruption and father absence. Meanwhile, for the last several decades, social perceptions and expectations of fatherhood have changed. Changes in economic and cultural contexts have generated a social force to challenge the traditional gender division of labor, which, in turn, places more emphasis on the role of the father in children's wellbeing (Lamb 2004).

As a result, the past four decades have witnessed the proliferation of research on the consequences of father presence. Previous research exploring the effects of father presence on children's wellbeing documents that living in resident-father homes is associated with various outcomes for children, from school performance (Jones 2004; Magnuson and Berger 2009; Painter and Levine 2000) to sexual activity (Ellis et al. 2003; Wu and Martinson 1993). Specifically, father presence has been consistently linked to the two most important facets of child development, namely academic performance and behavioral problems (McLanahan et al. 2013). Not only are those living with fathers more likely to succeed in the educational system (e.g., academically competent or unlikely to be suspended/expelled from school) (DeBell 2008; Fry and Scher 1984; McLanahan and Sandefur 1994; Robinson et al. 1997), but they also exhibit less externalizing and internalizing behavior problems (Algozzine et al. 2011; Masten et al. 2005) than children living apart from fathers.

Yet, little is known about the cumulative nature of father absence. Although attempts have been made to investigate the effects of nonresident fathers on children using a longitudinal design, most of them focus on contemporaneous effects of father absence, with some exceptions (Jaffee et al. 2003; Lang and Zagorsky 2001; Magnuson and Berger 2009; Sandefur and Wells 1997). Analyzing twin data, Jaffee and colleagues (2003) assess father presence as the percentage of the twins' first five years that their father lived with them and reveal that the percentage of father presence is negatively associated with twins' conduct problems. Another study indirectly measures father absence by the number of years residing in single-mother households and finds the negative association between father absence and children's academic performance (Sandefur and Wells 1997). Though these studies begin to concern about the cumulative nature of father absence/presence, they only evaluate the outcomes at one time period and the change in father absence/presence over time is not directly considered. The lack of direct measures of cumulative effect of father absence/presence and the failure to account for omitted variables plague the literature of the effect of father absence/presence on children's outcomes.

Also, the mechanisms through which father presence affects children's outcomes are underexplored. Recent scholarship on child development has directed attention to the factors that may mediate or moderate the association between father presence and children's outcomes (Cabrera et al. 2014; Karberg and Cabrera 2017) and these factors can be classified into two types. One is associated with the characteristics of parents, such as parenting style or parents' mental health status. The other is related to child functioning such as child's behavior. While the former has received some evidence (Beck et al. 2010; Carlson and Corcoran 2001), the role of child functioning in either mediating or moderating the relationship between father presence and children's outcomes remains elusive. Given the well-documented relationship between father

presence and child's behavior problems (Harper and McLanahan 2004; Magnuson and Berger 2009), this study argues that child's behavior problems may mediate the impact of father presence on academic performance. It should be emphasized that previous research often investigates the impact of father presence on children's academic performance and behavior problems, respectively, and their intertwined relationships have not been untangled. Though there is active discussion on how behavior problems affect academic performance in the psychological literature (Masten et al. 2005; van Lier et al. 2012), the role of father presence in this relationship remains unclear. This study goes beyond the literature in two ways. One is to measure father presence with a cumulative perspective in that the change in father presence over time is considered and further link this measure to behavior problems and academic performance that are repeatedly measured between age 7 and 14. Moreover, we empirically examine a theoretical framework where externalizing and internalizing behavior problems serve as the mediators that channel part of the effect of father presence on academic performance.

Background and Theoretical Framework

Father Presence and Children's Academic Performance

A large body of research has attempted to identify factors associated with children's academic outcomes because it has been found that early children's academic performance has a salient and long-term effect on later-life outcomes. The most obvious consequences of early academic performance are the later academic success (Duncan et al. 2007) and labor force outcomes. Studies found that years of education and cognitive ability are associated with earnings and occupation standing (Warren et al. 2002) as well as the status of occupation (Kerckhoff et al. 2001). In addition, extant literature suggests that early academic performance

may affect later health outcomes (e.g., self-rated health and mortality) through educational attainment (Lê-Scherban et al. 2014; Ross and Mirowsky 2011).

Although numerous factors have been identified as determinants of children's performance, father presence is one of the factors that have gained consistent attention. In earlier studies, father presence was measured by whether a child was living with his or her father, and this direct measure has found to be associated with a wide range of children's academic outcomes. More importantly, there have been consistent reports that children living without fathers lagged behind on a number of cognitive and educational outcomes. These studies document that children who live apart from their biological fathers are more likely to be suspended or expelled from school, less likely to enjoy school experiences, perform less well, and more likely to drop out of high school than children who live with both biological parents (Amato and Gilbreth 1999; Astone and McLanahan 1991; DeBell 2008; Gennetian 2005; Johnson 1996; Jones 2004; McLanahan and Sandefur 1994). For instance, Jones (2004) compares the academic performance of nonresident-father boys with that of resident-father boys between ages 14 and 17. Results show that boys living in nonresident father homes, on average, had a lower GPA compared to boys living in father-resident homes. A sample of black children reveals that father-absent adolescents display significantly more school-related conduct problems than do father-present adolescents, such as skipping or cutting classes and being suspended from school (Rodney and Mupier 1999). Moreover, some studies investigate the association between time spent in different family types and various indicators pertaining to academic performances (Lang and Zagorsky 2001; Magnuson and Berger 2009). For instance, Lang and Zagorsky (2001) find that years lived with a biological father are associated with increased the Armed Forces Qualification Test (AFQT) scores for older children aged between 14 and 22.

As more complex family structures emerge, scholars begin to see family structure as a dynamic process, instead of a static form. Shifting the central focus to the partnership transitions, this line of inquiry investigates whether the number and specific types of family transitions affect children's academic performance. For instance, focusing on the academic trajectories of children aged between 5 and 12 years, Magnuson and Berger (2009) find that not only the proportion of time residing in a single-mother family but also the transition to a single mother or stepfather family is associated with the decrease in academic achievement. Furthermore, in an attempt to incorporate the heterogeneity of two parents families, some studies report that children in stably married families academically outperform their peers in cohabitating families (Bachman et al. 2009) and blended- or step-families (Halpern-Meekin and Tach 2008), which lends indirect support to the relationship between father presence and children's academic performance.

Despite the scholarly efforts to investigate the effects of father presence on children's outcomes, many of the studies employed a cross-sectional design to measure father presence, which may only offer weak theoretical implications. Socialization theories have provided an important theoretical framework that explains how parent-child interactions in early childhood have enduring effects on children's later life (Wu and Martinson 1993). Children learn social skills and behaviors that are crucial for their development by interacting with and observing parents. When two parents are present in the home, they can share responsibility and monitor their child's activities and behaviors. However, when only one parent is present, most of the responsibilities of raising the child is likely to be placed on the resident parent's shoulder. Consequently, children raised in the single-parent household are less likely to receive consistent monitoring and discipline that are necessary for their social development, compared to their peers in the two-parent household (McLanahan and Sandefur 1994; Sigle-Rushton and

McLanahan 2002). In other words, the consistent presence of resident fathers who can monitor and discipline children's behaviors may be positively correlated with children's development (Falci 2006). From this socialization perspective, length of time spent living apart from the biological father may be considered as a particular concern because experiencing a long-term relative to short-term father absence, and earlier relative to later father departure are considered to be more deleterious for children's development (Markowitz and Ryan 2016). Drawing from the socialization perspective, the effects of father presence are expected to accumulate or evolve over time, which cannot be fully captured by a contemporaneous measure of father presence. In addition, a cross-sectional measure of father presence may be sensitive to the timing of a survey and may misestimate the actual effects of father presence on children. As a result, it becomes important to move away from the contemporaneous approach and focus on the cumulative effect of father presence on children's development.

Based on the discussion above, we aim to examine whether cumulative father presence has a salient effect on a child's academic performance over time, even after controlling for confounding factors. We propose the first hypothesis below.

H1: After controlling for other potential confounders, cumulative father presence has an independent and positive effect on children's academic performance.

Behavior Problems as Mediators Linking Father Presence and Academic Performance

In empirical research, behavior problems are commonly divided into two subscales—internalizing and externalizing behavior problems (Kahn, Brandt, and Whitaker 2004; Kang and Cohen 2017; McLeod and Fettes 2007; Peterson and Zill 1986). The former assesses the symptom of depression, insecurity, withdrawal, or anxiety, whereas the latter measures the extent

to which a child has shown the presence of aggressive, hyperactive, disruptive or antisocial behaviors.

Many empirical studies suggest that family structure and transition are among the consistent and robust predictors for children's behavior problems (Campbell et al. 1996; Ryan and Claessens 2013) and that children's behavior problems are the strongest predictor for a range of children's outcomes in later life. Examining the timing of family transition, studies report that family change in early childhood has a stronger effect on children's behaviors than does family transition in later life (Cavanagh and Huston 2008; Ryan and Claessens 2013). In addition, the adverse effects of father absence on children's behavior problems have received strong support from the literature (Carlson and Corcoran 2001; Harper and McLanahan 2004; Magnuson and Berger 2009; Peterson and Zill 1986). Focusing on 10^{th}-12^{th} grade youths, Sun (2001) demonstrates that children from disrupted family have higher scores on both teachers- and student-rated Behavior Problem Index (BPI) than their classmates living with biological parents. Using panel analysis, Magnuson and Berger (2009) also suggest that residing in a mother-headed household is positively associated with children's behavior problems. Drawing from the literature above, father presence should be negatively associated with children's behavior problems, both internalizing and externalizing.

In order to establish the mediating role of behavior problems, it is critical to understand why children's behavior problems adversely affect academic performance. There are three major explanations for this relationship. First, parental expectation and involvement are adjusted in response to child's behaviors. Believing that children's behaviors reflect their underlying dispositions, parents may lower academic expectations for their children in response to observed behavioral problems, which in turn affects children's academic achievement (McLeod and

Kaiser 2004). The second explanation is through the relationships with peers and teachers (Valiente et al. 2012). Because quality relationships with peers and teacher are linked to better educational outcomes (Hamre and Pianta 2001), children who have difficulties in developing interpersonal relationships due to behavior problems are likely to underperform at school. Lastly, behavior problems can directly undermine academic performance through children's weak motivation, poor concentration, or underdeveloped school-related skills.

As discussed previously, behavior problems are commonly divided into externalizing and internalizing problems. It is essential to further discuss whether different types of problems may be related to academic performance in different ways. Studies examining the relationship between externalizing behavior problems and academic performance have yielded consistent results (Nelson et al. 2003). To be specific, among the diverse domains of externalizing behavior problems, inattention, hyperactivity, and antisocial behaviors are found to be negatively associated with academic achievements (Nelson et al. 2003; Wentzel 1993). Analyzing 155 K-12 students, Nelson and colleagues (2003) reveal that attention and disruptive externalizing behavior problems are adversely associated with academic achievement in reading, written language, and mathematics. This negative association holds for younger children as Wentzel (1993) reports that the presence of antisocial behavior decreases children' grades even after controlling for IQ, teachers' preference for students, and family structure. More recent studies continue to lend support to the negative relationship between externalizing behavior problems and academic performance (Kremer et al. 2016; Masten et al. 2005; van Lier et al. 2012).

By contrast, the evidence for the association of internalizing behavior problems with academic performance is mixed (Masten et al. 2005). Some studies suggest that children with anxiety and depression are likely to have academic problems (Rapport et al. 2001), but others

report a null relationship (Barriga et al. 2002). Several explanations have been proposed to understand the mixed findings. First, the poor measurements of internalizing behavior problems and unique characteristics of samples may lead to diverging findings (Barriga et al. 2002; Riglin et al. 2014). Another explanation is that internalizing and externalizing behavior problems are not mutually independent. Focusing only on internalizing behavior problems is more likely to find a significant relationship due to the omission of externalizing behavior problems (Van der Ende et al. 2016). That is, when simultaneously considering internalizing and externalizing behavior problems, researchers tend to find the null relationship between internalizing behavior problems and academic performance.

The discussion above suggests that children's behavior problems should play a role in mediating the relationship between father presence and children's academic performance. We propose two additional hypotheses regarding the potential mechanisms below.

H2: Externalizing behavior problem is one mechanism through which cumulative father presence affects children in that consistent presence of fathers decreases externalizing behavior problems, which subsequently improves academic performance.

H3: As the relationship between internalizing behavior problems and academic performance is unclear, we propose two competing hypotheses:

H3a: Children with higher levels of cumulative father presence report fewer internalizing behavior problems, which ultimately benefits academic performance.

H3b: While cumulative father presence decreases internalizing behavior problems, academic performance is unrelated to internalizing behavior problems.

Confounders for the Relationship Between Father Presence and Academic Performance

We divide the factors that may confound the relationship between father presence and academic performance into three aspects—gender-role socialization, economic security, and parenting and maternal psychological status. The gender-role socialization perspective emphasizes the importance of gender-specific role modeling (Powell and Downey 1997). It suggests that father presence is especially beneficial for boys because girls look to their mothers and boys look to their fathers as their role models (Fry and Scher 1984; Montare and Boone 1980). Following this perspective, a child's gender should be considered in our analysis.

Second, father presence may correlate with economic security. Research shows that single mother families in the U.S. are more likely to live in poverty and to rely on public assistance (Brown et al. 2015; Sigle-Rushton and McLanahan 2002) and that divorced families experience a 40 percent drop in income right after the divorce (Page and Stevens 2004). Economic security in resident father households affects not only material resources that can be used for children's development (Amato and Keith 1991) but also the quantity and quality of time mothers spend with their children (Sandberg and Hofferth 2001). To better clarify the relationships among father presence, behavior problems, and academic performance, economic security should be considered.

Finally, parenting and maternal psychological status may confound the proposed mechanisms in this study. Studies find that single motherhood tends to be associated with a lack of authority and supervision, harsh punishments, and less emotional and cognitive support (Amato 2000; Astone and McLanahan 1991; Johnson 1996). The low levels of parental support and lack of adequate supervision consequently result in increased behavior problems and poor academic performance of children. Furthermore, juggling motherhood with a demanding work,

single mothers tend to have higher levels of stress and depressive symptoms (Cairney et al. 2003) and this maternal psychological status may affect children's wellbeing (Turney 2012). Beck et al. (2010) found that mothers who experience high levels of parenting stress report greater psychological distress, and their young children score lower on measures of socioemotional and cognitive wellbeing. Following this reasoning, parenting and maternal psychological status should be controlled for.

Data

We use data from the National Longitudinal Survey of Youth, 1979 Cohort (NLSY79) and the NLSY79 Child and Young Adult (NLSY79CYA) collected between 1986 and 2014. The NLSY79, funded by the U.S. Bureau of Labor Statistics, is a nationally representative sample of young men and women who were 14-22 years old when they were first surveyed in 1979. These individuals were initially interviewed annually through 1994, and they are currently interviewed on a biennial basis through either in-person or phone interviews. The NLSY79CYA collects information about biological children who were born to female NLSY79 respondents and interviews are conducted on a biennial basis since 1986 (Magnuson and Berger 2009). The NLSY not only provides rich information on a variety of topics pertaining to marriage, family structure, and socioeconomic characteristic of the respondents, but also offers detailed data regarding their children's developmental trajectories. In particular, one of the strengths of the NLSY79 lies in providing the detailed marital and childbearing history of the respondents, which allows us to measure father presence in different ways and to explore the robustness of our results across different measures for the key variable. The retention rate of the survey was 90.2% in 1988 and 71% in 2014 for the NLSY79 Cohort. Also, considering the fact that the NLSY79

oversampled Hispanic, black and economically disadvantaged population, sample weights were used for a descriptive analysis. In this study, we restricted our sample to children aged between 7 and 14. Given our research focus, 31 children whose father were deceased are excluded and our final sample consisted of 7,801 children (and their mothers).

Dependent Variable

The dependent variable is a latent outcome representing children's academic performance, which was created from standardized Peabody Individual Achievement Test (PIAT) Mathematics and Reading Recognition scores. Although there are several indicators of early academic performance, the PIAT scores are among the most widely used indicators in research that examines the link between child academic performance and family structure (Aughinbaugh et al. 2005; Ginther and Pollak 2004; Magnuson and Berger 2009; Masten et al. 2005). The PIAT assessment is administrated to children aged 5 and over and shows high test-retest reliability and concurrent validity. Since 1986, the PIAT scores have been repeatedly measured at each wave as a part of the NLSY79CYA. Therefore, many children aged 13 or 14 in our sample have completed these assessments 3 to 4 times.

Independent Variable

The key independent variable is cumulative father presence. At each wave, mothers were asked to report whether the father of a child was present in the household. Based on this information, a continuous variable for cumulative father presence is defined as the proportion of time spent in the father-present household, which ranges from 0 to 1. More specifically, it is calculated by first counting father presence up to a specific wave and then dividing it by the

number of waves. Unlike extant research that assesses father presence by the number of years (Sandefur and Wells 1997) or proportion of time a child spent in a particular family type (Jaffee et al. 2003), this time-varying variable is expected to capture the cumulative effect of father presence more directly.

Mediators

The two mediators pertaining to children's behavior problems are externalizing and internalizing BPIs, and both are standardized. Children's behavior problems are assessed using the BPI scores reported by mothers. The BPIs were created to measure the frequency, range, and type of children' behavior problems (Peterson and Zill 1986). The externalizing BPI is marked by aggressive and antisocial behaviors while the internalizing BPI is characterized by depressive and anxious behaviors. Both BPIs have been commonly used in the literature (Kremer et al. 2016). The BPI scores in the NLSY79CYA are created by asking mothers to assess specific behaviors that their children may have exhibited in the previous three months with three response categories ("often true", "sometimes true", "not true"). After gathering responses on 28 survey items (e.g., Having sudden changes in mood or feeling/Feels worthless or inferior), the NLSY79CYA created a single standardized measure for externalizing and internalizing behavior problems, respectively. The BPI is assessed for children aged 4 and over and measured repeatedly at each wave.

Confounding variables

As the NLSY provides longitudinal data, our confounding variables were categorized into time-varying and time-invariant groups. For the former, we considered the following variables at

each wave: *mother's marital status* (1=married, otherwise 0), *mother's education* (in years), *logged family income, child's age* (in years) and *its squared term*, and *home environment*. *Home environment* is a continuous variable that is derived from the Home Observation of the Environment-Short Form (HOME-SF) in the NLSY79CYA. The HOME-SF measures the quality of the child's home environment based on maternal report and interviewer observations. As a part of the HOME-SF, the quality of emotional support, including parenting (e.g., How many times in the past week have you had to spank child?) is assessed. Because of this feature, the HOME-SF is often used as a proxy for parenting (Pachter et al. 2006).

With respect to the time-invariant confounding variables, we first considered the following features of a child: *gender* (female=1, male=0), *birth order* (an ordinal variable), *race/ethnicity*, and *teenage pregnancy status*. *Race/ethnicity* was categorized into non-Hispanic whites (reference group), non-Hispanic blacks, and Hispanics. *Teenage pregnancy status* was coded 1 if a child was born when his/her mother was a teenager, otherwise 0. Beyond the child's characteristics, we included *mother's self-esteem* and *cognitive ability scores* in 1980 as proxies for a mother's mental health status. *Self-esteem* was measured with Rosenberg's self-esteem scale (Rosenberg 1965) and *cognitive ability* was assessed with the AFQT.

It should be emphasized that the NLSY79CYA interviewed each child multiple times and a female NLSY79 respondent could be a mother of multiple children. This research design naturally forms a hierarchical data structure where the time-varying variables (particularly cumulative father presence, BPIs, and academic performance) serve as the lower-level observations and the time-invariant variables should be included in the higher-level.

Analytic Methods and Strategy

In light of the data structure and research hypotheses, we used the multilevel structural equation modeling (MSEM) approach to investigate the mechanisms through which cumulative father presence affects children's academic performance and to understand whether (and how) the relationship between cumulative father presence and academic performance varies by time-invariant features (of both mothers and children).

We followed the MSEM model discussed by Preacher, Zyphur, and Zhang (2010) and this model can be expressed as follows:

$$\text{Measurement Model: } Y_{ij} = \Lambda\eta_{ij}$$

$$\text{Within-child Model: } \eta_{ij} = \alpha_j + \mathrm{B}_j\eta_{ij} + \Gamma_j X_{ij} + \xi_{ij}$$

$$\text{Between-child level: } k_j = \mu + \beta\kappa_j + \gamma X_j + \xi_j$$

, where Y_{ij} refers to the latent academic performance variable of the i^{th} child in j^{th} wave of survey, and Λ is a vector for reading and mathematics scores by child and wave (η_{ij}). α_j indicates the vector of intercepts, and B_j is a matrix of parameter estimates that can vary by wave. Γ_j is a vector of coefficient estimates of individual level time-varying exogenous variables (X_{ij}), such as age and home environment. k_j is a vector that contains all the random effects and μ includes the mean values of the random effect distributions and intercepts. β refers to regression slopes of random effects and γ contains the parameter estimates of exogenous time-invariant variables (X_j), such as teen pregnancy status and race/ethnicity. Both ξ_{ij} and ξ_j are assumed to follow a multivariate normal distribution.

Specific to this study, the multilevel structure allows us not only to explicitly examine how time-invariant mothers' and children's features affect academic performance, but also investigate whether the relationship between cumulative father presence and academic

performance varies by these time-invariant variables. For example, cumulative father presence may have a stronger impact on boys' academic performance than girls' as fathers serve as the role model in the socialization process for boys. Using the MSEM approach, the effect of cumulative father presence on academic performance can have a random component that can be further analyzed in k_j. The intercept of cumulative father presence in μ should represent the direct effect of cumulative father presence on academic performance in the within-child framework. All the analyses were implemented in Mplus 7.0 (Muthén and Muthén 2012).

The analysis was divided into two phases. We first obtained the descriptive statistics of the variables used in this study to have a basic understanding of the longitudinal data that combined both NLSY79 and NLSY79CYA. The second stage was to implement the MSEM analysis as follows. We examined the measurement model for the latent academic performance variable to ensure that the measurement model was properly assessed. We then conducted a regression model in which the within-children mechanisms through both externalizing and internalizing BPIs were specified. The final model further considers the impacts of time-invariant covariates on the association between cumulative father presence and academic performance.

Results

Table 1 shows the descriptive statistics of the variables and we summarize several findings as follows. First, on average, a child's father was present in the household for 56% of the time. That is, roughly three out of five waves of the survey, a child lived with his/her both parents. In our sample, 38% of children have never lived with their biological fathers and 47% have always resided with their fathers throughout the survey years. We further investigated

whether cumulative father presence varies by race/ethnicity and found that non-Hispanic black children were more likely to experience consistent father absence (i.e., father presence = 0) than their non-Hispanic white and Hispanic counterparts (results not shown but available upon request). Second, the distributions of PIAT Mathematics and Reading scores were comparable, though the latter had a slightly higher mean value (104.0). The mediators, externalizing and internalizing BPI, also shared a similar distribution. Third, regarding mother's marital status, the mean value of 0.63 indicated that between ages 7 and 14, a child experienced his/her mother being "non-married" for over 2 years (7-7*0.63=2.6). Finally, with respect to time-invariant covariates, roughly 20% of children were born to teenage mothers. Roughly 50% of our respondents were non-Hispanic white and 30% were non-Hispanic black. The gender distribution is fairly even as 49% of our children are female.

The MSEM results are summarized in Table 2. The first model contains the MSEM results with an emphasis on within-level influences and the pathways from cumulative father presence and academic performance. The second model further includes the moderating effect of time-invariant covariates on the effect of cumulative father presence on academic performance. The measurement model results are available upon request. We focus our discussion on the second model in Table 2 and identify four major findings.

First, without considering the potential moderating effects of time-invariant covariates on the impact of cumulative father presence on academic performance, the two proposed mechanisms fully mediated the effect of cumulative father presence (Model 1). The direct effect of cumulative father presence was not statistically significant and the indirect effect through externalizing BPI was more than six times stronger than that through internalizing BPI (0.589/0.099=5.9). After accounting for the moderating roles of time-invariant covariates in the

slope of cumulative father presence (Model 2), the direct effect of cumulative father presence on academic performance became significant (β=4.259). Specifically, for every 0.5 unit increase in cumulative father presence (i.e., roughly 1 out of 2 waves), the latent academic performance variable increased by 2.130.

Second, we obtained evidence to support that externalizing behavior problems serve as the mediator that channels part of the effect of cumulative father presence on academic performance. Specifically, in Model 2, the parameter estimates at the within-child level suggested that higher exposure to cumulative father presence was related to fewer externalizing behavior problems (β=-4.917). Coupled with the adverse association between academic performance and externalizing behavior problems (β=-0.052), the indirect effect of cumulative father presence on academic performance through externalizing behaviors problems was roughly 0.26 (-4.917*-0.052=0.256). In other words, our analysis indicated that cumulative father presence decreases externalizing behavior problems, which in turn improves academic performance. By contrast, while cumulative father presence also reduced internalizing behavior problems (β=-4.125), the relationship between internalizing behavior problems and academic performance was not statistically significant (β=-0.005). The formal test confirmed that this mechanism did not hold for our data (β=0.020, p-value > 0.05). However, it should be noted that the pathway via internalizing behavior problems was significant in Model 1. The change between models suggests that this pathway may reflect the importance of cumulative father presence (Model 1) but fail to capture the potential gender difference in the direct effect (as shown in Model 2). As a result, the evidence for the internalizing behavior problem pathway is weaker than that for the externalizing behavior problem mechanism.

Third, the between-child level analysis (Model 2) offers insight into whether and how the effect of cumulative father presence on academic performance may differ by a range of time-invariant covariates (e.g., teenage pregnancy status and race/ethnicity). Among these variables, gender was found to significantly moderate the association between cumulative father presence and academic performance. Explicitly, cumulative father presence played a less critical role (β=-1.123) in academic performance for girls than for boys. This finding echoes the literature that father presence has a more profound influence on boys than girls due to the differential socialization process (Fry and Scher 1984). Moreover, the effect of cumulative father presence on academic performance did not vary by race/ethnicity, suggesting that father presence should be equally important for children, regardless of their race/ethnicity.

Finally, beyond the aforementioned key independent variables, children's academic performance was associated with other covariates, both time-varying and time-invariant. For the former, higher mother's education, better home environment, and higher family income were related to stronger academic performance. Regarding the time-invariant variables, the difference in academic performance between children can be attributed to race/ethnicity, mother's cognitive ability, child's gender, and birth order. Overall, in contrast to non-Hispanic whites and Hispanics, non-Hispanic black children performed more poorly. Should a child be raised by a mother with a higher AFQT score, s/he reported better mathematics and reading scores. In addition, girls and those with lower birth orders tended to have better academic performance than their counterparts.

Discussion and Conclusion

Using the results in the previous section, we revisited our research hypotheses. We first hypothesized that cumulative father presence, measured by the proportion of time a child spent in a resident-father household at each wave, has an independent and positive effect on children's academic performance. The MSEM results provide evidence to support the first hypothesis for children aged between 7 and 14. While some scholars suggest that the direct effect of father presence on children is weakened or even disappears after other family characteristics, such as household income and parenting, are taken into account (Aughinbaugh et al. 2005; Ginther and Pollak 2004), our findings indicate that cumulative father presence has a salient and direct effect after controlling for various characteristics of households, mothers, and children. Therefore, we conclude that the longer a child resides with a biological father, the better his/her academic performance is, even after controlling for other confounders. We also acknowledge that it may be critical to consider the gender difference in the direct effect of cumulative father presence on academic performance; otherwise, this direct association may be masked.

Supplementary analyses were performed to check the robustness of our primary results. First, as some studies suggest that the quality of the father-child relationship explains part of the effects of father presence on child development (Cabrera et al. 2011; Jones 2004), we included a variable that captures how a child feels close toward his/her father (i.e., closeness) in the model. We found that adding this variable did not change our findings and conclusions above (results not shown but available upon request). More specifically, although closeness to fathers was positively associated with child's academic performance, the effect of cumulative father presence remained significant. Indeed, our supplementary analysis echoes the research that suggests that father presence still provides an important implication for children even though the quality of

parent-child relationships may partially account for the association between father presence and children's wellbeing (Carlson 2006; Falci 2006). Using data from the NLSY79, Carlson (2006) found that although father involvement mediates the effects of family structure on children's outcomes, father involvement is more beneficial for children with resident fathers than their peers with nonresident fathers. We would like to note that the closeness variable was reported by the child's mother and it may not fully reflect the child's perception. It would be more ideal to use the closeness to fathers reported by children, but such information is only available for children aged 10-14.

Second, taking advantage of the NLSY79 dataset, father presence was measured in two different ways. Because the measure for father presence in the primary analysis is based on mother's reports on whether the father of the child was present, our results may change depending on how we measure father presence. Thus, we reran our models using different approaches to measure father presence. The first measure was constructed based on household roster and childbearing information. For each wave, respondents were asked to report the number of spouse/partners they have had and a unique ID can be assigned for each residential spouse/partner (Dorius 2012). Assuming that a spouse/partner who was present when a child was born is the father of the child, we created a proxy variable that captures whether the father is present at each wave. One thing to note is that since the spouse/partner information was available since 1979, children born before 1979 were excluded from the analysis. This supplementary analysis produced similar results as the primary analysis reported in this study. That is, cumulative father presence has salient effects on children's academic performance. The direction and size of the cumulative father presence effect remained the same and those of other explanatory variables also did not change much (results not shown but available upon request).

In addition, another approach to measuring father presence was based on mother's marital history and childbearing information. We created a new variable that captures whether a child was born and raised in the same marital union, which is more related to marital stability of respondents, rather than father presence per se. When we replaced this new variable with the original variable, the effect of cumulative father presence, which was indirectly measured by marital status, was no longer significant. But it is worth noting that measuring father presence in this way may not reflect father presence well, particularly for those who experienced marital disruption. In some cases, parents were separated for many years before they ended their marriage, which means that children began to live without their fathers long before a divorce. Thus, this approach tends to underestimate the actual effects of father presence. Based on the supplemental results, we are more confident to suggest that father presence has its own role in children's outcomes.

Our second and third hypotheses are concerned with whether cumulative father presence affects children's academic performance through behavior problems. Our MSEM results reveal that externalizing behavior problems mediate the relationship between cumulative father presence and children's academic performance. More specifically, cumulative father presence decreases children's externalizing behavior problems, and subsequently increases academic performance. On the other hand, it is found that internalizing behavior problems do not serve as a mediator between cumulative father presence and academic performance. Though cumulative father presence decreases child's internalizing behavior problems, no relationship was found between internalizing behavior problems and academic performance. Given the inconsistent results reported in the previous literature, no relationship between internalizing behavior problems and children's academic performance is not surprising, but it remains unclear why the

mechanism is only significant for externalizing behavior problems, but not for internalizing behavior problems. One possible explanation might be that the direction of the causation between internalizing behavior problems and academic performance is the opposite to what we expected in this analysis. Instead internalizing behavior problems cause changes in academic performance, academic performance affects internalizing behavior problems in a way that lower academic performance increases internalizing behavior problems. Several studies using developmental cascade models found externalizing behavior problems in childhood undermine academic competence by adolescence, which subsequently affect internalizing behavior problems in young adulthood (Masten et al. 2005; Moilanen et al. 2010).

The other plausible explanation that can be drawn from our results is that internalizing behavior problems may not directly undermine academic performance. As shown in Table 2, the major reason why the internalizing behavior problem pathway became non-significant is due to the null relationship between internalizing BPI and academic performance (between Model 1 and Model 2). It is likely that cumulative father presence undermines internalizing behavior problems, but internalizing behavior problems do not play a role in determining academic performance. Future research should explore why the mixed findings were reported in the literature.

In addition, the MSEM results point to a child's gender as a moderator between cumulative father presence and academic performance. Echoing previous literature (Johnson 1996), our results suggest that boys benefit more from cumulative father presence than girls. However, the effects of cumulative father presence do not vary with other time-invariant variables such as race/ethnicity or mother's cognitive ability, indicating that cumulative father presence matters for all children regardless of their background characteristics. In terms of the

effects of other covariates on child's academic performance, all of time-varying variables, except marital status and child's age, are associated with academic performance. Specifically, mother's education level, home environment, and household income are positively associated with academic performance. As for time-invariant variables, non-Hispanic black, male and higher birth order children tend to show lower academic performance compared to their counterparts. Also, children with mother who had lower AFQT score in 1980 lagged behind academically.

Our present study is not without limitations. First, our analysis did not address the heterogeneity of fathers' involvement in nurturing children. The degree to which father presence affects children can depend on the quality of the father-child relationship, which can considerably vary by household. Even though a father does not live with children, he might interact with his children on a regular basis and involve in child's daily life. In fact, studies show that children with non-resident fathers who paid child support and were emotionally closed to them tend to display fewer behavior problems and better academic achievement than their counterparts (Amato and Gilbreth 1999; Johnson 1996; King and Sobolewski 2006). By contrast, it is possible that resident fathers might negatively affect children's wellbeing. For example, significant conflicts between parents have an adverse effect on children and as such, father presence harms children more than his absence (Sun 2001). Due to the data constraint, we are not able to account for the heterogeneity of fathers' involvement in children. Future research should further delve into the role of the father in child development. Second, the NLSY79 and the NLSY79CYA better reflect the population born between 1957 and 1965 and their children. It should be cautious to generalize the findings to other cohorts or populations.

Several policy implications can be drawn from this study. First, given the relationship between externalizing behavior problems and academic performance, we can consider improving

our school-based intervention programs so that children with high externalizing behavior problems can build a good relationship between their peers and teachers, particularly for children without resident fathers. Second, our results suggest that mother's education and home environment play an important role in children's academic performance. Beyond the intervention programs targeting children, it may also be helpful to provide assistance (e.g., subsidy and parenting training) to single-mothers. Finally, while the behavior problem mechanisms are important in understanding why father presence matters, they account for less than 10% of the overall effect. Any effort to improve academic performance among children should increase father's involvement.

In sum, this study contributes to the existent literature in two ways. First, using longitudinal data, we provide strong evidence to support that cumulative father presence is beneficial to children's academic performance, even after accounting for potential changes in household and maternal characteristics, as well as children's development over time. Second, our analysis confirms the externalizing behavior problem mechanism through which father presence affects children's academic performance and suggests that the internalizing behavior problem pathway warrants future effort to understand why the results are mixed in the literature.

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Table 1. Descriptive Statistics of the Variables Used in the Analysis

Variables	Minimum	Maximum	Mean	S.D.
Time-varying variables				
Father Presence (1 if yes)	0	1	0.56	(0.50)
PIAT Mathematics	65	135	101.30	(14.35)
PIAT Reading	65	135	104.01	(15.03)
Externalizing BPI	84	173	103.92	(15.41)
Internalizing BPI	86	193	102.65	(15.44)
Mother's Marital Status (1 if married)	0	1	0.63	(0.48)
Mother's Years of Education	0	20	12.84	(2.43)
Home Environment/1,000	0.1	1.3	976.87	(156.96)
Household Income	4	974,100	51,237.60	(72,495.85)
Household Income (log)	1.4	13.8	10.34	(1.04)
Child's Age	7	14	10.20	(2.18)
Time-invariant variables				
Teen Pregnancy Status	0	1	0.18	(0.38)
Race				
Non-Hispanic blacks	0	1	0.30	(0.46)
Hispanics	0	1	0.20	(0.40)
Mother's Self-esteem in 1980	9	30	21.86	(4.03)
Mother's AFQT in 1980	1	99	37.44	(27.82)
Child's Sex (1 if female)	0	1	0.49	(0.50)
Child's Birth Order	1	11	1.95	(1.13)
Number of Child-Waves		20,768		
Number of Children		7,801		

Table 2. MSEM Results of Cumulative Father Presence and Academic Performance, NLSY79 and NLSY79CYA (N= 20,768)

	Model 1			Model 2		
	β	S.E.		β	S.E.	
WITHIN LEVEL						
Academic Performance by						
PIAT Mathematics	1.00	(0.00)		1.00	(0.00)	
PIAT Reading	0.94	(0.02)	***	1.17	(0.00)	***
Academic Performance on						
Externalizing BPI	-0.11	(0.01)	***	-0.05	(0.01)	***
Internalizing BPI	-0.02	(0.01)	*	-0.01	(0.01)	
Marital status (Married = 1)	-0.56	(0.34)		-0.31	(0.23)	
Mother's Years of Education	0.64	(0.05)	***	0.57	(0.06)	***
Home Environment	7.27	(0.80)	***	2.45	(0.45)	***
Logged Income	1.15	(0.14)	***	0.35	(0.09)	***
Child's Age	1.81	(0.46)	***	0.06	(0.20)	
Square of Child's Age	-0.09	(0.02)	***	-0.01	(0.01)	
Externalizing BPI on						
Cumulative Father Presence	-5.36	(0.28)	***	-4.92	(0.34)	***
Internalizing BPI on						
Cumulative Father Presence	-4.63	(0.28)	***	-4.13	(0.32)	***
BETWEEN LEVEL						
Academic Performance by						
PIAT Mathematics				1.00	(0.00)	
PIAT Reading				1.17	(0.00)	***
Academic Performance on						
Teenage Pregnancy (Yes =1)	-1.15	(0.29)	***	-0.65	(0.39)	
Race (non-Hispanic whites = 0)						
Non-Hispanic blacks (Yes = 1)	-3.16	(0.27)	***	-2.70	(0.43)	***
Hispanics (Yes = 1)	-1.21	(0.27)	***	-0.26	(0.52)	
Mother's Self-Esteem	-0.06	(0.03)	*	0.08	(0.04)	
Mother's AFQT	0.13	(0.01)	***	0.14	(0.01)	***
Child's Sex (Female = 1)	-0.25	(0.21)		1.63	(0.33)	***
Child's Birth Order	-0.92	(0.10)	***	-0.72	(0.15)	***
Random Slope of Cumulative Father Presence on						
Teenage Pregnancy (Yes =1)				-1.04	(0.58)	
Race (non-Hispanic whites = 0)						
Non-Hispanic blacks (Yes = 1)				0.74	(0.59)	
Hispanics (Yes = 1)				-0.10	(0.64)	
Mother's Self-Esteem				-0.11	(0.06)	*
Mother's AFQT				-0.01	(0.01)	
Child's Sex (Female = 1)				-1.12	(0.42)	**
Child's Birth Order				-0.10	(0.21)	
Intercepts						
PIAT Mathematics	83.95	(2.64)	***	88.96	(1.82)	***
PIAT Reading	80.29	(2.87)	***	89.53	(2.14)	***
Direct Effect on Academic Performance						
Cumulative Father Presence	-0.33	(0.31)		4.26	(1.37)	**
Indirect Effect on Academic Performance						
Through Externalizing BPI	0.59	(0.06)	***	0.25	(0.03)	***
Through Internalizing BPI	0.10	(0.05)	*	0.02	(0.02)	
Total Effect	0.36	(0.31)		4.53	(1.37)	***
AIC	640375.644			632588.024		

***p < 0.001, **p < 0.01, *p < 0.05