

Paternal incarceration and children's reading achievement: The role of maternal caregiving quality

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Abstract

Objective: This study examined early childhood paternal incarceration (PI; birth to Age 6) effects on children's elementary reading achievement (i.e., Ages 8–10) as mediated by mothers' supportive caregiving and moderated by child gender.

Background: Extant research on PI has primarily focused on child behavioral problems. However, less is known about specific relations between PI and academic achievement.

Method: Participants were drawn from an ongoing, longitudinal study of development using a subsample of 180 children and their maternal caregivers (51.5% female children; 48.9% Latinx; 26.7% experienced PI). Study variables were assessed using semi-structured incarceration interviews, observational parenting tasks, and standardized achievement tests. A moderated mediation analysis evaluated the hypothesized model by child gender.

Results: PI predicted decreased maternal supportive caregiving, which, in turn, predicted lower reading achievement, even when family socioeconomic status, child ethnicity-race, prior supportive caregiving, prior reading achievement, and maternal psychopathology were held constant. Further, a moderation analysis indicated that the relation between maternal supportive caregiving and reading achievement was moderated by child gender.

Conclusion: This investigation revealed a significant and negative indirect effect of early childhood PI on children's reading achievement via changes in maternal supportive caregiving. However, this indirect effect was significant for boys only.

Implications: These findings highlight the potential for interventions and resources that promote supportive maternal caregiving to mitigate the deleterious effects of PI on children's reading achievement, especially for boys.

KEYWORDS

education, incarceration, mediation, parenting

From 1991 to 2007, the number of incarcerated people increased by 59% (Prison Policy Initiative, 2020). However, during this same time, the number of incarcerated parents of children under the age of 18 evidenced an even greater increase of 79% (Glaze & Maruschak, 2008). Approximately 2.3% of American children under the age of 18 have a parent who is incarcerated, with rates of paternal incarceration (PI; 3.6%) outpacing maternal incarceration (MI; 0.4%) by eightfold (The Pew Charitable Trusts, 2010). Prior research documents a host of deleterious outcomes associated with parental incarceration, including, but not limited to, increased rates of later social exclusion, psychopathology, and antisocial behavior (Besemer & Dennison, 2018; Johnson & Easterling, 2012; Murray, 2012), negative teacher expectations (Dallaire et al., 2010), and poor educational outcomes (Cho, 2009, 2011). In contrast to prior studies of parental incarceration effects, which tend to conflate PI with MI, the current study sought to extend the growing body of research focused specifically on PI effects.

Extant research on PI has primarily focused on child behavioral problems (Antle et al., 2020; Dwyer Emory, 2018; Murray et al., 2009), with comparatively few studies evaluating relations between PI and functioning beyond the behavioral domain. Although some studies have documented associations between PI and childhood educational outcomes, such as decreased levels of noncognitive school readiness (e.g., anxiety and depression symptoms), early grade retention, and impaired cognitive capacities (Haskins, 2014; Haskins, 2016; Turney & Haskins, 2014), less is known about specific relations between PI and academic achievement (Haskins, 2016; Turney, 2017). Moreover, extant research has largely focused on main effects of PI in the absence of evaluating mediators or moderators of PI effects on any domain of child adaptation (Haskins, 2015; Roettger et al., 2011; Wilbur et al., 2007), and this is particularly true of educational outcomes (Haskins, 2016).

Guided by the Family Stress Model (FSM; Masarik & Conger, 2017), the current study sought to advance our understanding of PI effects on children's early reading achievement. The FSM posits that stressors, such as PI, can negatively impact child adjustment by compromising supportive parenting. Although the FSM considers various individual, family, and community factors that may exacerbate or mitigate family stress, these influences have received very little empirical consideration (Masarik & Conger, 2017). Similarly, although the FSM theoretically applies to a variety of stressors, including PI, extant applications have largely focused on stressors related to economic hardship (e.g., Kavanaugh et al., 2018). Recently, Turney and Sugie (2021) proposed an expanded FSM that explicitly positions the family stress process within the context of broader social inequality wherein parental arrest operates as a primary family stressor. This expanded application of the FSM situates various status indicators (e.g., ethnicity-race, poverty) as factors that shape the likelihood that families will experience specific stressors, including parental arrest and incarceration. Here, we extend Turney and Sugie's (2021) focus on the first half of the family stress process (i.e., parental arrest as a stressor that negatively affects parenting quality), to examine how hypothesized negative parenting effects influence child adaptation (i.e., reading achievement) and to consider the sociocultural context of PI. For example, PI disproportionately affects low-income communities of color (Turney & Sugie, 2021), and these same communities are more likely to feature under-resourced schools that are ill-equipped to support learning, especially among vulnerable children (Wakefield & Wildeman, 2013). Thus, this study tested changes in maternal supportive caregiving as a putative mediator of predicted relations between children's experiences of PI during the first 6 years of life (i.e., prior to the start of formal schooling) and children's reading achievement across the elementary school years (i.e., Ages 8–10). Moreover, we explored these relations by child gender given prior data showing gender differences in PI effects on child adaptation (Dwyer Emory, 2018; Wildeman, 2010), as well as in caregiving effects on academic achievement (Kashahu et al., 2014; Pinquart, 2016).

THE SOCIOCULTURAL CONTEXT OF PI

Consistent with recent expansions of the FSM model (Turney & Sugie, 2021), research on PI must consider broader contexts of systemic racism and mass incarceration that eventuate in marked ethnic and racial disproportionalities in both rates and impacts of PI. Black people are 5.1 times more likely to be incarcerated than whites (Nellis, 2016), and represent roughly 40% of US inmates, despite comprising only 13% of the US population (Guerino et al., 2011; Humes et al., 2011). Additionally, Native American and Latinx individuals experience incarceration at 2.6 and 1.7 times the rate for whites, respectively (Hartney & Vuong, 2009). Research indicates that these ethnic and racial overrepresentations in carceral settings are the result of the punitive practices that fueled mass incarceration (Felson & Krajewski, 2020).

Given ethnic and racial disproportionalities in rates of incarceration, children of color are more likely to experience PI (Pettit & Gutierrez, 2018). Moreover, as noted earlier, the impacts of PI may be heightened for children of color as a result of correlated risks associated with systemic racism (e.g., poverty, underfunded public schools, community violence; Adams, 2018; Wakefield & Wildeman, 2013). For example, research indicates that PI poses relatively greater challenges for poor families because it often results in decreased income amidst increased expenses (e.g., traveling to visit the incarcerated parent; Arditti et al., 2003). Mirroring the overrepresentation of ethnic and racial minorities among PI-impacted youth, this study drew on an ethnically and racially diverse sample of children from relatively high-risk socioeconomic backgrounds to test theoretically specified relations among childhood PI, maternal caregiving, and reading achievement.

PI EFFECTS ON CHILD ADJUSTMENT

Research consistently documents negative effects of PI on socioemotional adjustment in early childhood (Wildeman, 2010), middle childhood (Washington, 2018; Wilbur et al., 2007), adolescence (Kinner et al., 2007; Lee et al., 2013), and adulthood (Nebbitt et al., 2017; Swisher & Roettger, 2012). Across development, PI has been associated with internalizing problems (e.g., depression; Lee et al., 2013; Wilbur et al., 2007), externalizing problems (e.g., delinquency; Porter & King, 2015; Swisher & Roettger, 2012), and social problems (e.g., low assertiveness; Washington, 2018; Wildeman, 2010). However, these relations are nuanced, with varying effects across diverse outcomes and sociodemographic groups. For example, in a longitudinal study of 2,275 children, Wildeman (2010) found positive relations between PI and increased physical aggression for boys, but not for girls. Moreover, boys of fathers with *nonviolent* offenses showed the largest increases in aggression, whereas boys of fathers who were violent offenders showed comparatively smaller increases in aggression from birth to Age 5.

Relative to evidence of robust PI effects on children's socioemotional adjustment outcomes, research on PI and children's cognitive skills and academic achievement is scarce and mixed. For example, drawing on the Fragile Families Study of 1709 children, Haskins (2014) found that PI did not evidence significant relations with children's receptive vocabulary at Ages 3 and 5, but Haskins (2016) found that PI was related to more attention and working memory problems in the same sample at Age 9. To date, the only studies to examine PI and elementary school achievement have also drawn from the Fragile Families Study, but, again, with conflicting results. For example, McLeod et al. (2019) found that, among African American boys, PI showed enduring and consistent negative effects on literacy across Ages 3, 5, 9, and 15. Similarly, Haskins (2016) documented a negative association between PI and children's reading and math achievement at Age 9. However, using a different subset of data from this same study, Turney (2017) found no significant association between PI and academic achievement at Age

9. Given both the paucity of extant research on PI and children's academic achievement outside the Fragile Families Study, as well as the contradictory findings within that study, the current investigation sought to evaluate prospective relations between experiences of early childhood PI from birth to Age 6 and children's reading achievement across the elementary school years (i.e., Ages 8–10) in a high-risk community sample. Moreover, this study also addressed the need to elucidate explanatory mechanisms underlying expected PI effects on early achievement while testing for potential gender differences in these pathways.

MEDIATORS OF PI EFFECTS

Mirroring the broader literature on PI, studies that have evaluated mediating mechanisms of PI effects have typically focused on pathways to socioemotional adjustment outcomes, rather than cognitive or educational domains of adaptation. Consistent with the FSM, evidence suggests that a range of mediators, including economic instability (Dwyer Emory, 2018; Western, 2006), paternal attachment (Porter & King, 2015), and maternal mental health (e.g., depression; Antle et al., 2020), undergird PI effects on children's socioemotional adjustment. In contrast, although researchers have highlighted peer (Bryan, 2017), teacher (Wildeman et al., 2017), and caregiver (Shlafer & Poehlmann, 2010) factors as potential mediators of PI effects on cognitive and academic outcomes, there remains a pressing need to empirically evaluate these suggestions. In a rare study that did test a mediation model of PI effects on school adjustment, Turney and Haskins (2014) found that teacher-reports of the child's overall academic proficiency across verbal, quantitative, and social skills at Age 5 explained more than half the relation between early childhood PI (Ages 1–5) and grade retention between kindergarten and third grade.

Both theory (Masarik & Conger, 2017) and empirical evidence (Turney, 2014; Turney & Wildeman, 2013) suggest that family processes are heavily impacted by PI. However, surprisingly few studies have evaluated the degree to which altered family dynamics, particularly the quality of care provided by the custodial caregiver, may account for PI effects on child development. Moreover, studies that have considered the explanatory role of family-level processes have focused primarily on contextual mediators (e.g., maternal caregivers' access to social support and experiences of parenting stress; Turney et al., 2012; Turney & Wildeman, 2013; Dennison et al., 2020), rather than on specific caregiving practices. Although some evidence points to significant relations between PI and increases in negative maternal caregiving behaviors, such as aggression and neglect (Turney, 2014), research on positive caregiving practices, such as maternal engagement (e.g., reading stories with the child), has yielded mixed findings that appear to vary based on data analytic techniques. For example, Turney and Wildeman (2013) found that ordinary least squares regression (i.e., simple linear regression) models yielded no significant association between PI and maternal engagement, whereas fixed-effect regression models (i.e., group means are fixed) suggested that PI was related to increased maternal engagement. Of note, extant research has also favored caregiver- or child-reports of caregiving practices, rather than independent observations of parent-child interactions, which renders extant findings susceptible to shared method variance.

Supportive caregiving is a core facet of parenting quality that entails positive regard for the child, as well as appropriate praise, responsiveness, and structure (Gadeyne et al., 2004; Martin et al., 2010; Serbin et al., 2013). Attachment theory emphasizes the universal salience of supportive caregiving in child development (Bowlby, 1969), and data suggest that supportive caregiving may be compromised in the wake of PI (Turney, 2014; Turney & Wildeman, 2013). Indeed, more distal candidate mechanisms of PI effects (e.g., maternal depression; Baker, 2018; maternal support; Turney et al., 2012) may influence child adaptation via proximal parenting processes. For example, substantial evidence indicates that maternal depression negatively impacts parenting behaviors, such as by compromising parental warmth and

support, in ways that hinder child functioning (Baker, 2018; Kuckertz et al., 2018; Kujawa et al., 2015; Priel et al., 2020). Specific associations between supportive caregiving and positive educational outcomes are also well-documented across the elementary school years (Bronstein et al., 1996; Kim et al., 2013; Kim et al., 2015; Murray, 2012), and mirror the promotive effects of supportive caregiving on a wide range of positive child adjustment outcomes (Coe et al., 2019; Frosch & Mangelsdorf, 2001). Building on this research, and consistent with the theoretical postulates of the FSM, the current study evaluated the hypothesis that observational assessments of maternal supportive caregiving during mother–child interaction tasks would explain significant variance in (i.e., mediate) the expected negative relation between PI and children's reading achievement.

MODERATORS OF PI EFFECTS

Many factors may qualify specific relations among PI, supportive caregiving, and achievement, including the nature of the crime (e.g., violent vs. nonviolent; Washington, 2018), the context of incarceration (e.g., duration; Andersen, 2016), and child factors, such as gender (Haskins, 2016). This study explored child gender as a potential moderator of the proposed mediation model given prior evidence that PI effects on adjustment may vary by gender (e.g., greater effects on boys' externalizing problems; Dwyer Emory, 2018; Wildeman, 2010) and that caregiving effects on child achievement differ by gender (Kashahu et al., 2014; Pinquart, 2016).

There are many reasons that parental influences, such as PI and supportive parenting, may differentially influence adjustment outcomes among daughters versus sons. For example, Foster and Hagan (2013) suggest that paternal influences will more strongly impact sons, whereas maternal influences may more strongly impact daughters due to the heightened salience of same-sex role models. Consistent with this explanation, as compared to daughters, several studies have documented poorer behavioral functioning among sons with incarcerated fathers (Haskins, 2015; Poehlmann-Tynan & Turney, 2021; Wildeman, 2010). Of note, however, research examining nonbehavioral outcomes, such as those related to education, yields mixed gender patterns. For example, in the Fragile Families Study, there were no significant gender differences in relations of PI with receptive vocabulary (Haskins, 2014) or early grade retention (Turney & Haskins, 2014), but PI contributed to declines in math and reading achievement among girls only (Haskins, 2016). Likewise, studies of supportive caregiving and achievement among sons versus daughters paint a mixed picture of effects. For example, a meta-analysis of research on parenting styles and academic achievement found that maternal warmth was more strongly associated with adolescent girls' achievement as compared to paternal warmth, but this pattern was not found among boys (Pinquart, 2016). In contrast, a study of second graders did not reveal significant gender differences between girls and boys when examining relations between several parenting behaviors, including supportive caregiving (i.e., affection and responsiveness), and children's math and reading achievement (Gadeyne et al., 2004). Given mixed theoretical perspectives and empirical research findings regarding gendered relations among PI, parenting, and achievement, gender-based analyses were exploratory in this study.

THE CURRENT STUDY

Building on the work of Haskins (2016) and a handful of other scholars (Turney & Wildeman, 2013), this investigation filled important gaps in PI research by examining temporally proximal reading achievement effects across the elementary school years while evaluating both mediation through maternal supportive caregiving and moderation by child gender. The current study drew on a sociodemographically diverse sample of mother–child dyads to

evaluate hypothesized relations between childhood experiences of PI from birth to the start of elementary school (i.e., Age 6) and children's reading achievement across the elementary school years (i.e., Ages 8–10). Moreover, we evaluated maternal supportive caregiving at Age 8 as a hypothesized mediator of PI effects on elementary school achievement while exploring child gender as a potential moderator of these relations.

The current effort to understand if and how PI affects educational achievement *within* childhood is of crucial importance for several reasons. First, nearly 2 million children experiencing PI in the United States are under the age of 12 (Glaze & Maruschak, 2008). Second, identifying early pathways toward school failure has powerful implications for prevention efforts (Green et al., 2019). Given that PI has demonstrated negative relations with high school grade point average (GPA) (Hagan & Foster, 2012), completed years of education (Foster & Hagan, 2007; Foster & Hagan, 2009), and rates of college graduation (Miller & Barnes, 2015), there is a pressing need for research to identify if and how early childhood PI may instantiate potentially problematic educational pathways. This is particularly important given evidence that educational patterns and pathways strengthen across middle childhood with enduring implications for success in adolescence and adulthood (Coll & Szalacha, 2004). Indeed, a third reason to test these effects centers on consistent relations between academic adjustment and later well-being (Bücker et al., 2018). Finally, and perhaps most importantly, it is imperative to document and understand achievement effects of PI because academic difficulties may undergird the intergenerational transmission of PI as suggested by well-established connections between school performance and later carceral involvement (i.e., the school-to-prison pipeline; Heitzeg, 2016; also see Barnert et al., 2021 and Hagan & Foster, 2012).

This study focused on children's early reading achievement because it is uniformly emphasized during the elementary school years (Porter et al., 2011) and it is strongly related to later educational achievement and attainment (Casillas et al., 2012). All analyses controlled for covariates, including correlates of PI that have documented associations with maternal caregiving behaviors and/or children's academic achievement, including prior levels of maternal supportive caregiving and child reading achievement, family socioeconomic status (SES; Gubbins & Otero, 2020), maternal psychopathology (Goodman et al., 2011; Lovejoy et al., 2000; Muzik et al., 2017), and children's ethnicity and race (Reardon & Galindo, 2009).

METHOD

Participants

Participants were selected from a larger sample of 250 maternal caregiver–child dyads who were part of an ongoing, longitudinal study of child development. Seventy dyads were excluded from these analyses due to missing PI information ($n = 3$), initial exposure to PI after Age 6 ($n = 8$), encounters with other kinds of familial incarceration (e.g., mothers, siblings, aunts/uncles) in the absence of PI ($n = 22$), or insufficient data regarding the occurrence of PI (e.g., caregiver indicated that PI may have occurred, but provided no other details; $n = 37$). Thus, the current analyses were based on a subsample of 180 dyads in which early PI (up to Age 6) was present in 48 dyads (26.7%) and no PI or other familial incarceration was present in 132 dyads (73.3%).

The subsample of 180 children was diverse with regard to child gender (51.1% female, 48.9% male) and ethnicity-race (48.9% Latinx, 22.7% multiracial, 15.6% Black, and 12.8% white). Participating families were representative of the southern California community from which they were recruited (U.S. Census Bureau, 2011), as well as of communities facing disproportionate rates of PI (Pettit & Gutierrez, 2018). Primary caregivers were mostly biological mothers (93.3%), followed by foster/adoptive mothers (3.3%), and grandmothers or other female kin caregivers (3.4%). Caregiver education levels were variable (i.e., 15.8% had not

completed high school, 11.8% had a high school diploma or GED, 32.9% had some technical training or college coursework, 20.4% had a 2-year degree or technical diploma, and 19.1% had completed a 4-year degree or greater). Just over half the caregivers were employed (54.2%), and the majority were married (58.2%) or in a committed relationship (21.6%).

Procedures

Caregivers were invited to participate in a longitudinal study of children's early learning and development via flyers placed in community-based childcare centers between 2008 and 2010. Caregivers completed a brief screening by phone to ensure the target child was (1) between 3.9 and 4.6 years of age, (2) proficient in English, and (3) not diagnosed with a developmental disability. All assessments were carried out at our university research laboratory.

At Ages 4 ($N = 180$), 5 ($N = 156$), 6 ($N = 153$), 7 ($N = 144$), 8 ($N = 151$), and 10 ($N = 149$), dyads completed a 3-h laboratory assessment, which consisted of measures with the child, the caregiver, and the caregiver and child interacting. One hundred seventy-one dyads (95%) completed two or more assessments and nine dyads (5%) did not. There were no significant differences between these groups on all study variables. Caregivers received \$25 per hour of assessment and children received a gift at the end of each assessment. Informed consent was obtained from the child's legal guardian at all waves and informed assent was collected from children beginning at Age 7. All procedures were approved by the human research review board of the participating university.

Measures

Paternal incarceration

At each data wave, caregivers reported the child's exposure to family incarceration on the Early Trauma Inventory (Bremner et al., 2000). In the context of this semi-structured interview, caregivers were asked, whether the child had a family member who had been arrested, jailed, or taken away (by police). If the maternal caregiver endorsed incarceration, she completed a series of follow-up questions to establish who was involved in each incident, what happened, the age of the child, and the last time this occurred. Two advanced research assistants and the first author created comprehensive incarceration summaries to integrate all available incarceration information across data waves, since some caregivers did not report early childhood PI until later data waves. Based on these summaries, 48 children in the current subsample (26.7%) were identified as having experienced PI prior to Age 6. Of these 48 children, 22 (45.8%) experienced a single PI incident and 26 (54.2%) experienced 2–9 separate incidents from birth to Age 6. The average age of the children at the first incarceration event was 1.83 years ($SD = 1.30$) and the average duration of incarceration was 2.10 years ($SD = 2.44$). Consistent with prior PI research (Haskins, 2016; McLeod et al., 2019), the current study employed a dichotomous indicator of PI (from birth to Age 6) in all analyses.

Maternal supportive caregiving

Caregiving quality was observed during four video-recorded tasks at Ages 6 and 8. The tasks were adapted from Block and Block (1980) to capture a range of typical caregiver-child interaction contexts, such as problem-solving (e.g., completing puzzles), conflict resolution (e.g., discussion of revealed diffs), and game-playing (e.g., Don't Spill the Beans™). The problem-solving tasks were designed to be just beyond the level of difficulty that the child could

complete alone, and caregivers were instructed to help the child as much as they thought the child needed, while allowing the child to do as much work as they could independently. Discussion and game-playing tasks were intended to capture typical collaborative and conversational dynamics between caregiver and child.

Coders who were naïve to other information about the family evaluated supportive caregiving during each task using a 7-point scale with higher scores indicating care that was sensitive and responsive to the child's needs, and appropriately positive and encouraging of the child's contributions (Egeland, 1982; Egeland et al., 1993). Coders were trained to reliability by the second author who was trained by the original authors of this coding protocol. Coders were six doctoral students and six advanced undergraduate or post-baccalaureate research assistants who resolved coding disagreements via weekly consensus meetings with all team members. Coding assignments were counterbalanced across tasks, coding teams were rotated, and ~10% of cases were coded by all teams to minimize carryover effects, ensure adherence to the coding protocol, and mitigate observer drift. Consensus scores were averaged across tasks to index maternal supportive caregiving ($ICC_{age6} = 0.762$, $ICC_{age8} = 0.828$). This coding scheme has been used in prior studies, including with economically (Weinfield et al., 2002) and ethnically and racially diverse samples (Zaslow et al., 2006).

Reading achievement

At Ages 6, 8 and 10, children completed the Letter-Word subtest of the Woodcock Johnson III Tests of Achievement (WJ-III) to assess reading achievement (Woodcock et al., 2001). The WJ-III is a well-validated measure of academic achievement designed for use from Age 2 to adulthood. In the Letter-Word subtest, children were asked to read a series of increasingly difficult words out loud beginning with a six-item basal level and continuing until six consecutive items were missed. Given the high correlation between reading achievement at Ages 8 and 10 ($r = .894$), all analyses predicted to a composite measure of reading achievement to mitigate collinearity concerns while holding prior reading achievement at Age 6 constant.

Family SES

At Age 6, family SES was calculated using the Hollingshead (1975) Four-Factor Index of Social Status based on a composite of caregiver education and occupational status. Education codes ranged from 1 (*less than seventh grade*) to 7 (*graduate or professional training*). Occupational scores ranged from 1 (*farm laborers and unskilled service workers*) to 9 (*executives and major professionals*). Education codes were multiplied by three and occupation codes were multiplied by five. Scores were summed within caregiver and then averaged across caregivers (in cases with two caregivers in the home) to yield a family SES score. At Age 6, family SES scores ranged from 13 (e.g., unemployed with a 10th grade education) to 66 (e.g., an attorney with a graduate degree) with higher scores connoting higher SES ($M_{SES} = 33.17$, $SD = 12.58$, e.g., salesclerk).

Maternal psychopathology

At Age 6, maternal psychopathology was assessed using the 53-item Brief Symptom Inventory (BSI; Derogatis & Spencer, 1993). Maternal caregivers reported on how much they had been bothered by symptoms they had experienced in the past week (e.g., feeling lonely) on a scale from 0 (*not at all*) to 4 (*extremely*). The BSI yields a Global Severity Index *T*-score, which reflects both the number of symptoms endorsed and the intensity of perceived distress ($\alpha = .95$).

Data analytic plan

All analyses were conducted in SPSS version 27. Data were examined for non-normality to render parametric statistics valid (Afifi et al., 2007). A multivariate analysis of variance (MANOVA) evaluated group differences across study variables as a function of the child's gender, ethnicity-race, and their interaction. Correlation analyses assessed bivariate relations among study variables. Hayes' (2013) PROCESS routine evaluated the indirect effects of early childhood PI up to Age 6 on reading achievement at Ages 8 and 10 as mediated by observations of maternal supportive caregiving at Age 8 and moderated by child gender. Last, we conducted a post hoc power analysis using G*Power (Faul et al., 2007) to assess whether the unequal sample sizes of children who did and did not experience PI were sufficiently powered to detect the obtained findings.

Results yielded 95% bootstrapped confidence intervals (CIs) for unconditional effects. Bootstrapping is a nonparametric technique that minimizes the influence of non-normality across study variables and yields a more reliable estimation of mediation than Sobel's (1982) test, particularly in smaller samples (Preacher et al., 2007; van Jaarsveld et al., 2010). Bootstrapping also allows for direct estimation of mediation and mitigates power problems due to the asymmetric and non-normal sampling distribution of indirect effects (Hayes, 2009). Predictors were centered to reduce multicollinearity (Kraemer & Blasey, 2004). All models controlled for child ethnicity-race, family SES, prior maternal supportive caregiving and child reading achievement at Age 6, and prior maternal psychopathology at Age 6. Consistent with contemporary recommendations for evaluating mediation (Hayes, 2009; Zhao et al., 2010), the indirect path from PI to reading achievement through supportive caregiving was tested regardless of whether the direct effect of PI on reading achievement attained significance.

Of the 180 children in this sample, 28 (15.5%) were missing supportive caregiving data at Age 6 because they completed a partial assessment ($n = 1$) or did not attend the Age 6 data wave ($n = 27$). At Age 8, 36 children (20%) were missing supportive caregiving data because they completed a partial assessment ($n = 7$) or did not attend the Age 8 wave ($n = 29$). Likewise, 29 children (16.1%) were missing reading achievement data at Age 6 because they completed a partial assessment ($n = 1$), were not administered the reading achievement measure due to lack of time ($n = 1$), or did not attend the data wave ($n = 27$). At Age 8, 35 (19.4%) children were missing reading achievement data because they completed a partial assessment ($n = 6$) or did not attend the data wave ($n = 29$). At Age 10, 40 (22.2%) children were missing reading achievement data due to completing a partial assessment ($n = 7$), administration errors ($n = 2$), or not attending the Age 10 data wave ($n = 31$).

Missing data were handled using the expectation maximization (EM) algorithm across 100 iterations as supported by Little's (1988) MCAR test, $\chi^2(28) = 27.980, p = .466$ (Schafer & Graham, 2002). The EM algorithm uses multiple imputation methods to impute values into a single data set, rather than listwise deletion or imputation across multiple data sets, which was the only estimation method available in previous versions of SPSS. The pattern of obtained findings was consistent across both the raw and imputed data sets.

RESULTS

Descriptive and bivariate analyses

Descriptive statistics and bivariate correlations are shown in Table 1. A MANOVA revealed significant differences across study variables by child ethnicity-race (Wilks' $\lambda = 0.691, p = .001$), but not by child gender, nor their interaction. Specifically, there was one significant difference by ethnicity-race such that caregivers of white children were coded as exhibiting more

TABLE 1 Descriptive statistics and bivariate correlations among study variables

	<i>M</i> (<i>SD</i>)	1	2	3	4	5	6	7	8	9
1. PI	.267 (.443)	—	—	—	—	—	—	—	—	—
2. SES (Age 6)	33.170 (12.580)	-.120	—	—	—	—	—	—	—	—
3. Maternal psychopathology (Age 6)	4.829 (.619)	.157	.071	—	—	—	—	—	—	—
4. Supportive caregiving (Age 6)	4.699 (.712)	-.028	.190*	-.053	—	—	—	—	—	—
5. Supportive caregiving (Age 8)	47.331 (10.574)	-.203*	.229**	-.194*	.518**	—	—	—	—	—
6. Achievement (Age 6)	109.55 (15.616)	-.162*	.064	.043	.233**	.267**	—	—	—	—
7. Achievement (Age 8)	106.500 (14.089)	-.101	.179*	.069	.201*	.301**	.732**	—	—	—
8. Achievement (Age 10)	103.95 (14.094)	-.183*	.125	.041	.053	.182*	.672**	.894**	—	—
9. Achievement (Ages 8 and 10)	105.287 (13.710)	-.128	.163	.039	.193*	.273**	.727**	.975**	.975**	—

Abbreviations: PI, paternal incarceration; SES, socioeconomic status.

* $p < .05$.** $p < .01$.

TABLE 2 Regression of children's reading achievement on PI as mediated by maternal supportive caregiving and moderated by child gender

Variable	M_1 (SUPP)		Y (ACH)	
	b (bootstrapped SE)	p value (95% CI; bias-corrected)	b (bootstrapped SE)	p value (95% CI; bias-corrected)
X (PI)	a_1	.023 (-.387, -.029)	c	.527 (-3.854, 1.982)
M_1 (SUPP)	—	—	b_{1i}	.008 (1.097, 7.241)
Constant	i_{M1}	<.001 (-3.865, -2.135)	i_y	.001 (11.196, 42.393)
Gender	—	—	b_2	.006 (1.007, 5.990)
Gender*SUPP	—	—	b_{3i}	.002 (-9.801, -2.194)
Race-ethnicity	-.067 (.079)	.397 (-.224, .089)	1.850 (1.277)	.149 (-.671, 4.371)
SES	.005 (.003)	.135 (-.002, .012)	.091 (.056)	.078 (-.001, .211)
Prior ACH	.007 (.003)	.010 (.002, .012)	-.656 (.044)	.743 (.569, .743)
Prior SUPP	.547 (.071)	<.001 (.406, .687)	-.110 (1.322)	.880 (-2.809, 2.409)
Prior MP	-.010 (.004)	<.001 (-.018, -.002)	.035 (.066)	<.001 (.569, .743)
<i>Conditional indirect effect</i>				
Boys	—	—	4.169 (1.556)	.008 (1.097, 7.241)
Girls	—	—	-1.829 (1.541)	.237 (-4.870, 1.212)
<i>Test of unconditional interaction</i>				
R^2 change = 0.020				
$F(1,170) = 9.690, p = .002$				
$R^2 = 0.641, f^2 = 0.230$				
$F(9,170) = 33.778, p \leq .001$				

Note: Bold text denotes significant coefficients.

Abbreviations: ACH, achievement; CI, confidence interval; MP, maternal psychopathology; PI, paternal incarceration; SES, socioeconomic status; SUPP, supportive caregiving.

supportive behaviors ($M = 5.278$) than caregivers of Black ($M = 4.600$) and multiracial ($M = 4.606$) children, but they did not differ significantly from caregivers of Latinx children ($M = 4.831$) at Age 6. There were no significant differences in ratings of supportive caregiving by ethnicity-race at Age 8. A chi-square test of independence revealed no significant ethnic-racial or gender differences in PI status. Likewise, there were no significant differences between dyads with or without missing data on any of the study variables with respect to gender, poverty status, PI status, and ethnicity-race.

Bivariate analyses indicated that PI was related to lower reading achievement at Ages 6 and 10, as well as to less supportive caregiving at Age 8. Family SES was positively related to supportive caregiving at both Ages 6 and 8. Prior supportive caregiving at Age 6 was positively related to supportive caregiving at Age 8. Maternal psychopathology at Age 6 was negatively related to supportive caregiving at Age 8. Finally, maternal supportive caregiving at both Ages 6 and 8 was positively related to reading achievement at Ages 6 and 8. However, only maternal supportive caregiving at Age 8 was positively related to reading achievement at Age 10.

Mediation analysis

Table 2 depicts parameter estimates and 95% bootstrapped CIs across 10,000 resamples for the direct and indirect pathways from early childhood PI to reading achievement as mediated by maternal supportive caregiving and moderated by child gender. The direct effect from early childhood PI to reading achievement was not significant. However, early childhood PI predicted lower levels of maternal supportive caregiving and, in turn, maternal supportive caregiving predicted higher reading achievement, even when family SES, child ethnicity-race, prior supportive caregiving, prior reading achievement, and maternal psychopathology at Age 6 were held constant. Figure 1 displays the primary model pathways with their corresponding standardized parameter estimates from Table 2 for the total sample, as well as separately for girls and boys. As depicted in Figure 1, the relation between maternal supportive caregiving and reading achievement was significant and positive for boys ($b = 4.169, p = .008$), but not for girls ($b = -1.829, p = .237$). Thus, the indirect effect from early childhood PI to lower reading achievement via decreases in maternal supportive caregiving behaviors was significant for boys, but not for girls.

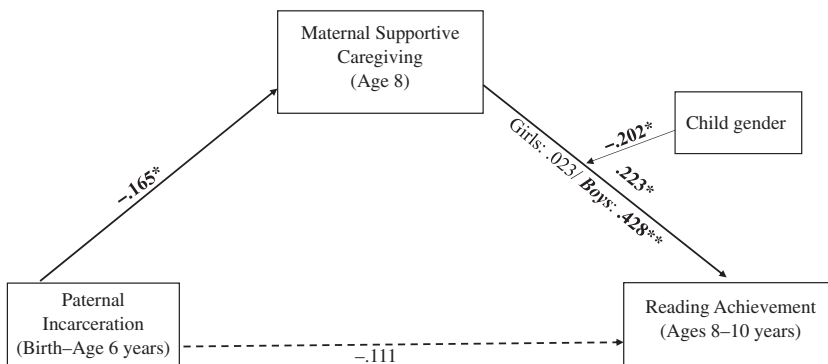


FIGURE 1 A moderated mediation model with PI predicting reading achievement via maternal supportive caregiving, as moderated by child gender. Pathways depict standardized coefficients with significant relations indicated in bold. * $p < .05$; ** $p < .01$. PI, paternal incarceration

Post hoc power analysis

A post hoc power analysis evaluated whether or not the sample size of the current study was sufficient to detect the obtained effects. Despite our sizable sample of 180 dyads, this power analysis was warranted given the marked difference in the number of PI-exposed children versus those without PI exposure. A post hoc power analysis using G*Power (Faul et al., 2007) indicated the current sample provided exceptional power (99.9%) to detect the obtained estimates of direct and indirect effects when using nine predictors (including five covariates) to examine supportive maternal caregiving and children's reading achievement in this mediation analysis.

DISCUSSION

This investigation revealed a negative indirect effect of early childhood PI on children's reading achievement via changes in maternal supportive caregiving. However, because the relation between maternal supportive caregiving and reading achievement was stronger for boys than girls, this indirect effect was significant for boys only. Importantly, this pathway was robust to controls for family SES, child ethnicity-race, prior supportive caregiving, prior reading achievement, and maternal psychopathology at Age 6. Evidence supporting specific pathways by which early childhood PI may eventuate in negative reading achievement outcomes *within* childhood represents an important contribution to the extant literature because it enables us to better understand why seemingly contradictory findings exist in prior studies of childhood PI and educational outcomes, for whom these relations are salient, and at what period in development they are most impactful.

Although bivariate analyses revealed modest negative relations of PI with reading achievement, the absence of a significant direct effect from early childhood PI to reading achievement in the full model was somewhat surprising. However, extant studies of PI and educational outcomes have yielded similarly mixed results with some supporting direct relations (Haskins, 2016), others not (Turney, 2017), and still others showing effects only within circumscribed groups (e.g., African American boys; McLeod et al., 2019). The added complexity suggested by the current moderated mediation by child gender may help make sense of contradictory patterns across prior studies while illuminating the need for ongoing consideration of both mediating and moderating mechanisms in future research on PI. Perhaps most importantly, the current study provides valuable evidence that early childhood PI need not de facto undermine children's reading achievement. Indeed, these findings suggest that efforts to enhance maternal supportive caregiving in the context of PI may help to protect children, particularly boys, from negative reading achievement outcomes.

Early childhood PI introduces an abrupt disruption to the family system, with negative effects on familial processes (Adams, 2018). For example, evidence indicates that PI is associated with higher rates of parenting stress (Turney & Wildeman, 2013) and negative caregiving behaviors, such as maternal neglect (Turney, 2014; Turney & Wildeman, 2013). Research regarding positive caregiving practices remains scarce. In contrast to Turney and Wildeman's (2013) inconsistent findings regarding relations between PI and maternal engagement (i.e., reading stories with children), we found that PI predicted declines in maternal supportive caregiving from Ages 6 to 8. In addition to differences in measurement and sample composition, our results suggest that early childhood PI may differentially impact specific versus global positive caregiving practices. For example, the amount of maternal engagement may increase in the wake of PI given the absence of a second caregiver, but the current findings suggest that the overall quality of caregiving may nevertheless suffer. This study highlights the need for ongoing efforts to explore nuanced relations between PI and family processes, particularly

in the domain of positive caregiving practices, such as literacy engagement and overall supportive caregiving.

Positive associations between supportive caregiving and children's educational outcomes are well documented across the elementary school years (Bronstein et al., 1996; Kim et al., 2013; Kim et al., 2015; Murray, 2012). However, the differential significance of maternal support for reading achievement among boys versus girls in this study warrants further consideration. This pattern of results may reflect the specific focus on reading achievement in this study, given that boys tend to struggle with reading more than girls (Lietz, 2006; Nalipay et al., 2020; Wheldall & Limbrick, 2010), and on later childhood, which is when gender differences in reading achievement typically emerge (Reilly et al., 2019; Washington et al., 2019). These findings point to the need for more research to clarify the developmental timing and domain-specificity of associations between maternal supportive caregiving and children's academic achievement by child gender.

Strengths and limitations

The current study featured several methodological strengths that support new insights into how and for whom early PI may undermine reading achievement *within* childhood. First, our use of prospective data across several time points while controlling for prior levels of maternal supportive caregiving and child reading achievement justified a stronger degree of directional inference than previous cross-sectional research designs. Second, our use of multiple informants (i.e., observers and caregivers) and methods (i.e., semi-structured interviews, observational tasks, and standardized tests) mitigated concerns about biased estimates due to shared method variance. Third, by holding common correlates of PI, including socioeconomic vulnerability and maternal psychopathology, constant, we evaluated the specific role of caregiving quality for understanding early PI effects on children's reading achievement. Despite these strengths, however, several limitations qualify our findings while illuminating promising directions for future research.

First, although we recognize that caregiving influences on children's achievement in the context of PI are impacted by additional sociodemographic factors, such as neighborhood resources (e.g., Greenman et al., 2011), we were unable to probe for additional moderators beyond gender in this study given our limited sample size. In particular, we need studies with sufficient power to examine potentially unique dynamics *within* specific ethnic and racial groups using well-validated instruments. For example, the current measure of supportive caregiving in this study has been used in diverse samples (Weinfield et al., 2002; Zaslow et al., 2006), but yielded lower supportive parenting scores when caregivers were observed with Black or multiracial children as compared to white children at Age 6. Although these differences were not present at Age 8, which was the mediator in these analyses, additional work is needed to clarify whether or not the obtained patterns reflect cultural bias in the current measure, particularly with regard to observations of caregiving toward younger children. In a recent meta-analysis, Pinquart and Kauser (2018) emphasized the need for research to examine the expression and adaptive significance of different caregiving practices within and across specific ethnic and racial groups. For example, although an abundance of research demonstrates associations between parental hostility and negative child outcomes (Khaleque, 2017; Lam et al., 2018), these relations appear muted in African American samples (Rious et al., 2019). Finally, given the known significance of intersectionality (Warner & Brown, 2011), particularly in caregiving (Jackson et al., 2019) and educational settings (Baird & Keene, 2019), a true picture of PI and caregiving effects on child achievement must consider *both* gender and ethnicity-race, and likely additional contextual qualifiers, such as SES and neighborhood characteristics.

Second, additional moderators of PI effects likely center on specific features of the PI experience that could not be probed within this relatively small sample. For example, preincarceration living arrangements (i.e., whether the father was living in the home prior to incarceration) may influence PI effects on child adaptation and/or intervening variables, such as caregiving quality. Likewise, the frequency and form of father–child contact during the period of incarceration may qualify the impact of PI on child adjustment. For example, some data suggest that in-person visitation can be traumatizing for children with corresponding increases in child internalizing symptoms, whereas written and phone communication are associated with fewer symptoms (Dallaire et al., 2015).

Third, although maternal supportive caregiving emerged as a significant mechanism by which early childhood PI may influence children's reading achievement, ongoing efforts are needed to identify vulnerability and protective processes that may shape maternal caregiving quality in the context of PI. As noted earlier, consistent with FSM, we focused on caregiving practices as a proximal mediator of PI effects. However, additional mechanisms, such as alterations in housing stability, maternal social support, maternal mental health, or family economic status, also influence these pathways (Baker, 2018; Turney et al., 2012). For example, this study controlled for SES, but more nuanced measures of mothers' difficulties meeting their child's basic needs may illuminate specific areas of vulnerability (and opportunities for protection) when working with families affected by PI. Indeed, some evidence suggests that challenges meeting basic needs may increase parenting stress, which, in turn, decreases positive caregiving behaviors (Gershoff et al., 2007). Future research on varied contextual factors, such as caregivers' perceived stress and social support, that are likely to influence parenting quality among custodial caregivers will inform efforts to promote positive parenting in the context of PI.

Fourth, our inclusion of prior measures of supportive caregiving and child reading achievement in the analytic model strengthened our capacity to offer directional interpretations of the obtained findings. However, future research awaits the evaluation of a fully cross-lagged model wherein all constructs are assessed at all waves to support causal conclusions. This is especially important because, consistent with well-documented child effects in development (Bell & Harper, 2020), PI-related elevations in children's socioemotional and behavioral difficulties could have influenced both maternal caregiving behaviors and children's reading achievement in ways that could not be evaluated here.

Fifth, the current investigation of PI and maternal caregiving quality encompassed a heterogeneous group of "mothers." Although the majority of maternal caregivers in our sample were biological mothers, 6.7% were foster/adoptive mothers, grandmothers, or other female kin caregivers. Thus, additional research is needed to evaluate the proposed model among maternal caregiver–child dyads beyond biological mothers. This is particularly important since some data suggest that as many as one-third of caregivers raising children affected by PI are grandparents, other relatives, or friends (Tasca, 2018). In addition to highlighting the need for research on the unique strengths and vulnerabilities of specific caregiver groups, these findings suggest that the current sample may not have been fully representative of children affected by PI.

Sixth, given the time constraints of each assessment, we were limited to an abbreviated measure of children's reading achievement. Reading achievement encompasses multiple developmental acquisitions, including not only the letter and word identification skills that were assessed in this study, but also fluency, comprehension, and phonemic awareness (National Reading Panel, 2000). Although abbreviated measures, such as the letter-word identification test, have been used in prior research (Blair et al., 2015; Blankenship et al., 2019; McCormick & O'Connor, 2015; Rabiner et al., 2016), this study would have benefited from the administration of a comprehensive assessment of reading achievement, or better yet, a full battery of academic achievement measures. Likewise, future research on caregiving and children's educational adjustment would be advanced by additional consideration of global achievement indicators, such as GPA. That said, the elementary schools in this study rarely employed traditional

measures of GPA, with most favoring class performance evaluations using teacher narratives or various descriptive ratings (e.g., needs improvement, satisfactory, above average). Holistic evaluations of children's educational outcomes, particularly given known gender (Lietz, 2006; Nalipay et al., 2020; Wheldall & Limbrick, 2010) and ethnic-racial disparities in standardized assessments of achievement (Creighton, 2006; Paik & Walberg, 2007), are needed to obtain a full and accurate picture of academic adjustment among PI-affected children.

Finally, despite the current study being sufficiently powered, the unequal groups (i.e., smaller group of PI-affected children) examined here may have attenuated statistical power and elevated Type 1 error rates (Rusticus & Lovato, 2019). Future PI research will benefit from larger PI samples to support more nuanced moderation analyses and mitigate statistical concerns. However, it is essential that scaling up studies of PI and child development does not come at the cost of using the kinds of multiple informants and methods (e.g., direct assessments with children affected by PI, observational measures of the caregiving context) employed in the current study.

Implications for future research and practice

The current study contributes to a more comprehensive understanding of whether, how, and for whom early childhood PI affects children's reading achievement via changes in maternal supportive caregiving. Examining these associations *within* childhood is especially important given the relatively high rates of children under the age of 12 experiencing PI in the United States (Glaze & Maruschak, 2008), the value of identifying early pathways toward school failure for drop-out prevention efforts (Green et al., 2019), and well-documented associations between educational success and well-being in adulthood (Barnert et al., 2021), particularly with respect to carceral outcomes (Heitzeg, 2016). The current results suggest that efforts to promote mothers' (and likely others') supportive caregiving in the context of PI will support reading achievement and well-being within childhood and beyond.

At the same time these results point to the powerful protective role of supportive caregiving, especially for boys, we must acknowledge the tremendous and unfair burdens placed upon custodial caregivers in contexts of PI. Custodial caregivers, typically biological mothers, bear the brunt of the material (e.g., loss of income, legal fees) and emotional (e.g., symptoms of depression or anxiety) hardship caused by PI (Arditti et al., 2003; Comfort, 2009). Thus, caring for the custodial caregivers left behind in the wake of PI is crucial to supporting positive development among children affected by PI. A wealth of research has investigated strategies to support incarcerated parents (Kamptner et al., 2017; Kjellstrand, 2017), with an abundance of research focused on incarcerated fathers (Butler et al., 2019; Fowler et al., 2017; Turner et al., 2021), and, to a lesser degree, incarcerated mothers (Dallaire & Shlafer, 2018; Tremblay & Sutherland, 2017). However, there is substantially less research concerning programming and strategies to support custodial (and potentially new) primary caregivers in the context of PI. One exception is a study evaluating the Strengthening Families Program (Miller et al., 2013), which directly targets *both* the incarcerated and non-incarcerated caregivers (e.g., by promoting clear communication and limit setting), as well as the child (e.g., teaching emotion expression and identification), across 16 weekly sessions. Initial program outcomes indicate positive changes at the level of the family climate (e.g., enhanced family cohesion) and caregiver functioning (e.g., increased positive parenting skills; Miller et al., 2013).

Although the Strengthening Families Program represents a promising intervention for caregivers in the wake of PI, more research is needed to elucidate the optimal timing and delivery platform (e.g., individual vs. group, home- vs. school-based) for intervention efforts to support caregiving and child achievement in the context of PI. That said, the effectiveness of any intervention rests on our capacity to integrate specific strengths and ameliorate unique

vulnerabilities in a given community. Thus, we encourage collaborative, culturally responsive intervention development approaches (cf. Borelli et al., 2020). We must also advocate for policy makers and community-based organizations to provide material and emotional supports that reduce stress on custodial caregivers so they can provide the best possible care to their PI-affected child(ren).

Finally, we must recognize that some groups of children are disproportionately affected by PI and environmental stressors due to structural racism. Per the FSM, a variety of status positions (e.g., race and ethnicity, economic status) influence the likelihood that specific children and families will experience PI (Turney & Sugie, 2021). As mentioned earlier, Black children are significantly more likely to experience PI than white children (Nellis, 2016). Additionally, relations between experiencing PI and poor educational outcomes may be further exacerbated by elements of the broader sociocultural context, such as community violence and underfunded public schools (Adams, 2018; Wakefield & Wildeman, 2013). Thus, ongoing research is needed to address and redress the source of these disproportionalities (e.g., racial profiling, redlining) and to target intervention efforts accordingly.

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