Direct Associations between Early Childhood Paternal Depression and School-Age Psychosocial and Academic Functioning, and the Potential Mediating Role of Father-Child Interaction

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The present study used a longitudinal design to test father-child interaction quality in the preschool period as a mediator between paternal depressive symptoms in toddlerhood and both academic and socioemotional maladjustment during the school-age period (n = 117, 52% female). Further, it aimed to assess child gender and maternal depressive symptoms as moderators of direct associations between paternal depressive symptoms and later child maladjustment. The sample represented a subsample of families from the Early Steps Multisite Study, which is a clinical trial testing the effectiveness of the Family Check-Up among a sample of 731, low-income, ethnically-diverse families using Women, Infants, and Children Nutritional Supplement Services in three communities varied in urbanicity. Direct relations were not found between paternal depressive symptoms (age 2), observations of father-child interactions (age 3), and children's school-age academic abilities on a standardized assessment (ages 7.5 and 8.5) and mother- and teacher-reported socioemotional maladjustment (ages 8.5 and 9.5). Further, there was no evidence for an indirect pathway from early paternal depressive symptoms to children's school-age outcomes via negative father-child interactions. However, child gender was found to moderate relations between paternal depressive symptoms and children's school-age internalizing symptoms as reported by mothers, such that this association was stronger for boys than girls. These findings have important implications for future research on preventing low-income boys' school-age internalizing problems at home, suggesting that decreasing paternal depressive symptoms at age 2 may be an important intervention target to explore.

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1.0 Introduction

Depression is one of the most pervasive mental illnesses. In 2016, 6.7% of adults in the United States (8.5% of women and 4.8% of men) experienced at least one major depressive episode (Substance Abuse and Mental Health Services Administration, 2017). Depressive symptoms may be even more common in parents than in the general population. It has been estimated that 10% of mothers of children under age 18 experience depression annually (Ertel, Rich-Edwards, & Koenen, 2011), with rates of elevated depressive symptoms estimated to be between 14% to 24% for mothers of infants and toddlers (Giallo, Cooklin, Wade, D'Esposito, & Nicholson, 2014; Mclennan, Kotelchuck, & Cho, 2001). Mothers from low socioeconomic status (SES) backgrounds also tend to have higher rates of depression than more privileged mothers (Ertel et al., 2011). Mothers of young children from low SES backgrounds have been found to be at an especially high risk for developing depressive symptoms, with estimates ranging from 35% to 49% (Beeghly et al., 2003; Ramos-Marcuse et al., 2010). For these reasons and because maternal depression has repeatedly been established as a reliable predictor of multiple dimensions of maladjustment beginning in early childhood (Giles, Davies, Whitrow, Warin, & Moore, 2011; Shaw, Connell, Dishion, Wilson, & Gardner, 2009), research on associations between parental depression and children's outcomes has typically focused on mothers.

Prior research on *paternal* depression[1] suggests that fathers also experience elevated rates compared to adult males in the general population, although rates of depression for fathers are typically lower than rates for mothers. A study of primary care records found that 21% of fathers reported experiencing at least one depressive episode by the time their children were 12 years old (Davé, Petersen, Sherr, & Nazareth, 2010). In contrast, a national survey estimated that approximately 5% of men aged 18 to 34 experience clinical depression annually (Adams, Knopf, & Park, 2014). Furthermore, approximately 3% to 10% of fathers of infants and preschool-aged children report heightened depressive symptoms (Bergström, 2013; Giallo et al., 2012; Ramchandani et al., 2008), and residential fathers have been found to experience a 68% increase in depressive symptoms during the first five years of their children's lives (Garfield et al., 2014). Similar to mothers, rates of depression have been found to be elevated for fathers of infants from low SES backgrounds (Bergström, 2013). For example, a prior study estimated that approximately 11% of low-income fathers of infants had heightened levels of depressive symptoms (Bamishigbin et al., 2017). Although the majority of children under the age of 12 in the United States live with their fathers (U.S. Census Bureau, 2017) and fathers' caregiving behaviors have been found to be uniquely associated with various indices of youth's adjustment (Jeynes, 2016), notably little research has been conducted on associations between paternal depression and children's adjustment in early childhood and the school-age period, especially for children living in low-SES environments.

[1] For the purposes of the present study, "paternal depression" refers to both clinical diagnosis of depression and elevated symptoms of depression because both have been related to multiple types of children's maladjustment at comparable levels (Kane & Garber, 2004).

1.1 Literature Review

1.1.1 Exposure to Parental Depression and Child Outcomes: Longitudinal Studies

Across age periods, there is general support for significant, albeit modest, relations between maternal depressive symptoms and children's psychosocial adjustment (Goodman et al., 2011), and some studies suggest that qualities of parent-child interactions mediate such associations (Goodman, 2007). Although there is less comparable research on fathers, the existing literature suggests that fathers' depressive symptoms are negatively associated with children's later psychosocial development. Meta-analytic data suggest modest effect sizes between paternal depression and children's externalizing (d = .19) and internalizing outcomes (d = .24) (Kane & Garber, 2004). However, such effect sizes are comparable to meta-analytic findings between *maternal* depression and children's externalizing (d = .21) and internalizing problems (d = .23) (Goodman et al., 2011).

Specifically, heightened paternal depressive symptoms in infancy have been found to predict higher levels of externalizing and internalizing problems in toddlers and elementary-aged children, even after accounting for maternal depression (Gutierrez-Galve, Stein, Hanington, Heron, & Ramchandani, 2015; Ramchandani et al., 2008; Smith, Eryigit-Madzwamuse, & Barnes, 2013). Similarly, paternal depressive symptoms in the preschool period have been associated with children's externalizing and internalizing outcomes in middle childhood (Fanti, Panayiotou, & Fanti, 2011). One study that simultaneously assessed maternal and paternal depressive symptoms in relation to children's adjustment found that fathers', but not mothers', depressive symptoms in toddlerhood was associated with children's socioemotional problems in the early school-age years (Psychogiou et al., 2017). Although this study appears to suggest that paternal depression may

uniquely contribute to children's psychological adjustment, the relatively high contribution of paternal depression may reflect the manner in which the sample was recruited (i.e., fathers were required to participate while maternal participation was optional). Thus, these fathers may have been more involved in caregiving than the typical father.

Genetically-informed studies have also found support for the environmental contribution of paternal depression. A study of children born via in vitro fertilization found that both biological and non-biological fathers' levels of depressive symptoms from early to middle childhood were associated with concurrent internalizing symptoms (Lewis, Rice, Harold, Collishaw, & Thapar, 2011). Longitudinal studies conducted during early childhood are less clear. For example, adoptive fathers' depressive symptoms in infancy have been found to predict heightened externalizing problems in toddlerhood (Pemberton et al., 2010). However, using the same sample, Natsuaki et al. (2010) found that adoptive fathers' depressive symptoms at 9 months were not associated with children's fussiness at 18 months. Non-biological factors associated with paternal depression that have been explored as potential mechanisms of transmission on children's maladjustment include low paternal involvement (Gutierrez-Galve et al., 2015) and characteristics of caregiving (e.g., Cummings, George, Koss, & Davies, 2013; Nath, Russell, Kuyken, Psychogiou, & Ford, 2016).

A subset of studies has found that paternal depressive symptoms predict children's academic abilities and performance. For instance, fathers' depressive symptoms at age 3 have been associated with children's academic problems at age 6 (Herbert, Harvey, Lugo-Candelas, & Breaux, 2013). However, Herbert et al. (2013) did not account for maternal depressive symptoms. A large study of Swedish youth did account for levels of maternal depression and revealed that paternal depressive symptoms throughout childhood and early- to mid-adolescence predicted impaired school performance in mid-adolescence (Shen et al., 2016). There also is some support

indicating that lower levels of engagement in academic-related activities may be a mechanism by which paternal depression predicts children's academic abilities. For example, fathers with elevated levels of depressive symptoms have been found to speak less to their 2-year-old children, which has been found to be concurrently associated with children using less grammatically complex speech (Malin et al., 2012). Fathers with heightened depressive symptoms have also been found to read less to their infants than fathers with lower levels of depressive symptoms which, in turn, has been associated with children's lower levels of expressive vocabulary at age 2 (Paulson, Keefe, & Leiferman, 2009). Together, these studies suggest that heightened paternal depressive symptoms may have important implications for children's later psychological adjustment and performance in school.

1.1.2 Exposure to Parental Depression and Child Outcomes: Theoretical Mechanisms

When we consider the transmission of parental depressive symptoms to children's outcomes, most models focus on mothers. Potential mechanisms of transmission for mothers include genetic transmission of vulnerability and exposure to stressful environments that result from mothers with depression being less active on the world (Goodman & Gotlib, 1999). Exposure to such stressful environments may increase children's risk for psychopathology and decrease their access to resources, including academic resources both in the home (e.g., help on homework from mothers) and outside the home (e.g., tutoring). Mothers with depression may also model negative behaviors and cognitions (Goodman & Gotlib, 1999), which may increase their children's risk for psychopathology by teaching maladaptive coping strategies when dealing with difficulties with peers or at school. Negative qualities of mother-child interactions have also been explored as potential mechanisms of transmission, including mothers paying less attention to the child, being

less sensitive to the child's needs, expressing high levels of negative and low levels of positive emotions, and engaging in negative evaluations of the child (Campbell, Matestic, von Stauffenberg, Mohan, & Kirchner, 2007; Dix & Meunier, 2009; Goodman & Gotlib, 1999). Associations between maternal depression and children's outcomes may be exacerbated when parenting is already compromised from the stressors associated with being low SES (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Shelleby et al., 2014), although there is some indication that issues associated with poverty may contribute to child outcomes independently of effects associated with caregiving (Shaw et al., 2009; Shaw & Shelleby, 2014).

There are many potential, but underexplored, mechanisms for how fathers may transmit their risk to children's socioemotional maladjustment and suboptimal academic performance. For depressed fathers, it is likely that genetic inheritance would be an equally powerful mechanism of transmission of risk as with mothers, as both mothers and fathers contribute equally to their children's genetic profiles. Like mothers, depressed fathers may also model high levels of negative affect and irritability and low levels of positive affect and problem-solving, which in turn, may have a direct effect on children's levels of psychopathology by impairing the development of early emotion regulation skills. Depressed fathers may also transmit a genetic vulnerability for being less active, which may impair their children's academic performance by preventing children from fully engaging with lessons at school. Fathers with heightened depressive symptoms may themselves be less active on the world, which may spill over into personally providing or obtaining (from school personnel) less academic support for their children.

Paternal depressive symptoms may also indirectly impact children's academic and psychosocial outcomes via negative father-child interactions. For instance, fathers with heightened levels of depression may be less responsive to their children's needs, which may lead children to

engage in disruptive conduct to gain attention. High levels of unresponsiveness and negativity by fathers may teach children to internalize distress because sharing their emotions had previously led to feeling invalidated. In addition, by omission this pattern of unresponsive negativity may further hinder children from learning how to appropriately regulate negative emotions.

Because of their higher levels of inactivity and passivity, fathers with depression may also be less likely to respond to their children's academic needs based on their expected lower probabilities of engaging in academic-related activities, such as reading together or teaching numbers. In addition, fathers with depression may not set or enforce strict rules on behavior when interacting with their children, which may contribute to the development of children's conduct problems. Lack of limit-setting may also be negatively associated with children's academic performance by not providing children with a structured environment at home that includes guidelines about completing homework and other academic-related activities.

1.1.3 Negative Father-Child Interactions as a Mechanism of Risk

Preliminary research suggests that qualities of father-child interactions mediate relations between early paternal depressive symptoms and children's later maladjustment. Dette-Hagenmeyer and Reichle (2014) found that inconsistent discipline and low levels of positive parenting mediated relations between paternal depressive symptoms and elementary-aged children's problem behaviors and poor socioemotional competence 6 months later. However, this study assessed paternal depression and paternal parenting (mediator) at the same age, had a limited follow-up, relied on self-reported parenting, did not account for maternal depression, and employed a relatively high-SES sample. All of these factors cumulatively lessen the findings' credibility and generalizability to higher-risk samples. Self-reports of parenting and parent-child

interactions are especially problematic, as a father experiencing elevated levels of depressive symptoms may exhibit negative cognitive biases. Father-child interactions would be more objectively assessed using observational measures. Two additional studies revealed that the quality of father-child relationships mediated relations between paternal depressive symptoms in infancy and children's socioemotional maladjustment in toddlerhood (Malmberg & Flouri, 2011) and the late preschool years (Giallo et al., 2014). Notably, both studies accounted for maternal depressive symptoms and included a broader range of families socioeconomically; however, both still relied on self-reports of father-child relationships and assessed parent-child relationships (mediator) and child socioemotional outcomes at the same age.

Examining another aspect of father-child interactions, paternal conflict with their preschool-aged children has been found to mediate relations between paternal depressive symptoms during infancy and maternal reports of indices of children's socioemotional adjustment in elementary school, after controlling for maternal depression and SES (Nath et al., 2016). Although this study assessed all three constructs at different time points, it also relied on self-reports of parent-child interactions. Lastly, after controlling for maternal depression, maternal parenting, and SES, paternal negative responses to children's distress in first grade was found to mediate associations between fathers' depressive symptoms in kindergarten and multi-informant reports of children's socioemotional adjustment problems in middle school (Cummings et al., 2013). However, this study also relied on self-reports of father-child interactions. In summary, there is evidence that paternal depressive symptoms uniquely predict children's later maladjustment via impaired father-child interactions, but future research would benefit from including measurements of observed interactions. In addition, although some prior studies

accounted for SES, none of the aforementioned studies assessed such pathways in a primarily low-income sample, much less at elevated risk based on the presence of family and/or child risk factors.

1.1.4 Potential Moderating Effect of Child Gender on the Relation Between Paternal Depression and Child Adjustment

Although it is expected that both boys and girls will be influenced by exposure to paternal depression in early childhood, there are theoretical reasons to suggest that boys might be more vulnerable to paternal depression than girls, especially in early childhood. Schore (2017) posited that boys' sensitivity to both biological and social stressors in in early childhood may be due to the relatively slow maturation of their neural structures associated with stress responsivity, relative to girls. Boys' sensitivity to early life stressors is reflected in their higher rates of stillbirths (Mondal, Galloway, Bailey, & Mathews, 2014), infant deaths (Drevenstedt, Crimmins, Vasunilashorn, & Finch, 2008), and vulnerabilities to die following injuries throughout childhood (Borse et al., 2008) relative to girls. Boys have also been found to be more sensitive to compromises in optimal caregiving across early childhood. For instance, preschool boys', but not girls', levels of externalizing behaviors have been found to be concurrently associated with lower levels of maternal positive caregiving (Annemiek Karreman, Cathy van Tuijl, Marcel A. G. van Aken, & Maja Dekovíc, 2009; Kerr, Lopez, Olson, & Sameroff, 2004), lower levels of paternal positive caregiving, and higher levels of maternal harsh punishment (Kerr et al., 2004). Longitudinal studies have found similar associations. For instance, low levels of maternal sensitivity in infancy and toddlerhood have been associated with worse performance on an attention task for boys, but not girls, in the preschool years (Mileva-Seitz et al., 2015). Furthermore, lower levels of maternal and paternal sensitivity in the preschool years have been

associated with worse academic achievement for boys, but not girls, in the school-age years (National Institute of Child Health and Human Development Early Child Care Research Network, 2008). Maternal sensitivity across early childhood and the school-age years has also been found to be more strongly associated with boys' (compared to girls') externalizing problems in the late school-age years (Miner & Clarke-Stewart, 2008). Thus, in general, as boys have been found to be more vulnerable to negative caregiving practices in early childhood than girls, it follows that boys might also be more susceptible to the effects of paternal depressive symptoms on later socioemotional adjustment and academic abilities.

More specific to *paternal* depression, boys may demonstrate more adjustment problems because they are more likely to identify with their same-sex parent than girls, and therefore may be more susceptible to modeling of passive, distant, and more hostile behavioral styles. There is some empirical support for these relations, but findings are weak and somewhat mixed. For instance, Mikkonen, Moustgaard, Remes, and Martikainen (2016) found that boys whose fathers were treated for depression in late childhood and early adolescence were more likely to experience depressive symptoms in late adolescence and early adulthood than girls exposed to similar levels of paternal depression. Exposure to paternal depressive symptoms in kindergarten has been concurrently associated with boys', but not girls', decreased level of prosocial behaviors. However, in the same study, paternal depressive symptoms were comparably related to other indices of socioemotional functioning for boys and girls (Cummings, Keller, & Davies, 2005). Further, boys (but not girls) exposed to paternal depressive symptoms in early infancy have been found to exhibit higher levels of problem behaviors in the preschool years (Ramchandani et al., 2008). Conversely, exposure to elevated levels of paternal depressive symptoms in the preschool years has been found to be associated with higher levels of girls', but not boys', externalizing

behaviors in the school-age years (Fanti et al., 2011). No studies have assessed associations between paternal depressive symptoms and gender differences on academic outcomes. Thus, although in most (but not all) cases there may be a moderating effect of child gender on relations between paternal depressive symptoms and child outcomes, future work is needed to validate these findings on socioemotional maladjustment and investigate this possibility on academic abilities.

1.1.5 Potential Moderating Effect of Maternal Depression on Associations between Paternal Depression and Child Outcomes

If a child is raised in a household where only one parent exhibits elevated depressive symptoms, it is possible that potential adverse consequences on the child might be buffered by the other parent. However, if both parents exhibit elevated levels of depressive symptoms, one would expect the child to be at especially high risk for adverse social and academic outcomes. There is some evidence for interactive effects of exposure to both maternal *and* paternal depression, but findings are generally weak and warrant further examination. In a sample of 15-year-old adolescents and their parents, Brennan, Hammen, Katz, and Le Brocque (2002) found that youth exposed to both maternal and paternal depression were more likely to be concurrently diagnosed with depression above and beyond the effect of exposure to maternal or paternal depression alone. Exposure to both paternal and maternal depression in late childhood and early adolescence was found to be associated with higher levels of depression than exposure to only one parent with depression both concurrently (Gere et al., 2013). A bit closer to the age periods being studied in the current investigation, exposure to both paternal and maternal depression in infancy has been associated with higher levels of internalizing problems in kindergarten, compared to exposure to only maternal depression (Mezulis, Hyde, & Clark, 2004). It is important to note that this relation

was only significant for children whose fathers spent at least a moderate amount of time caregiving in infancy. However, other studies have failed to find interactions between paternal and maternal depression. For instance, Fredriksen, von Soest, Smith, and Moe (2018) found that levels of early maternal depressive symptoms did not moderate the impact of exposure to paternal depressive symptoms in the prenatal period and infancy on children's socioemotional and cognitive outcomes in toddlerhood. Clearly more research in this area is warranted, especially studies where there is a high level of variability in both maternal and paternal depressive symptoms.

1.2 The Present Study

High levels of paternal depressive symptoms in infancy and the preschool years have been found to predict school-age externalizing and internalizing problems (Fanti et al., 2011; Ramchandani et al., 2008), as well as academic problems (Herbert et al., 2013; Shen et al., 2016). Research on mechanisms linking early paternal depressive symptoms to children's later socioemotional difficulties suggests that impaired father-child interactions may mediate these longitudinal relations (e.g., Dette-Hagenmeyer & Reichle, 2014; Malmberg & Flouri, 2011; Nath et al., 2016). However, these studies have methodological weaknesses that significantly reduce their credibility (e.g., reliance on self-reports of father-child interactions; measuring independent, mediating, and/or dependent variables at same time; focus on lower-risk samples) and have findings that may not be generalizable to higher-risk, low-income samples. In addition, studies on the role of father-child interactions as a mechanism linking early paternal depressive symptoms to children's academic skills are lacking. Finally, studies assessing interactions between paternal and maternal depression and between paternal depression and child gender are inconclusive. Thus, the

present study aimed to use a longitudinal design to test a possible mechanism, father-child interaction quality, underlying associations between paternal depressive symptoms during the toddler period and both socioemotional maladjustment and poor academic skills during the school-age period, using observations of father-child interactions, mother and teacher reports of school-age behavioral and psychological problems, and direct assessments of academic abilities. Outcomes were assessed in the school-age period, rather than at school entry, as they may be more predictive of later competence and adjustment. The hypotheses were as follows:

1. Higher levels of paternal depressive symptoms in toddlerhood would predict higher levels of children's externalizing and internalizing problems and lower levels of academic skills during the school-age period.
2. Higher levels of paternal depressive symptoms in toddlerhood would predict more negative father-child interactions in the preschool period.
3. Negative father-child interactions in the preschool period would predict higher levels of children's externalizing and internalizing problems and lower levels of academic abilities during the school-age period.
4. Negative father-child interactions in the preschool period would mediate relations between early paternal depressive symptoms and children's poorer academic skills, and higher levels of school-age externalizing and internalizing problems.
5. Child gender was tested as a moderator of direct longitudinal relations between paternal depression in toddlerhood and child school-age outcomes.
6. Maternal depression was tested as a moderator of direct longitudinal relations between paternal depression in toddlerhood and child school-age outcomes.

2.0 Method

2.1 Participants

Children (n = 117) with participating fathers at ages 2 and 3 were drawn from the larger cohort of the Early Steps Multisite study (N = 731). The Early Steps Multisite study is a randomized controlled trial designed to test the effectiveness of the Family Check-Up (FCU) intervention for those using Women, Infants, and Children (WIC) Nutritional Supplement centers. Participants were recruited in three diverse communities: Pittsburgh, PA (urban); Eugene, OR (suburban); and Charlottesville, VA (rural) (Dishion et al., 2008). In 2002 to 2003, families with a child between ages 2 years 0 months and 2 years 11 months were approached at WIC sites and screened for participation. Families were invited to participate if they scored at or above one standard deviation on measures of at least two out of three of the following domains: child behavior (conduct problems, high-conflict relationships with adults), family problems (maternal depression, parenting challenges, parental substance use problems, and teen parent status), and/or low SES (i.e., low income and educational attainment)). To increase parent's motivation for intervention, if eligibility criteria were not met for child behavior, scores above the normative mean were required on the Eyberg Inventory for Intensity or Problem factors (Eyberg & Pincus, 1999). A total of 1666 families were approached at WIC centers across the three study sites, 879 subsequently met the eligibility criteria, and 731 agreed to participate in the study. After recruitment, families were randomly assigned to receive the FCU intervention or WIC services as usual (control group). The FCU is a three-session intervention with follow-up services focused on specific family management practices.

For the purpose of the present study, "fathers" are defined as primary or alternate caregivers who were listed as "biological father," "adoptive father," "step father," or "mother's romantic partner" at ages 2 and 3. Mothers' male romantic partners were included because they were in the child's life for at least one year in early childhood (i.e., between ages 2 and 3). Fathers were not required to live in the same home as the target child, as non-resident fathers' involvement has been found to have important relations with youth's academic and socioemotional development (Adamsons & Johnson, 2013). Each caregiver was assigned a unique identifier, which were used to match fathers across ages 2 and 3. To be included in the current analytic sample, the same father (i.e., same identifier) had to have completed a questionnaire about depressive symptoms at age 2 and participated in observed father-child interaction tasks at age 3. The majority of fathers included in the present study were identified as "biological fathers" (86%) and participated as alternate (rather than primary) caregivers (92%).

Family income (age 2) and paternal education (age 2 or 3) are displayed in Table 1.

Table 1: Descriptive Statistics of Study Variables

Variable		Age (Years)	*n*	*M* (*SD*) (or %)	*n* (%) Above Threshold
Paternal depression		2	117	10.55 (8.16)	25 (21.37%)[1]
Maternal depression		2	113	16.25 (10.70)	52 (46.02%)[1]
Family income	$14,999 or less	2	36	31.03%	
	$15,000 to $19,999		21	18.10%	
	$20,000 to $24,999		26	22.41%	
	$25,000 to $49,999		33	28.45%	
Paternal education	Partial high school or less	2 or 3	21	18.42%	
	High school/GED		54	47.37%	
	Partial college		29	25.44%	

Table 1: Descriptive Statistics of Study Variables (continued)

	College degree (2 or 4 years)		10	8.77%	
Dyadic Coercion		3	117	.12 (.09)	
Positive Engagement		3	117	.39 (.17)	
Child externalizing (mother-report)		2	114	59.03 (8.61)	32 (28.07%)[2]
		8.5	89	55.26 (10.90)	20 (22.47%)[2]
		9.5	86	55.48 (9.90)	16 (18.60%)[2]
Child internalizing (mother-report)		2	114	55.48 (8.31)	18 (15.79%)[2]
		8.5	89	52.67 (10.36)	13 (14.61%)[2]
		9.5	86	52.66 (10.36)	16 (18.60%)[2]
Child externalizing (teacher-report)		8.5	75	55.03 (9.23)	14 (18.67%)[2]
		9.5	66	54.44 (9.27)	13 (19.70%)[2]
Child internalizing (teacher-report)		8.5	70	54.11 (10.38)	14 (20.0%)[2]
		9.5	62	56.50 (10.36)	19 (30.65%)[2]
Academic skills		7.5	91	102.13 (14.42)	12 (13.20%)[3]
		8.5	85	97.65 (12.54)	18 (21.50%)[3]

Thresholds are CES-D (Radloff, 1977) total score[1] ≥ 16 (clinically significant), CBCL and TRF (Achenbach & Rescorla, 2000, 2001) *T*-score[2] > 64 (clinically significant), and WJ-III ACH (Woodcock et al., 2001) *T*-score[3] ≤ 89 (low average).

Approximately half of the children in the current study's subsample were female (*n* = 61, 52%). The majority of the children in the subsample were not Hispanic or Latino (*n* = 102, 87%) and were White (*n* = 80, 68%). The children in the remaining subsample were Black (*n* = 11, 9%), bi-racial (*n* = 13, 11%), or from another racial group (*n* = 8, 7%). Approximately half of the subsample were in the control group (*n* = 62, 53%) and the majority of the subsample lived in Eugene, OR at age 2 (*n* = 82, 70%). The remaining participants lived in Pittsburgh, PA (*n* = 26, 22%) and Charlottesville, VA (*n* = 9, 8 %). The majority of mothers in the subsample graduated high school or obtained a GED certificate (*n* = 41, 36%) or partial college/specialized training (*n* = 36, 32%).

Approximately 19% of mothers (n = 22) and 18% of fathers (n = 21) did not complete high school. The parents in the remaining subsample had a 2-year or 4-year college degree (n = 15, 13% of mothers; n = 10, 9% of fathers) or did not report their level of education (n = 3, 3% of mothers; n = 3, 3% of fathers).

Chi-square and independent samples t-tests were conducted in SPSS (25) to compare the current study's subsample to those excluded from the present study. Tests indicated that there were no significant differences in child gender, child ethnicity, intervention group status, paternal education, or maternal depression between the subsample and the excluded group. However, children in the subsample were more likely to be White and less likely to be Black than children excluded from analyses, $\chi^2(6) = 32.37$, $p < .05$. In addition, children in the subsample were more likely to live in Eugene, OR and less likely to live in Charlottesville, VA or Pittsburgh, PA than excluded children, $\chi^2(2) = 66.96$, $p < .05$. Finally, the average age 2 family income for children included in the present study's subsample was significantly higher than the excluded group, $t(721) = -4.37$, $p < .001$.

2.2 Procedure

Children and their caregivers were assessed 10 times between ages 2 and 16. For the present study, data from the age 2, 3, 7.5, 8.5, and 9.5 assessments were used. At age 2, caregivers participated in a 2.5-hour home visit, during which they completed questionnaires about their current depressive symptoms and their children's current psychosocial functioning. Primary caregivers also completed a demographic interview with the home examiner. At age 3, children completed videotaped interaction tasks with primary and alternate caregivers, including free play

and clean-up tasks. At ages 7.5 and 8.5 years, families participated in a 1.5- to 2-hour home visit, which included target children being tested on their academic abilities. At age 9.5 years, families participated in a 2- to 3-hour home visit. During both the age 8.5 and 9.5 home visits, caregivers completed questionnaires about their children's socioemotional adjustment. Teachers were sent similar questionnaires to complete and return via mail at these ages.

2.2.1 Measures

2.2.1.1 Parental Depressive Symptoms

At child age 2, paternal and maternal depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D (Radloff, 1977) is a 20-item scale that assesses symptoms of depression experienced in the past week. Each item is rated on a 4-point Likert scale, with responses ranging from "rarely or none of the time" to "most or all of the time." Sample items include "I felt sad" and "I felt lonely." The CES-D has been exhibited to have high levels of internal consistency in both clinical (α = .90) and general (α = .85) populations. In the current subsample, the CES-D exhibited comparable internal consistency for fathers (α = .85) and mothers (α = .75).

2.2.1.2 Father-Child Interaction Quality

When target children were 3 years of age, fathers and children completed nine (alternate caregivers) or 47 minutes (primary caregivers) of videotaped interaction tasks together. For the present study, only tasks that both primary and alternate caregivers completed were analyzed (i.e., nine minutes of observations): clean-up and teaching tasks, which were recorded and later coded. For the clean-up task, the father was instructed to get the child to put toys he or she had previously

been playing with in a basket without themselves cleaning up any of the toys. The clean-up task lasted four (alternate caregivers) or five minutes (primary caregivers) and was followed by a teaching task that lasted three (alternate caregivers) or nine minutes (primary caregivers), involving puzzles and toys that were purposefully selected based on requiring help to use for 3-year-old children. For the present study, only the first four minutes of the clean-up task and the first teaching task (three minutes) were used for fathers who were primary caregivers, so as to be the same length of time as the alternate caregivers' tasks.

Tapes were coded second-by-second primarily by a team of undergraduates led by an experienced trainer, using the Relationship Affect Coding System (RACS; Peterson, Winter, Jabson, & Dishion, 2008). Students coded a random subset of 20% of the videos and were trained until they were reliable ($\kappa > .90$). The RACS was used to assess affective displays, behaviors, and speech during father-child interactions. Within these categories, observations were classified into directives, ignore, negative, neutral, no talk, and positive. As described in Sitnick et al. (2015), RACS observations were converted into dyadic scores based on combinations of both child and father observation codes at each second. The quality of the father-child interactions (based on the combination of codes) were described as either *dyadic positive engagement* or *dyadic coercion*. As exhibited in Figure 1, dyadic positive engagement was defined as when both the father and the child exhibited concurrent positive or neutral behaviors. Meanwhile, dyadic coercion occurred when either the father or the child exhibited negative or directive behaviors while the other individual engaged in not talking, ignoring, negative behaviors, or directives.

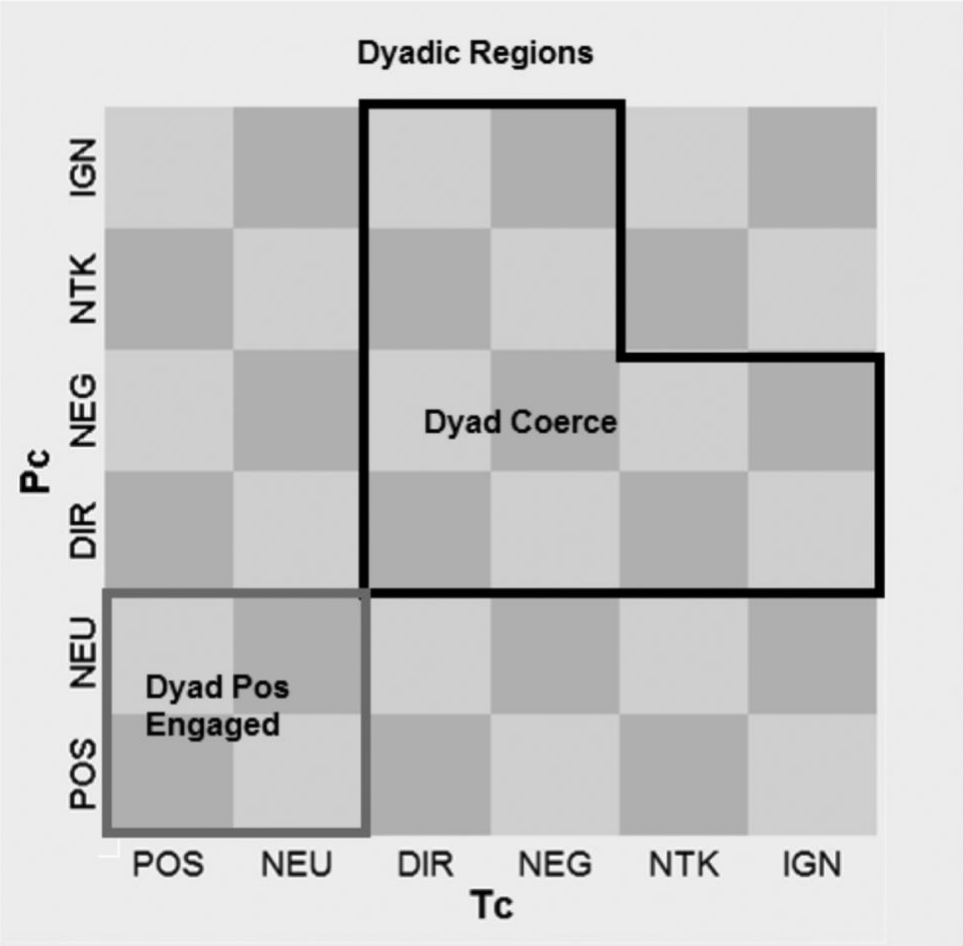

Figure 1: Regions that comprise dyadic positive engagement (Dyad Pos Engaged) and dyadic coercion (Dyad Coerce). Note: Father codes (Pc) are shown on the y-axis and child codes (Tc) are on the x-axis. POS = positive engagement; NEU = neutral engagement; DIR = directive; NEG = negative engagement; NTK = no talk; IGN = ignore. Figure originally published in Sitnick et al. (2015).

To ease interpretation of these measures, dyadic scores were divided by the total time of the interaction tasks, thus representing the proportion of time interacting was spent in either dyadic positive engagement or dyadic coercion. Dyadic scores have been shown to be moderately stable and inversely related throughout early childhood (Dishion et al., 2017; Sitnick et al., 2015). In the present sample, the dyadic scores were strongly inversely correlated (r = -.79, p < .001). For the present study, dyadic positive engagement and dyadic coercion were loaded onto a latent factor,

negative father-child interactions, in order to represent the proportion of time that children and fathers were engaged in negative interactions and *not* engaged in positive interactions.

2.2.1.3 Children's Academic Skills

At ages 7.5 and 8.5, target children were assessed with the Academic Skills Cluster of the Woodcock-Johnson III Tests of Achievement (WJ-III ACH; Woodcock et al., 2001), a standardized battery that assesses children's academic abilities. The WJ-III ACH was not administered at age 9.5. The Academic Skills Cluster of the WJ-III ACH comprises three subtests: Letter-Word Identification, Calculation, and Spelling. The WJ-III ACH has been normed by age using data from 8818 children and adolescents in the United States. The Academic Skills Cluster has been demonstrated to have excellent reliability (r = .96) and its subtests have demonstrated similarly high split-half reliability (r = .86 - .94) (Schrank, McGrew, & Woodcock, 2001).

2.2.1.4 Children's Externalizing and Internalizing Problems

Target children's externalizing and internalizing problems at ages 8.5 and 9.5 were assessed dimensionally using maternal reports from the Child Behavior Checklist/6-18 (CBCL; Achenbach & Rescorla, 2001) and elementary teachers' reports on the Teacher Report Form (TRF; Achenbach & Rescorla, 2001). Average scores from the age 8.5 and 9.5 assessments were used to maximize non-missing data. If scores from only one assessment age were available, those scores were used. In an effort to reduce reporter bias and because of relatively few paternal reports available at ages 8.5 and 9.5, fathers' reports of child adjustment were not used.

CBCL/6-18

The original CBCL/6-18 (Achenbach & Rescorla, 2001) consists of 112 items about children's behaviors in the past 6 months that are rated on a 3-point Likert scale: 0 = "not true (as

far as you know)", 1 = "somewhat or sometimes true", and 2 = "very true or often true." For the present study, the broad-band Externalizing and Internalizing factors were used to capture children's maladjustment. In past research, both factors have shown high internal consistency (α = .94 for Externalizing and .90 for Internalizing) (Achenbach & Rescorla, 2001), which was also found for the current subsample in the current study (α = .92 at age 8.5 and .91 at age 9.5 for Externalizing; α = .89 at age 8.5 and .86 at age 9.5 for Internalizing).

TRF

Like the CBCL/6-18, items on the TRF (Achenbach & Rescorla, 2001) are rated on a 3-point Likert scale. We also used the broad-band Externalizing and Internalizing factors at ages 8.5 and 9.5. In past research, both factors have shown high internal consistency (α = .95 for Externalizing and .90 for Internalizing) (Achenbach & Rescorla, 2001), which was also found in the current study's subsample (α = .94 at age 8.5 and .94 at age 9.5 for Externalizing; α = .89 at age 8.5 and .89 at age 9.5 for Internalizing).

2.2.1.5 Covariates

Child gender and early adjustment problems, paternal residential stability, study site, intervention group assignment, paternal education, and maternal depressive symptoms at age 2 were considered to be used as covariates in statistical analyses. Child gender and paternal education were collected during the demographic interview at age 2. If paternal education was missing at age 2, then the level of education reported at age 3 was used. Paternal residential stability was collected six times across ages 2 through 8.5 years and is defined by the percent of time that the father was living in the home (i.e., number of assessments the father was reported as living in the home). Children's early adjustment problems were assessed at age 2 via maternal responses on the Child Behavior Checklist/1½- 5 (CBCL 1½-5; Achenbach & Rescorla, 2000), for

which we utilized the Externalizing (α = .89 in current subsample at age 2) and Internalizing (α = .82 in current subsample at age 2) factors. Lastly, as mentioned previously, maternal depressive symptoms were collected at age 2 using the CES-D (Radloff, 1977).

The original CBCL/6-18 (Achenbach & Rescorla, 2001) consists of 112 items about children's behaviors in the past 6 months that are rated on a 3-point Likert scale: 0 = "not true (as far as you know)", 1 = "somewhat or sometimes true", and 2 = "very true or often true." For the present study, the broad-band Externalizing and Internalizing factors were used to capture children's maladjustment. In past research, both factors have shown high internal consistency (α = .94 for Externalizing and .90 for Internalizing) (Achenbach & Rescorla, 2001), which was also found for the current subsample in the current study (α = .92 at age 8.5 and .91 at age 9.5 for Externalizing; α = .89 at age 8.5 and .86 at age 9.5 for Internalizing).

2.3 Analytic Plan

Descriptive statistics and bivariate correlations of study variables were computed in SPSS (25). Structural equation modeling (SEM) was conducted in Mplus (8) (Muthén & Muthén, 1998-2013) to assess the hypotheses in a multivariate framework. Full-estimation maximum likelihood (FIML) estimation was used to estimate patterns of missing data for participants with missing outcome measures (Enders & Bandalos, 2001). First, individual outcomes were assessed separately and by reporter, generating five models predicting to: (1) academic skills averaged at child age 7.5 and 8.5, (2) mother-reported externalizing and (3) internalizing problems averaged at child age 8.5 and 9.5, and (4) teacher-reported externalizing and (5) internalizing problems averaged at child age 8.5 and 9.5. Next, two separate models that included academic skills and

either mother- or teacher-reported externalizing and internalizing problems were created to conduct simultaneous assessments of the hypothesized relations. Paternal depressive symptoms (age 2) was entered as the independent variable in all seven models. Negative father-child interactions, a latent variable created with dyadic coercion and dyadic positive engagement scores, was entered as a mediator in each model (Figure 2).

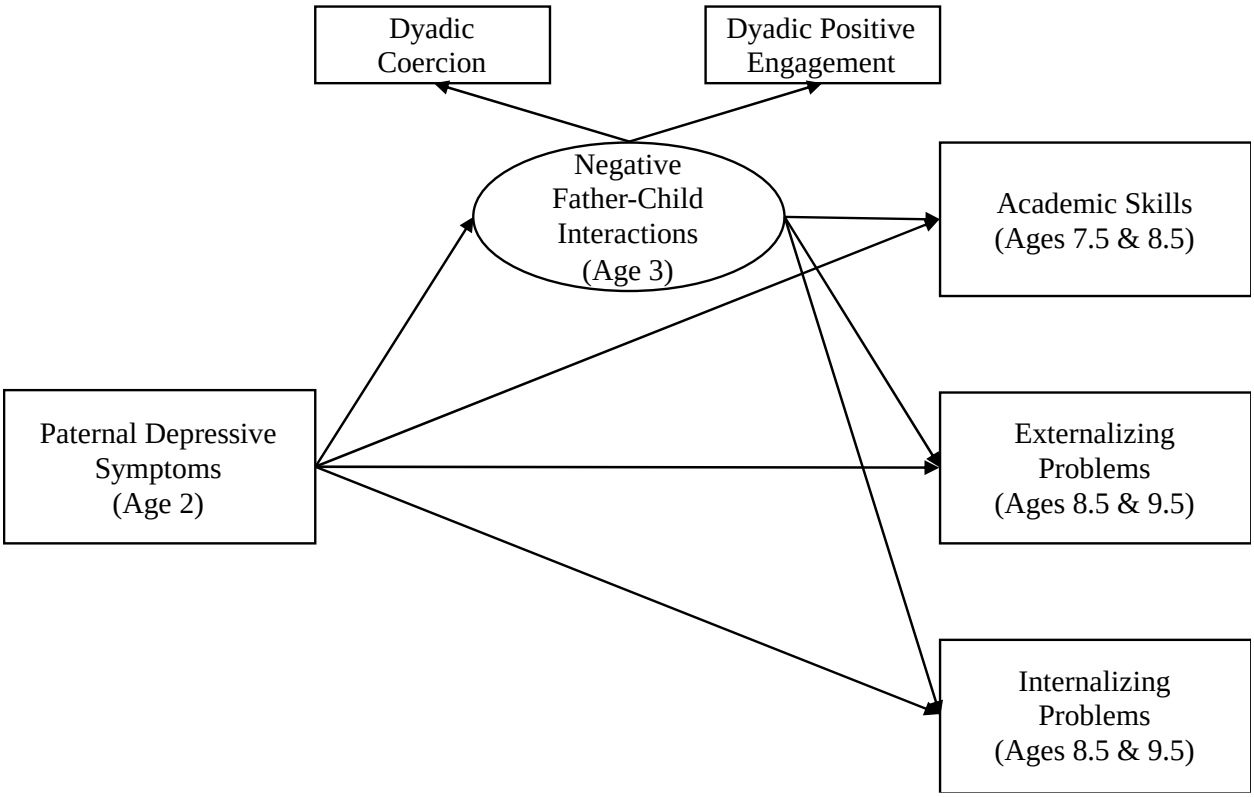

Figure 2: Theoretical model of the current study. Separate models were estimated for mother- and teacher-reported outcomes (externalizing and internalizing problems). The same score for academic skills was included in both the mother- and teacher-reported models.

Separate models were computed for mother- and teacher-reported externalizing and internalizing problems because of the relatively modest level of agreement between reporters (all *r*s < .4) and the different contexts in which the child was observed. Maternal depressive symptoms

(age 2), maternal reports of children's early externalizing and internalizing problems (age 2), site, intervention status, and the gender of the child were entered as covariates in all seven models. Paternal residential stability (age 2 to 8.5) and paternal education (age 2 or 3) were considered as covariates but were not included in the multivariate analyses because of a lack of significant associations with other study variables (Table 2). Interactions between paternal and maternal depression and between paternal depression and child gender were separately entered into each direct-effects model. Model fit was assessed using the chi-square ratio (χ^2/df = 1 to 3), comparative fit index (CFI > .90), and root mean square error of approximation (RMSEA < .05 for good fit, RMSEA < .08 for acceptable fit) (McDonald & Ho, 2002).

For child gender moderation analyses, significant interactions were examined with simple slopes, using calculation tools available at www.quantpsy.org (Preacher, Curran, & Bauer, 2006). The value of the coefficient when paternal depression was regressed on the outcome of interest was analyzed for one standard deviation above and below the mean of paternal depression for pre-specified values of the moderator (0 = female and 1 = male). Simple slopes testing was not conducted for Maternal Depression x Paternal Depression due to a lack of significant interaction terms in the multivariate analyses. *T*-tests were used to assess the significance of the simple slopes for each coefficient of interest.

3.0 Results

3.1 Descriptive Statistics and Bivariate Correlations

Descriptive statistics for study variables are presented in Table 1. Both mother- and teacher-reported externalizing and internalizing scores are presented as *T*-scores in Table 1, but raw scores were used in correlational and multivariate analyses to increase variability. Variables were assessed for normality via Q-Q plots and it was determined that no variables required transformation for future analyses.

Bivariate correlations of study variables are presented in Table 2. Outcome measures were aggregated across ages and separately by reporter. Overall, there was little support for associations between paternal depressive symptoms and children's later academic abilities and socioemotional functioning, with the exception of an association with teacher-reported externalizing problems in the unexpected direction, $r = -.22$, $p < .05$. Conversely, maternal depressive symptoms at child age 2 were associated with mother-reported externalizing and internalizing problems in the expected direction at ages 8.5 and 9.5. There was also a lack of significant correlations between paternal depression and both parent-child interaction measures, as well as between the parent-child dyadic measures and indices of academic and socioemotional functioning. Correlations with covariates revealed that, in general, teachers rated boys as having higher levels of externalizing behaviors than girls at ages 8.5 and 9.5. In addition, mothers in the intervention group were found to have higher levels of depressive symptoms at child age 2 than mothers in the control group prior to receiving the FCU. There were also significant differences in paternal depressive symptoms and dyadic measures by study site at child age 2. Fathers in the rural site exhibited higher levels of

depressive symptoms, higher levels of dyadic coercion, and lower levels of positive engagement compared to fathers in the suburban and urban sites. In addition, fathers in the suburban site exhibited higher levels of positive engagement and lower levels of dyadic coercion than fathers in the rural and urban sites. Lastly, early mother-reported externalizing and internalizing problems were associated with maternal reports of children's later externalizing and internalizing problems in expected directions. Similarly, early mother-reported externalizing problems were correlated with later teacher reports of internalizing problems.

When outlier analyses were conducted for paternal depressive symptoms, two outliers were identified ($SD > 3$). When these outliers were removed from the bivariate correlation analyses, no additional significant correlations emerged nor were previously identified significant correlations attenuated, including the unexpected negative association between paternal depression and teacher-reported externalizing problems. Thus, outliers were retained for future analyses in an effort to maximize the sample size.

In addition to previously reported bivariate associations between covariates and children's outcomes, multivariate analyses revealed that children in the rural site had lower levels of teacher-reported internalizing and externalizing problems than children in the urban site. Child gender, intervention group status, and early internalizing problems were also consistently associated with negative father-child interactions in the multivariate analyses. Specifically, boys, families in the control group, and children with higher levels of early internalizing problems were found to have elevated levels of negative father-child interactions at age 3.

Table 2: Bivariate Correlations of Study Variables

Variable (age[s] assessed)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Paternal depression (2)	1.00																	
2. Maternal depression (2)	.07	1.00																
3. Dyadic Coercion (3)	.12	.10	1.00															
4. Positive Engagement (3)	-.04	-.11	-.79***	1.00														
5. Gender = male	-.01	-.14	.15	-.11	1.00													
6. Group = intervention	.17†	.27**	-.14	.10	-.01	1.00												
7. Site = Pittsburgh	.02	.12	.16†	-.17†	.02	-.05	1.00											
8. Site = Eugene	-.16†	-.11	-.29**	.27**	.03	.05	--	1.00										
9. Site = Charlottesville	.26**	-.01	.26**	-.19*	-.08	-.02	--	--	1.00									
10. Paternal education (2 or 3)	-.12	.01	-.11	.17†	-.09	-.02	.13	-.02	-.16†	1.00								
11. Father time in home (2 - 8.5)	-.18†	.01	-.09	.04	.04	-.04	-.10	.11	-.03	.19*	1.00							
12. Child ext. (mother-report) (2)	-.06	.22*	.01	.00	.00	.13	.03	.01	-.06	.07	-.01	1.00						
13. Child int. (mother-report) (2)	.14	.29**	.14	-.11	-.18†	.16†	.04	.01	-.08	-.09	-.09	.45***	1.00					
14. Child ext. (mother-report) (8.5 & 9.5)	-.03	.26*	.00	.11	.02	.05	.01	.06	-.16	.08	.09	.45***	.22*	1.00				

Table 2: Bivariate Correlations of Study Variables (continued)

15. Child int. (mother-report) (8.5 & 9.5)	.16	.34***	.13	-.11	-.05	.12	.06	-.06	.00	.03	.00	.43***	.33**	.55***	1.00			
16. Child ext. (teacher-report) (8.5 & 9.5)	-.22*	.03	-.11	.15	.26****	-.03	-.10	.15	-.11	-.10	-.10	.12	-.05	.33**	.06	1.00		
17. Child int. (teacher-report) (8.5 & 9.5)	.04	.15	.00	-.02	.17	.14	.12	-.02	-.15	.03	-.05	.31**	.09	.14	.34**	.50***	1.00	
18. Academic skills (7.5 & 8.5)	-.07	-.12	-.16	-.01	-.08	-.17†	.19†	-.07	-.17†	.13	-.09	-.10	-.08	.01	-.09	-.19†	-.37**	1.00

†***p* < .10. ****p* < .05. ** *p* < .01. ******p* < .001**

3.2 Multivariate Results: Direct Effects and Mediation Testing

Model fit was generally acceptable to good for each model that assessed individual outcomes separately by reporter, $\chi 2/df > 1.18$, CFI > .94, RMSEA < .06. The two models that simultaneously assessed outcomes separately by reporter (i.e., mother and teacher) did not converge. Thus, the two models that simultaneously assessed academic skills and either mother- or teacher-reported externalizing and internalizing problems were computed solely with dyadic coercion, rather than with the latent factor for the negative father-child interaction, and had adequate model fit, $\chi 2/df > 1.63$, CFI > .87, RMSEA < .07. Models that assessed individual outcomes separately by reporter were also computed with dyadic coercion, rather than the latent factor for negative father-child interaction. Findings were consistent with the analyses that utilized a latent factor, but because model fit was poor to adequate, $\chi 2/df > 1.63$, CFI > .60, RMSEA < .07, only the latent factor analyses are reported for individual outcomes.

Regarding the first hypothesis, that paternal depressive symptoms would be related to school-age socioemotional adjustment and academic skills within a multivariate framework, mirroring univariate analyses, no significant associations were evident between paternal depressive symptoms in toddlerhood and children's externalizing problems, internalizing problems, or low academic skills. Regarding Hypothesis 2, paternal depressive symptoms at age 2 were not significantly related to negative father-child interactions at age 3 after accounting for covariates. Regarding Hypothesis 3, there also was no support that more negative father-child interactions at age 3 predicted higher levels of children's externalizing and internalizing problems

or lower levels of academic abilities during the school-age period. As Hypotheses 2 and 3 were not supported, Hypothesis 4 also was not supported – negative father-child interactions in the preschool period did not mediate relations between early paternal depressive symptoms and child socioemotional adjustment and academic skills.

3.3 Moderation Analyses: Child Gender and Maternal Depression

Hypothesis 5 involved testing child gender as a moderator of relations between paternal depression in toddlerhood and child school-age outcomes. Model fit was good for each model that assessed individual outcomes separately by reporter, $\chi 2/df > 1.04$, CFI > .96, RMSEA < .04. As with the direct effects and mediation models, the two models that simultaneously assessed outcomes separately by reporter did not converge and therefore are not reported. Child gender did not moderate relations between early paternal depressive symptoms and teacher reports of child externalizing or internalizing problems, mother reports of child externalizing problems, or academic skills. Child gender was found to moderate relations between early paternal depressive symptoms and maternal reports of later internalizing problems (Figure 3).

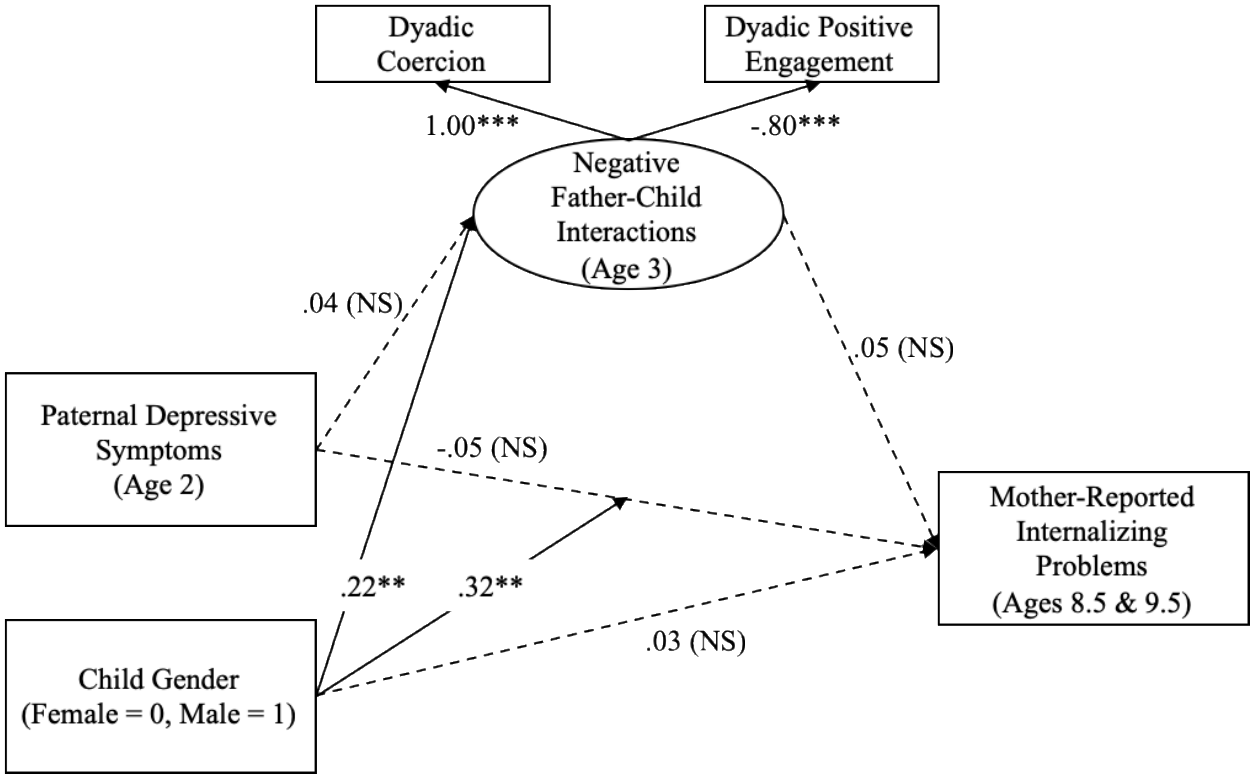

Figure 3: Longitudinal relations between paternal depressive symptoms, child gender, negative father-child interactions, and mother-reported internalizing problems. Covariates included maternal depressive symptoms (age 2), mother-reported externalizing and internalizing problems (age 2), site, and intervention status. Standardized beta values are reported. Fit statistics: $\chi 2/df > 1.04$, CFI > .99, RMSEA = .02. †p < .10. *p < .05. ** p < .01. ***p < .001.

Simple slopes analyses revealed that boys' levels of internalizing problems were positively related to their fathers' depressive symptoms in toddlerhood, $B = .34$, $SE = .11$, $t = 2.96$, $p = .01$. Conversely, girls' levels of internalizing problems were not significantly associated with paternal depressive symptoms, $B = -.04$, $SE = .09$, $t = -.49$, $p = .63$ (Figure 4).

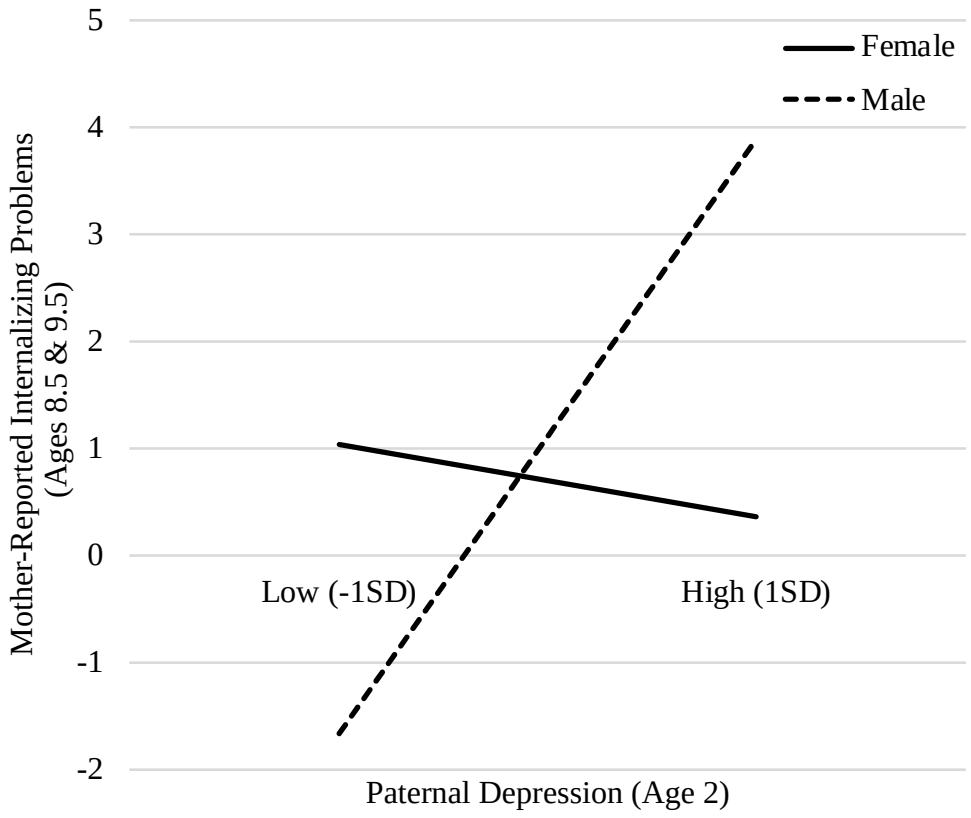

Figure 4: Interaction between paternal depression (age 2) and child gender predicting to children's mother-reported internalizing problems (ages 8.5 & 9.5).

Lastly, maternal depression was tested as a moderator of direct longitudinal relations between paternal depression in toddlerhood and child school-age outcomes (Hypothesis 6). Model fit was adequate for each model that assessed individual outcomes separately by reporter, $\chi 2/df >$ 1.49, CFI > .87, RMSEA < .08. An exception is the model that assessed academic skills as an outcome, which did not converge. The two models that simultaneously assessed outcomes separately by reporter did not converge and therefore are not reported. Maternal depression was not found to moderate associations between paternal depressive symptoms and children's school-age externalizing or internalizing problems.

4.0 Discussion

Studies linking early childhood exposure to parental depressive symptoms to children's later adjustment outcomes have typically focused exclusively on maternal depression (Giles et al., 2011; Shaw et al., 2009). However, based on fathers' increasing involvement in childrearing during early childhood (Bianchi, 2011) and modest to moderate rates of elevated depressive symptoms in fathers (Davé et al., 2010; Ramchandani et al., 2008), especially for fathers of infants from low SES backgrounds (Bamishigbin et al., 2017; Bergström, 2013), it is important to explore relations between early exposure to *paternal* depressive symptoms and children's later adjustment. The current study sought to improve upon past research in this area by examining associations between paternal depression and child socioemotional adjustment and academic abilities from early to middle childhood and examining potential mediators and moderators of these associations among a large sample of low-income families varied in urbanicity. First, we did not find support for direct relations between paternal depressive symptoms in toddlerhood and children's school-age academic abilities and socioemotional adjustment. Second, as paternal depression at child age 2 was not related to observations of father-child interaction at age 3, we also did not find support for an indirect pathway from early paternal depressive symptoms to children's school-age outcomes via negative father-child interactions. Regarding moderation, although maternal depression was not found to moderate associations between paternal depression and children's school-age outcomes, child gender was found to moderate relations between paternal depressive symptoms and children's school-age internalizing problems as reported by mothers, such that this association was stronger for boys than girls. However, no other moderation effects were evident

based on child gender for other child socioemotional adjustment or academic abilities across method or informant.

4.1 Paternal Depression and School-Age Child Outcomes

The unexpected failure to identify any significant direct pathway from paternal depressive symptoms to child adjustment outcomes may be valid for the fathers in the present study's sample. First, it is important to note that the majority of fathers that participated in the present study were not primary caregivers. Second, although paternal residential stability was not significantly associated with children's adjustment measures, it is unknown if and how the *amount* of time that fathers spent caregiving was related to child outcomes. Third, paternal residential stability was marginally correlated with lower levels of paternal depressive symptoms, supporting past research indicating that fathers' depressive symptoms are associated with lower levels of engagement with their children in infancy and early childhood (Bronte-Tinkew, Moore, Matthews, & Carrano, 2007; Cabrera, Fagan, Wight, & Schadler, 2011; Cabrera, Hofferth, & Chae, 2011; Kotila & Dush, 2013). Extending this finding, it is plausible to speculate that fathers with elevated depressive symptoms provided less caregiving for their children than less depressed fathers, reducing variability (and magnitudes of correlations with other variables) in paternal depressive symptoms among paternal caregivers in the current sample. Finally, although the majority of fathers in the present study were biologically related to their participating children, 14% were not (i.e., adoptive or step). Thus, it is possible that genetic effects, if present, may have been attenuated because of variation in genetic relatedness. The current null finding between paternal depression and both child socioemotional

maladjustment and poor academic functioning should be replicated in other low-income samples before presuming its validity.

4.2 Paternal Depression and Father-Child Interactions

Unexpectedly, paternal depressive symptoms at child age 2 also were not significantly related to the quality of father-child interactions at child age 3. These results were surprising based on extant literature suggesting a consistent, albeit fairly modest, association between paternal depressive symptoms and paternal parenting behaviors more broadly. For instance, a meta-analysis of 28 studies of fathers of children ages 2 months to 13 years revealed that paternal depressive symptoms were associated with higher levels of negative parenting (e.g., hostile, coercive, and critical behaviors) and lower levels of positive parenting (e.g., warm and supportive behaviors; Wilson & Durbin, 2010), these associations were found to be strongest for non-White and primarily residential fathers. However, as socioeconomic status was not included in Wilson & Durbin (2010), it is unknown if these associations were attenuated for low-income fathers and/or those less likely to be residential and stable figures in their children's lives. Further, father-child interactions were only observed for nine minutes at age 3, which may not represent the quality of father-child interactions for more prolonged or non-observed, private interactions. Lastly, middle- to high-income fathers with heightened depressive symptoms have been observed to be more withdrawn and insensitive to their infants' needs (Sethna, Murray, Netsi, Psychogiou, & Ramchandani, 2015) and to display lower levels of positive affect when interacting with their infants (Aktar, Colonnesi, de Vente, Majdandzic, & Bogels, 2017). Thus, paternal withdrawal and

low positive affect represent future domains of negative fathering to explore in relation to low-income fathers' depressive symptoms and children's school-age adjustment.

4.3 Father-Child Interactions to Child Outcomes

Negative father-child interactions in the preschool years were not found to predict children's later academic and socioemotional outcomes. Although a similar, albeit much longer, measure (i.e., 50 to 55 minutes) of observed negative mother-child interactions had been found to be associated with adverse child outcomes in the current sample (Sitnick et al., 2015), only nine minutes of father-child observations were used to assess negative father-child interactions in the present study. Although father-child dyads exhibited greater variability in interaction quality than mother-child dyads, it is possible that the observed interactions were not representative of typical father-child interactions because of the short nature of the observation period. Further, it is possible that this same measurement is not a robust predictor of children's academic and psychosocial functioning for father-child interactions. The battery of parent-child interaction tasks was originally designed to measure constructs (e.g., warmth, support, responsive caregiving, and scaffolding) that have linked *maternal* caregiving behaviors to later child problem and prosocial behavior. Applying mother-centric models of parenting and related measures to fathers may be problematic, as these measures may not represent key domains of paternal caregiving linked to children's later prosocial and problem behavior (Cabrera, Fitzgerald, Bradley, & Roggman, 2014). For instance, it may be more important for fathers to encourage prosocial and academic behavior through modeling or expressing attitudes about these domains, rather than engaging in positive interactions with their preschool-aged children. This may be especially relevant when mothers are

already providing high levels of support for their children, as fathers may make their own unique contributions to their children's development above that of supportive mothers. Further, paternal participation in caregiving and engagement in father-child interactions have been found to have important longitudinal associations with children's academic and socioemotional development across childhood (Ramchandani et al., 2013; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008). Thus, it is possible that a measure of paternal disengagement, rather than negative engagement, may be a more important predictor of children's later adjustment. Despite this important caveat, we uncovered an intervention effect on father-child interactions, with father-child dyads in the intervention group exhibiting lower levels of negative interactions than families in the control group in each model, β = -.18, p = .03. In exploratory analyses, this effect held after controlling for age 2 father-child interactions. Thus, it appears that the FCU may be associated with decreases in negative father-child interactions one year later. The persistence of this intervention effect should be evaluated in future research.

4.4 Paternal Depression and Child Internalizing Problems: Moderation by Child Gender

A significant pathway emerged between paternal depressive symptoms and children's later mother-reported internalizing problems, but only for boys. The pathway between paternal depressive symptoms and boys' later internalizing problems is not consistent with prior studies, which have found that school-age boys' conduct and social problems, but not internalizing problems, were associated with both concurrent (Cummings et al., 2005) and prior (i.e., infancy) paternal depressive symptoms (Ramchandani et al., 2008). However, this study differs from these aforementioned studies in important ways. First, the present study utilized a 7-year longitudinal

design and included important covariates in the gender moderation analyses, which other researchers (e.g., Cummings et al., 2005) have not done. Further, although Ramchandani et al. (2008) did test associations between paternal depression and child problem behavior over a 7-year period, they did not assess these associations in a high-risk, low-income sample. Thus, prior study's findings may not be generalizable to the present study's sample of low-income children.

The unique association between paternal depressive symptoms and boys' internalizing problems may be explained by boys being more sensitive than girls to suboptimal environmental conditions in early childhood, especially in relation to caregiving (Martin, 1981; Mileva-Seitz et al., 2015; Miner & Clarke-Stewart, 2008; National Institute of Child Health and Human Development Early Child Care Research Network, 2008; Shaw, Keenan, & Vondra, 1994; Shaw et al., 1998). It is important to note that prior studies have typically focused on suboptimal maternal care; thus, the current study expands these findings to suggest that exposure to paternal depression in early childhood might have similar adverse effects on toddler-age boys living in poverty. Same-sex modeling may have also contributed to the unique association between paternal depression and boys' internalizing symptoms. Toddlers and preschool-aged children have been found to selectively attend to and model same-sex adults' behaviors (Bussey & Bandura, 1984; Slaby & Frey, 1975). Thus, boys may have been more likely than girls to model their fathers' depressive behaviors when in distress, subsequently learning maladaptive emotion regulation strategies and expressing internalizing symptoms that persisted into the school-age years. Relatedly, boys at genetic risk for depressive symptoms may have been more likely than girls (with similar levels of genetic risk) to exhibit depressive behaviors if they saw their father expressing these symptoms in early childhood.

Although boys exposed to elevated levels of paternal depressive symptoms were more likely to demonstrate internalizing symptoms based on maternal reports at home, this pattern was not replicated based on teachers' reports of children's school-age internalizing problems at school. In general, teachers have been found to report fewer internalizing symptoms than mothers across school-age and early adolescence (Stanger & Lewis, 1993; Youngstrom, Loeber, & Stouthamer-Loeber, 2000), but this was only the case for girls' internalizing symptoms at age 8.5 in the present sample, $t(32) = 2.16$, $p = .04$. Otherwise, teachers and mothers did not report significantly different levels of internalizing symptoms at ages 8.5 or 9.5 for boys or for girls. Despite reporting similar mean ratings of internalizing symptoms for boys, teachers' and mothers' ratings of boys' internalizing symptoms were *not* significantly correlated at either age 8.5 ($r = .11$, $p > .58$) or 9.5 ($r = -.14$, $p > .51$). Conversely, teachers' and mothers' ratings of girls' internalizing symptoms were significantly correlated at both age 8.5 ($r = .52$, $p < .01$) and 9.5 ($r = .69$, $< .001$). Thus, it appears that mothers and teachers in the present sample identified a different group of boys but a similar group of girls with elevated levels of internalizing symptoms. Although speculative, it is possible that part of the reason mothers and teachers identified different boys was because of similarities between fathers' and sons' internalizing symptoms – mothers may have been particularly sensitive to their son's (versus their daughter's) internalizing symptoms because of their own interactions with the child's father. Thus, mothers may have been more likely to report their son's internalizing symptoms when they were similar to the symptoms that the son's father had expressed. Finally, this pattern was not replicated for disruptive behavior or academic abilities regardless of method or informant, suggesting that maternal reports of boys' internalizing symptoms were uniquely sensitive to early childhood paternal depressive symptoms.

4.5 Independent Effects of Maternal and Paternal Depressive Symptoms

Testing of interactions between maternal and paternal depressive symptoms in relation to children's school-age outcome also failed to reveal significant moderation findings. Thus, there did not seem to be additional risk conferred by having more than one parent with elevated levels of depressive symptoms. The present findings extend prior work with mothers, which found that maternal depressive symptoms did not moderate associations between paternal depressive symptoms and children's socioemotional and cognitive outcomes at child age 18 months (Fredriksen et al., 2018). Hence, results suggest that risk associated with exposure to parental depressive symptoms operate independently, at least from exposure in early childhood to child adjustment in the school-age years. Further, in the current sample more consistent associations were found for exposure to maternal versus paternal depression. Not only did mothers in the current sample tend to be more stable caregivers than fathers, mothers in the present study's sample reported experiencing significantly higher levels of depressive symptoms than fathers at age 2, $t(112) = 4.51$, $p < .001$. Thus, it is not surprising that maternal depressive symptoms were a more consistent predictor of children's school-age outcomes than paternal depressive symptoms. As such, because mothers in the current sample spent more time with children and also had higher levels of depressive symptoms, future research is needed to identify mechanisms underlying stronger associations for mothers' rather than fathers' depression in relation to later child functioning. Ideally, such study would include mothers and fathers who spend comparable time with their children and/or show similar levels of depressive symptoms.

4.6 Strengths and Limitations

Strengths of the present study include the use of a low-income sample of mothers *and* fathers followed prospectively from early childhood through the school-age period, the use of observational father-child interaction data, and multiple reports and methods of measuring children's psychosocial and academic functioning. Further, this study is the first to assess associations between paternal depressive symptoms, father-child interactions, and children's socioemotional adjustment and academic abilities in a primarily low-income, high-risk sample. Despite these strengths, the present study also had a variety of limitations.

A major limitation of the present study concerns sampling issues – both in relation to sample size and generalizability. Although the entire Early Steps Multisite Study comprises 731 families, only 117 (16%) met inclusion criteria for the present study based on paternal participation. It is important to note that this does not mean that only 16% of participating families had a father involved in caregiving, but rather that only 16% of families had fathers who opted to contribute data at ages 2 and 3. Thus, the sample size was greatly limited, reducing the ability to assess complex models. The unique composition of the present study's sample also impacts the generalizability of the findings. The subset of families was not selected at random and differed significantly from the broader study sample in multiple domains (i.e., race, study site, and income). Further, fathers who chose to participate in the study may be qualitatively different from fathers who were involved in caregiving but chose not to participate. However, this cannot be measured in the present study's sample.

Another limitation was the dependence on mothers' and teachers' reports of children's externalizing and internalizing problems. Clinician ratings or semi-structured interviews may have provided more insight into children's adjustment, with decreased chances of reporter biases

influencing the measures. Furthermore, inclusion of children's self-reported socioemotional functioning would have allowed the assessment of symptoms that may not be apparent to other reporters.

4.7 Future Directions

Despite these limitations, the present study provides support for the significance of paternal depressive symptoms for low-income boys' later internalizing problems. These findings have important implications for future research on preventing boys' school-age internalizing problems and, if replicated, suggest that decreasing paternal depressive symptoms at age 2 may be an important intervention target to explore. In addition, future studies should explore why paternal depressive symptoms were associated with boys', but not girls', later adjustment in high-risk, low-income families. As negative father-child interactions were not supported as a mediator, future studies should assess other potential mediators of this relationship, perhaps by focusing on paternal caregiving practices that have shown predictive validity with children's later psychosocial and academic outcomes. Furthermore, the proportion of time fathers spend caregiving should be assessed in relation to paternal depressive symptoms, father-child interactions, and children's later outcomes. Relatedly, it is important for future studies to assess how such relations occur in families where fathers, rather than mothers, are the primary caregivers. Such a study would inform us if the relative lack of associations with paternal depressive symptoms are reflective of the role of fathers, or the role of non-primary caregivers. Finally, future studies should explore other unexpected, significant relations found in the present study, such as the intervention effect on father-child interactions.

Bibliography

Achenbach, T. M., & Rescorla, L. A. (2000). Manual for the ASEBA Preschool Forms & Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families.

Achenbach, T. M., & Rescorla, L. A. (2001). Manual for the ASEBA School-Age Forms & Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

Adams, S. H., Knopf, D. K., & Park, M. J. (2014). Prevalence and Treatment of Mental Health and Substance Use Problems in the Early Emerging Adult Years in the United States: Findings From the 2010 National Survey on Drug Use and Health. Emerging Adulthood, 2(3), 163–172. https://doi.org/10.1177/2167696813513563

Adamsons, K., & Johnson, S. K. (2013). An updated and expanded meta-analysis of nonresident fathering and child well-being. Journal of Family Psychology, 27(4), 589–599. https://doi.org/10.1037/a0033786

Annemiek Karreman, Cathy van Tuijl, Marcel A. G. van Aken, & Maja Dekovíc. (2009). Predicting Young Children's Externalizing Problems: Interactions among Effortful Control, Parenting, and Child Gender. Merrill-Palmer Quarterly, 55(2), 111–134. https://doi.org/10.1353/mpq.0.0020

Bamishigbin, O. N., Dunkel Schetter, C., Guardino, C. M., Stanton, A. L., Schafer, P., Shalowitz, M., … Community Child Health Network Eunice Kennedy Shriver National Institute of Child and Health Development. (2017). Risk, resilience, and depressive symptoms in low-income African American fathers. Cultural Diversity and Ethnic Minority Psychology, 23(1), 70–80. https://doi.org/10.1037/cdp0000088

Beeghly, M., Olson, K. L., Weinberg, M. K., Pierre, S. C., Downey, N., & Tronick, E. Z. (2003). Prevalence, Stability, and Socio-Demographic Correlates of Depressive Symptoms in Black Mothers During the First 18 Months Postpartum. Maternal and Child Health Journal, 7(3), 157–168.

Bergström, M. (2013). Depressive Symptoms in New First-Time Fathers: Associations with Age, Sociodemographic Characteristics, and Antenatal Psychological Well-Being. Birth, 40(1), 32–38. https://doi.org/10.1111/birt.12026

Bianchi, S. M. (2011). Family Change and Time Allocation in American Families. The ANNALS of the American Academy of Political and Social Science, 638(1), 21–44. https://doi.org/10.1177/0002716211413731

Borse, N., Gilchrist, J., Dellinger, A. M., Rudd, R. A., Ballesteros, M. F., & Sleet, D. A. (2008). CDC Childhood Injury Report: Patterns of Unintentional Injuries Among 0-19 Year Olds in the United States, 2000-2006: (572462009-001) [Data set]. https://doi.org/10.1037/e572462009-001

Brennan, P. A., Hammen, C., Katz, A. R., & Le Brocque, R. M. (2002). Maternal depression, paternal psychopathology, and adolescent diagnostic outcomes. Journal of Consulting and Clinical Psychology, 70(5), 1075–1085. https://doi.org/10.1037//0022-006X.70.5.1075

Bussey, K., & Bandura, A. (1984). Influence of Gender Constancy and Social Power on Sex-Linked Modeling. Journal of Personality and Social Psychology, 47(6), 1292–1302.

Cabrera, N. J., Fitzgerald, H. E., Bradley, R. H., & Roggman, L. (2014). The Ecology of Father-Child Relationships: An Expanded Model. Journal of Family Theory & Review, 6, 336–354. https://doi.org/10.1111/jftr.12054

Campbell, S. B., Matestic, P., von Stauffenberg, C., Mohan, R., & Kirchner, T. (2007). Trajectories of maternal depressive symptoms, maternal sensitivity, and children's functioning at school entry. Developmental Psychology, 43(5), 1202–1215. https://doi.org/10.1037/0012-1649.43.5.1202

Cummings, E. M., George, M. R. W., Koss, K. J., & Davies, P. T. (2013). Parental Depressive Symptoms and Adolescent Adjustment: Responses to Children's Distress and Representations of Attachment as Explanatory Mechanisms. Parenting, 13(4), 213–232. https://doi.org/10.1080/15295192.2013.832568

Cummings, E. M., Keller, P. S., & Davies, P. T. (2005). Towards a family process model of maternal and paternal depressive symptoms: exploring multiple relations with child and family functioning. Journal of Child Psychology and Psychiatry, 46(5), 479–489. https://doi.org/10.1111/j.1469-7610.2004.00368.x

Davé, S., Petersen, I., Sherr, L., & Nazareth, I. (2010). Incidence of Maternal and Paternal Depression in Primary Care: A Cohort Study Using a Primary Care Database. Archives of Pediatrics & Adolescent Medicine, 164(11), 1038–1044. https://doi.org/10.1001/archpediatrics.2010.184

Dette-Hagenmeyer, D. E., & Reichle, B. (2014). Parents' depressive symptoms and children's adjustment over time are mediated by parenting, but differentially for fathers and mothers. European Journal of Developmental Psychology, 11(2), 196–210. https://doi.org/10.1080/17405629.2013.848789

Dishion, T. J., Mun, C. J., Tein, J.-Y., Kim, H., Shaw, D. S., Gardner, F., … Peterson, J. (2017). The Validation of Macro and Micro Observations of Parent–Child Dynamics Using the Relationship Affect Coding System in Early Childhood. Prevention Science, 18(3), 268–280. https://doi.org/10.1007/s11121-016-0697-5

Dishion, T. J., Shaw, D. S., Connell, A., Gardner, F., Weaver, C., & Wilson, M. (2008). The Family Check-Up With High-Risk Indigent Families: Preventing Problem Behavior by Increasing

Parents' Positive Behavior Support in Early Childhood. Child Development, 79(5), 1395–1414. https://doi.org/10.1111/j.1467-8624.2008.01195.x

Dix, T., & Meunier, L. N. (2009). Depressive symptoms and parenting competence: An analysis of 13 regulatory processes. Developmental Review, 29(1), 45–68. https://doi.org/10.1016/j.dr.2008.11.002

Drevenstedt, G. L., Crimmins, E. M., Vasunilashorn, S., & Finch, C. E. (2008). The rise and fall of excess male infant mortality. Proceedings of the National Academy of Sciences, 105(13), 5016–5021. https://doi.org/10.1073/pnas.0800221105

Enders, C., & Bandalos, D. (2001). The Relative Performance of Full Information Maximum Likelihood Estimation for Missing Data in Structural Equation Models. Structural Equation Modeling: A Multidisciplinary Journal, 8(3), 430–457. https://doi.org/10.1207/S15328007SEM0803_5

Ertel, K. A., Rich-Edwards, J. W., & Koenen, K. C. (2011). Maternal Depression in the United States: Nationally Representative Rates and Risks. Journal of Women's Health, 20(11), 1609–1617. https://doi.org/10.1089/jwh.2010.2657

Eyberg, S., & Pincus, D. (1999). Eyberg Child Behavior Inventory & Sutter-Eyberg Student Behavior Inventory-Revised: Professional Manual. Odessa, FL: Psychological Assessment Resources.

Fanti, K. A., Panayiotou, G., & Fanti, S. (2011). Associating Parental to Child Psychological Symptoms: Investigating a Transactional Model of Development. Journal of Emotional and Behavioral Disorders, 21(3), 193–210. https://doi.org/10.1177/1063426611432171

Fredriksen, E., von Soest, T., Smith, L., & Moe, V. (2018). Parenting Stress Plays a Mediating Role in the Prediction of Early Child Development from Both Parents' Perinatal Depressive Symptoms. Journal of Abnormal Child Psychology. https://doi.org/10.1007/s10802-018-0428-4

Garfield, C. F., Duncan, G., Rutsohn, J., McDade, T. W., Adam, E. K., Coley, R. L., & Chase-Lansdale, P. L. (2014). A Longitudinal Study of Paternal Mental Health During Transition to Fatherhood as Young Adults. Pediatrics, 133(5), 836–843. https://doi.org/10.1542/peds.2013-3262

Gere, M. K., Hagen, K. A., Villabø, M. A., Arnberg, K., Neumer, S.-P., & Torgersen, S. (2013). Fathers' mental health as a protective factor in the relationship between maternal and child depressive symptoms. Depression and Anxiety, 30(1), 31–38. https://doi.org/10.1002/da.22010

Giallo, R., Cooklin, A., Wade, C., D'Esposito, F., & Nicholson, J. M. (2014). Fathers' Postnatal Mental Health and Child Well-Being at Age Five: The Mediating Role of Parenting Behavior. Journal of Family Issues, 35(11), 1543–1562. https://doi.org/10.1177/0192513X13477411

Giallo, R., D'Esposito, F., Christensen, D., Mensah, F., Cooklin, A., Wade, C., … Nicholson, J. M. (2012). Father mental health during the early parenting period: results of an Australian population based longitudinal study. Social Psychiatry and Psychiatric Epidemiology, 47(12), 1907–1916. https://doi.org/10.1007/s00127-012-0510-0

Giles, L. C., Davies, M. J., Whitrow, M. J., Warin, M. J., & Moore, V. (2011). Maternal Depressive Symptoms and Child Care During Toddlerhood Relate to Child Behavior at Age 5 Years. Pediatrics, 128(1), e78–e84. https://doi.org/10.1542/peds.2010-3119

Goodman, S. H. (2007). Depression in Mothers. Annual Review of Clinical Psychology, 3(1), 107–135. https://doi.org/10.1146/annurev.clinpsy.3.022806.091401

Goodman, S. H., & Gotlib, I. H. (1999). Risk for psychopathology in the children of depressed mothers: A developmental model for understanding mechanisms of transmission. Psychological Review, 106(3), 458–490. https://doi.org/10.1037/0033-295X.106.3.458

Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal Depression and Child Psychopathology: A Meta-Analytic Review. Clinical Child and Family Psychology Review, 14(1), 1–27. https://doi.org/10.1007/s10567-010-0080-1

Gutierrez-Galve, L., Stein, A., Hanington, L., Heron, J., & Ramchandani, P. (2015). Paternal Depression in the Postnatal Period and Child Development: Mediators and Moderators. Pediatrics, 135(2), e339–e347. https://doi.org/10.1542/peds.2014-2411

Herbert, S. D., Harvey, E. A., Lugo-Candelas, C. I., & Breaux, R. P. (2013). Early Fathering as a Predictor of Later Psychosocial Functioning Among Preschool Children with Behavior Problems. Journal of Abnormal Child Psychology, 41(5), 691–703. https://doi.org/10.1007/s10802-012-9706-8

Jeynes, W. H. (2016). Meta-Analysis on the Roles of Fathers in Parenting: Are They Unique? Marriage & Family Review, 52(7), 665–688. https://doi.org/10.1080/01494929.2016.1157121

Kane, P., & Garber, J. (2004). The relations among depression in fathers, children's psychopathology, and father–child conflict: A meta-analysis. Clinical Psychology Review, 24(3), 339–360. https://doi.org/10.1016/j.cpr.2004.03.004

Kerr, D. C. R., Lopez, N. L., Olson, S. L., & Sameroff, A. J. (2004). Parental Discipline and Externalizing Behavior Problems in Early Childhood: The Roles of Moral Regulation and Child Gender. Journal of Abnormal Child Psychology, 32(4), 369–383. https://doi.org/10.1023/B:JACP.0000030291.72775.96

Lewis, G., Rice, F., Harold, G. T., Collishaw, S., & Thapar, A. (2011). Investigating Environmental Links Between Parent Depression and Child Depressive/Anxiety Symptoms Using an Assisted Conception Design. Journal of the American Academy of Child & Adolescent Psychiatry, 50(5), 451-459.e1. https://doi.org/10.1016/j.jaac.2011.01.015

Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior: A meta-analytic review. Clinical Psychology Review, 20(5), 561–592. https://doi.org/10.1016/S0272-7358(98)00100-7

Malin, J. L., Karberg, E., Cabrera, N. J., Rowe, M., Cristaforo, T., & Tamis-LeMonda, C. S. (2012). Father–toddler communication in low-income families: The role of paternal education and depressive symptoms. Family Science, 3(3–4), 155–163. https://doi.org/10.1080/19424620.2012.779423

Malmberg, L.-E., & Flouri, E. (2011). The Comparison and Interdependence of Maternal and Paternal Influences on Young Children's Behavior and Resilience. Journal of Clinical Child & Adolescent Psychology, 40(3), 434–444. https://doi.org/10.1080/15374416.2011.563469

Martin, J. A. (1981). A Longitudinal Study of the Consequences of Early Mother-Infant Interaction: A Microanalytic Approach. Monographs of the Society for Research in Child Development, 46(3), i. https://doi.org/10.2307/1166014

McDonald, R. P., & Ho, M.-H. R. (2002). Principles and practice in reporting structural equation analyses. Psychological Methods, 7(1), 64–82. https://doi.org/10.1037//1082-989X.7.1.64

Mclennan, J. D., Kotelchuck, M., & Cho, H. (2001). Prevalence, Persistence, and Correlates of Depressive Symptoms in a National Sample of Mothers of Toddlers. Journal of the American Academy of Child & Adolescent Psychiatry, 40(11), 1316–1323. https://doi.org/10.1097/00004583-200111000-00012

Mezulis, A. H., Hyde, J. S., & Clark, R. (2004). Father Involvement Moderates the Effect of Maternal Depression During a Child's Infancy on Child Behavior Problems in Kindergarten. Journal of Family Psychology, 18(4), 575–588. https://doi.org/10.1037/0893-3200.18.4.575

Mikkonen, J., Moustgaard, H., Remes, H., & Martikainen, P. (2016). Intergenerational transmission of depressive symptoms – The role of gender, socioeconomic circumstances, and the accumulation of parental symptoms. Journal of Affective Disorders, 204, 74–82. https://doi.org/10.1016/j.jad.2016.06.036

Mileva-Seitz, V. R., Ghassabian, A., Bakermans-Kranenburg, M. J., van den Brink, J. D., Linting, M., Jaddoe, V. W. V., … van IJzendoorn, M. H. (2015). Are boys more sensitive to sensitivity? Parenting and executive function in preschoolers. Journal of Experimental Child Psychology, 130, 193–208. https://doi.org/10.1016/j.jecp.2014.08.008

Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. Developmental Psychology, 44(3), 771–786. https://doi.org/10.1037/0012-1649.44.3.771

Mondal, D., Galloway, T. S., Bailey, T. C., & Mathews, F. (2014). Elevated risk of stillbirth in males: systematic review and meta-analysis of more than 30 million births. BMC Medicine, 12(1). https://doi.org/10.1186/s12916-014-0220-4

Muthén, L. K., & Muthén, B. O. (1998). Mplus User's Guide (8th ed.). Los Angeles, CA: Muthén & Muthén.

Nath, S., Russell, G., Kuyken, W., Psychogiou, L., & Ford, T. (2016). Does father–child conflict mediate the association between fathers' postnatal depressive symptoms and children's adjustment problems at 7 years old? Psychological Medicine, 46(8), 1719–1733. https://doi.org/10.1017/S0033291716000234

National Institute of Child Health and Human Development Early Child Care Research Network. (2008). Mothers' and fathers' support for child autonomy and early school achievement. Developmental Psychology, 44(4), 895–907. https://doi.org/10.1037/0012-1649.44.4.895

Natsuaki, M. N., Ge, X., Leve, L. D., Neiderhiser, J. M., Shaw, D. S., Conger, R. D., … Reiss, D. (2010). Genetic liability, environment, and the development of fussiness in toddlers: The roles of maternal depression and parental responsiveness. Developmental Psychology, 46(5), 1147–1158. https://doi.org/10.1037/a0019659

Paulson, J. F., Keefe, H. A., & Leiferman, J. A. (2009). Early parental depression and child language development. Journal of Child Psychology and Psychiatry, 50(3), 254–262. https://doi.org/10.1111/j.1469-7610.2008.01973.x

Pemberton, C. K., Neiderhiser, J. M., Leve, L. D., Natsuaki, M. N., Shaw, D. S., Reiss, D., & Ge, X. (2010). Influence of parental depressive symptoms on adopted toddler behaviors: an emerging developmental cascade of genetic and environmental effects. Dev Psychopathol, 22(4), 803–818. https://doi.org/10.1017/S0954579410000477

Peterson, J., Winter, C., Jabson, J. M., & Dishion, T. J. (2008). Relationship affect coding system.

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational Tools for Probing Interactions in Multiple Linear Regression, Multilevel Modeling, and Latent Curve Analysis. Journal of Educational and Behavioral Statistics, 31(4), 437–448. https://doi.org/10.3102/10769986031004437

Psychogiou, L., Moberly, N. J., Parry, E., Nath, S., Kallitsoglou, A., & Russell, G. (2017). Parental depressive symptoms, children's emotional and behavioural problems, and parents' expressed emotion—Critical and positive comments. PLOS ONE, 12(10), e0183546. https://doi.org/10.1371/journal.pone.0183546

Radloff, L. S. (1977). The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. Applied Psychological Measurement, 1(3), 385–401.

Ramchandani, P. G., Domoney, J., Sethna, V., Psychogiou, L., Vlachos, H., & Murray, L. (2013). Do early father-infant interactions predict the onset of externalising behaviours in young children? Findings from a longitudinal cohort study. J Child Psychol Psychiatry, 54(1), 56–64. https://doi.org/10.1111/j.1469-7610.2012.02583.x

Ramchandani, P. G., O'Connor, T. G., Evans, J., Heron, J., Murray, L., & Stein, A. (2008). The effects of pre- and postnatal depression in fathers: a natural experiment comparing the

effects of exposure to depression on offspring. J Child Psychol Psychiatry, 49(10), 1069–1078. https://doi.org/10.1111/j.1469-7610.2008.02000.x

Ramos-Marcuse, F., Oberlander, S. E., Papas, M. A., McNary, S. W., Hurley, K. M., & Black, M. M. (2010). Stability of maternal depressive symptoms among urban, low-income, African American adolescent mothers. Journal of Affective Disorders, 122(1–2), 68–75. https://doi.org/10.1016/j.jad.2009.06.018

Sarkadi, A., Kristiansson, R., Oberklaid, F., & Bremberg, S. (2008). Fathers' involvement and children's developmental outcomes: a systematic review of longitudinal studies. Acta Paediatrica, 97(2), 153–158. https://doi.org/10.1111/j.1651-2227.2007.00572.x

Schore, A. N. (2017). All Our Sons: The Developmental Neurobiology and Neuroendocrinology of Boys at Risk. Infant Mental Health Journal, 38(1), 15–52. https://doi.org/10.1002/imhj.21616

Schrank, F. A., McGrew, K. S., & Woodcock, R. W. (2001). Technical Abstract (Woodcock-Johnson III Assessment Service Bulletin No. 2). Itasca, IL: Riverside Publishing.

Shaw, D. S., Connell, A., Dishion, T. J., Wilson, M. N., & Gardner, F. (2009). Improvements in maternal depression as a mediator of intervention effects on early childhood problem behavior. Development and Psychopathology, 21(2), 417–439. https://doi.org/10.1017/S0954579409000236

Shaw, D. S., Keenan, K., & Vondra, J. I. (1994). Developmental Precursors of Externalizing Behavior: Ages 1 to 3. Developmental Psychology, 30(3), 355–364.

Shaw, D. S., & Shelleby, E. C. (2014). Early-starting conduct problems: intersection of conduct problems and poverty. Annu Rev Clin Psychol, 10, 503–528. https://doi.org/10.1146/annurev-clinpsy-032813-153650

Shaw, D. S., Winslow, E. B., Owens, E. B., Vondra, J. I., Cohn, J. E., & Bell, R. Q. (1998). The Development of Early Externalizing Problems Among Children from Low-Income Families: A Transformational Perspective. Journal of Abnormal Child Psychology, 26(2), 95–107.

Shelleby, E. C., Votruba-Drzal, E., Shaw, D. S., Dishion, T. J., Wilson, M. N., & Gardner, F. (2014). Income and children's behavioral functioning: A sequential mediation analysis. Journal of Family Psychology, 28(6), 936–946. https://doi.org/10.1037/fam0000035

Shen, H., Magnusson, C., Rai, D., Lundberg, M., Le-Scherban, F., Dalman, C., & Lee, B. K. (2016). Associations of Parental Depression With Child School Performance at Age 16 Years in Sweden. JAMA Psychiatry, 73(3), 239–246. https://doi.org/10.1001/jamapsychiatry.2015.2917

Sitnick, S. L., Shaw, D. S., Gill, A., Dishion, T. J., Winter, C., Waller, R., … Wilson, M. (2015). Parenting and the Family Check-Up: Changes in Observed Parent-Child Interaction

Following Early Childhood Intervention. Journal of Clinical Child & Adolescent Psychology, 44(6), 970–984. https://doi.org/10.1080/15374416.2014.940623

Slaby, R. G., & Frey, K. S. (1975). Development of Gender Constancy and Selective Attention to Same-Sex Models. Child Development, 46(4), 849–856.

Smith, H. R., Eryigit-Madzwamuse, S., & Barnes, J. (2013). Paternal Postnatal and Subsequent Mental Health Symptoms and Child Socio-Emotional and Behavioural Problems at School Entry. Infant and Child Development, 22(4), 335–348. https://doi.org/10.1002/icd.1800

Stanger, C., & Lewis, M. (1993). Agreement Among Parents, Teachers, and Children on Internalizing and Externalizing Behavior Problems. Journal of Clinical Child Psychology, 22(1), 107–116. https://doi.org/10.1207/s15374424jccp2201_11

Substance Abuse and Mental Health Services Administration. (2017). Key substance use and mental health indicators in the United States: Results from the 2016 National Survey on Drug Use and Health (No. HHS Publication No. SMA 17-5044, NSDUH Series H-52). Retrieved from Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. website: https://www.samhsa.gov/data/

U.S. Census Bureau. (2017). Current Population Survey, 2017 Annual Social and Economic Supplement. America's Families and Living Arrangements. Retrieved from https://www.census.gov/data/tables/2017/demo/families/cps-2017.html

Wilson, S., & Durbin, C. E. (2010). Effects of paternal depression on fathers' parenting behaviors: A meta-analytic review. Clinical Psychology Review, 30(2), 167–180. https://doi.org/10.1016/j.cpr.2009.10.007

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). Woodcock-Johnson III Tests of Achievement. Itasca, IL: Riverside Publishing.

Youngstrom, E., Loeber, R., & Stouthamer-Loeber, M. (2000). Patterns and correlates of agreement between parent, teacher, and male adolescent ratings of externalizing and internalizing problems. Journal of Consulting and Clinical Psychology, 68(6), 1038–1050. https://doi.org/10.1037/0022-006X.68.6.1038