

EXPLORING THE INFLUENCE OF WORK-FAMILY STRESS, FATHER INVOLVEMENT,  
AND FAMILY DYNAMICS ON CHILD WELLBEING

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on Child Wellbeing**

**ABSTRACT**

This dissertation examined how maternal stress (i.e., work-family stress (WFS), parenting stress) and father engagement influences child behaviors (i.e., aggression, television (TV) viewing). Participants were from the Fragile Families and Child Wellbeing Study, a longitudinal birth cohort of nearly 5,000 children born in large U.S. cities to predominantly socioeconomically disadvantaged, racial/ethnic minority families.

Paper 1 employed path analysis to jointly test associations between WFS and child aggression over time. After adjusting for a host of mother- and household-related covariates, WFS measured when children were 1 year old was significantly positively associated with aggression measured when children were 3 years old ( $\beta = 0.115$ ,  $p=0.001$ ). Programs and/or policies that decrease WFS and facilitate improved work-family balance early in motherhood, particularly during children's first year, may reduce later childhood aggression.

Paper 2 examined the association between three measures of fathers' engagement (co-parenting, instrumental support provided to child's mother, participation in activities with his child) and child TV viewing. Using mixed effects linear regression models, and adjusting for child, father, and family/household covariates, we observed a significant inverse association between co-parenting and child TV viewing when children were 3 years old ( $\beta = -0.057$ ,

p=0.040), and no significant association when children were 5 years old ( $\beta= 0.008$ ,  $p=0.696$ ).

Fathers participate in family life and support their families in a variety of ways and benefits of engagement may vary by type of engagement and by child age.

Paper 3 examined the association between mothers' parenting stress and child aggression, and explored the potential moderating effect of father engagement. Using linear regression models and accounting for mother, child, and family/household covariates, we observed that parenting stress experienced when children were 1 year old was significantly positively associated with child aggression at age 3 ( $\beta= 0.049$ ,  $p<0.001$ ). There was a significant stress by father engagement moderation effect ( $\beta= 0.055$ ,  $p=0.034$ ) in the unadjusted model only, suggesting that this effect may have been a result of omitted variable bias. Future research should disentangle the role of father engagement as a potential moderator, confounder, or mediator in the association between mothers' parenting stress and child aggression.

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## **Paper 1**

### **Positive association between mothers' work-family stress and early childhood aggression among socioeconomically disadvantaged families**

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## ABSTRACT

**Objective.** To examine the association between mothers' work-family stress (WFS) and early childhood aggression among socioeconomically disadvantaged families.

**Methods.** Participants were from the Fragile Families and Child Wellbeing Study, a birth-cohort of majority socioeconomically disadvantaged, racial/ethnic minority urban families. We conducted path analysis to jointly test associations between WFS measured when child was 1, 3, and 5 years old and child aggression measured when child was 3 and 5 years old using data from interviews with mothers ( $n = 1,364$ ). WFS was assessed via mothers' responses to 3 items related to her ability to balance work and family demands. Child aggression was measured via mothers' response to aggression-related items from the Child Behavior Checklist.

**Results.** After adjusting for mothers' education, mothers' age, household income, violent/controlling relationship with partner, number of children <18 years in household, weeks worked/year, hours worked/week, nontraditional work hours, mothers' chronic depression, and multiplicity in childcare arrangements, WFS measured when child was 1 year old was significantly positively associated with aggression measured when child was 3 years old ( $\beta = 0.115, p=0.001$ ). Additionally, significant positive associations were demonstrated between WFS over time ( $\beta = 0.164, p<0.001$  WFS age 1 to WFS age 3;  $\beta = 0.142, p<0.001$  WFS age 3 to WFS age 5). Aggression scores when children were 3 years old were significantly associated with aggression scores when children were 5 years old ( $\beta = 0.516, p<0.001$ ).

***Conclusion.*** Programs and/or policies that decrease WFS and facilitate improved work-family balance early in motherhood, particularly during child's first year, may reduce later childhood aggression.

## ***INTRODUCTION***

### *Childhood aggression.*

A growing literature argues that children who are at high risk for later chronic violent behaviors can be identified earlier in life based on the presence of childhood conduct problems (Dodge, Greenberg, Malone, & Conduct Problems Prevention Research, 2008; Moffitt, 1993). The term conduct disorder is an overarching label that refers to a persistent pattern of antisocial behavior in which the individual repeatedly breaks social rules and carries out aggressive acts that upset other people (National Collaborating Centre for Mental Health, 2013). Children who display high levels of aggression during childhood and beyond are likely to face academic and social difficulties that set them up for poor psychosocial outcomes later (Reef, Diamantopoulou, van Meurs, Verhulst, & van der Ende, 2010). Because early aggression in children may persist into adulthood, and is associated with poor social and health outcomes in adolescence, ascertaining the antecedents of childhood aggression may suggest pathways for intervention. Studies of childhood aggression discriminate between behavior that diminishes by adolescence and that which persists across the life-course. (Reef et al., 2010). Life course persistent antisocial behavior, termed by Moffitt as “early starter” (1993), describes people who engage in antisocial behavior at every stage of life. This early onset group is important as they are far more likely to display the most severe symptoms in adolescence, and to persist in their antisocial tendencies into adulthood (National Collaborating Centre for Mental Health, 2013).

### *Influence of maternal stress and caregiving behavior on child behavior.*

Maternal stress has been shown to influence various aspects of parenting practices and mother–child interactions (Morrissey & Dagher, 2014). Mothers experiencing high levels of stress may interact less with their children (Clowtis, Kang, Padhye, Rozmus, & Barratt, 2016;

Gundersen, Mahatmya, Garasky, & Lohman, 2011). Maternal stress may also alter mothers' own behaviors, for example related to diet, physical activity, and sedentary behavior, which in turn may alter her child's behavior as a result of maternal modeling (Gelfand & Teti, 1990). Studies that rated maternal caregiving behavior on several dimensions, including acceptance, rejection, availability, and sensitivity (Ainsworth, 1976), found that compared to infants who received high quality maternal caregiving behavior, those receiving low quality maternal caregiving behavior in infancy showed significantly more proneness to anger and aggressive play (Hane & Fox, 2006; Hane, Henderson, Reeb-Sutherland, & Fox, 2010).

*Socioecological perspective.*

Historically, studies investigating the correlates of early aggression have adopted a socioecological perspective which asserts that children are embedded in and interact within several contexts (Bronfenbrenner, 1979). Most notably, these studies tend to focus on direct and immediate intrafamilial interactions at the microsystem. For example, parents' use of corporal punishment as a disciplinary method has been shown to influence childhood aggression especially maternal spanking (Lee, Altschul, & Gershoff, 2015; MacKenzie, Nicklas, Brooks-Gunn, & Waldfogel, 2015). While many of these studies indicate that parental stress may be an important motivator of number and severity of disciplinary actions such as spanking, studies rarely address the sources of the stress. Few studies examining parental stress and childhood aggression involve the mesosystem—the interaction of microsystems such as work and family (Belsky, 1984; Bronfenbrenner, 1979).

*Maternal employment and work-family stress.*

The interaction between mothers' work and home microsystems is important for a variety of reasons. First, employment provides income and other essential benefits that families need to

survive (Barnett & Hyde, 2001), and may be particularly important for low-income families because they are less able to rely on intergenerational wealth (Braveman, Egerter, & Williams, 2011). Also, low-income mothers are more likely to be the primary source of income for their families and to work in low-wage jobs that do not provide financial and other resources for mitigating work-family stress (Povich, Roberts, & Mather, 2013). Research indicates that employed mothers reap economic and non-economic rewards, such as social support and recognition from others (Barnett & Hyde, 2001). However, the lack of infrastructure across all systems in the ecological framework, -including the family, workplace, community, and broader society-, to support maternal employment may induce stress among mothers attempting to balance work and family. This difficulty in meeting family and child needs due to work obligations, is hereon referred as work-family stress (Amstad, Meier, Fasel, Elfering, & Semmer, 2011). McLoyd et al explored the association between work-family stress and child adjustment, including child externalizing behaviors like aggression in a sample of small town and rural African-American mothers (McLoyd, Toyokawa, & Kaplan, 2008). They found that higher levels of work-family stress were associated with greater externalizing problems in children, ages 10-12 years, and this association was mediated through a decrease in family routines (McLoyd et al., 2008). This study indicated that work demands related to hours, commuting time, and schedule were not significantly associated with child externalizing problems. It is unclear whether their findings are generalizable to urban families, or families with pre-school aged children.

*The present study.*

Building upon prior research, this study addresses important gaps by investigating a meso-system interaction, specifically work-family stress, as it relates to early childhood

aggression in a socioeconomically disadvantaged urban cohort. Given the paucity of studies examining child aggression among toddlers and preschool aged children, and guided by the “early- starter” model, this paper will explore child aggression among 3 and 5 year old children. This work also investigates whether the timing of work-family stress is relevant for child aggression, which would suggest time-sensitive interventions and policies to mitigate the effect.

Using longitudinal data from the Fragile Families and Child Wellbeing Study (FFCWS) we examined the following two research questions:

- Is maternal work-family stress associated with child aggression scores?
- Does experiencing high work-family stress during child’s first year of life, have a persistent association on child aggression scores later in childhood?

Our first question is based on the idea that there exists a transactional relationship across work and family domains (Bronfenbrenner, 1979). The spillover hypothesis suggests that affect or behavior transfers directly from one setting or relationship to another within a family system (J. A. Nelson, O'Brien, Blankson, Calkins, & Keane, 2009), thus experiences at work impact experiences and practices at home. Additionally, sources of stress and support derived from work are key drivers influencing parenting behaviors and subsequent child development (Belsky, 1984). Based on the Social Ecological Systems Theory (Bronfenbrenner, 1979), this analysis takes into account multilevel and interconnected settings that influence behavior. In addition to a primary caregiver’s work environment, individual-level influences related to characteristics of mother and child, and experiences related to one’s family/household must be considered when exploring the relationship between work-family stress and child aggression. To this end, this analysis accounts for covariates related to the mother, her work, and her family/household environment.

Our second question, investigating whether timing of work-family stress matters as it relates to child aggression, is supported by Attachment Theory (Bowlby) and prior research on critical and sensitive periods in child development. Attachment Theory asserts that children internalize concepts of self and others based on repeated interactions with caregivers and these interactions serve as templates for navigating relationships throughout the lifespan, providing the foundation for self-efficacy beliefs, affect regulation strategies, self-concept, and behavioral strategies for distress management (Bowlby, 1969, 1982). It is possible that work-family stress challenges a primary caregiver's capacity to consistently and reliably bond with, stimulate, and nurture a child and this disruption may have persistent impacts on child behavior, like aggression. Nelson and colleagues have documented how exposure to a healthy caretaking environment is necessary for normal emotional development (C. A. Nelson, 2000). Studies of children raised in Romanian orphanages and adopted by parents in North America reveal associations between institutionalization and deficits across cognitive, emotional, and linguistic domains, and provide evidence of a potential sensitive period for being exposed to an enriching caretaking environment. Notably, children adopted before their first birthday had better outcomes than those adopted later (Benoit, Jocelyn, Moddemann, & Embree, 1996), supporting the sensitive period hypothesis that early caregiving environments have potentially lasting effects on emotional, behavioral, and physical outcomes in children.

On the basis of prior evidence, we hypothesize that work-family stress will be positively associated with child aggression, and that early childhood (age birth-1 year) may present a sensitive period during which disruptions to positive attachment caused by stress, specifically work-family stress, in caregiver environment, may have persistent effects on child aggression. Thus, we expect that high maternal work-family stress experienced during the child's first year



will have a withstanding effect on aggression scores later in childhood, taking into account work-family stress experienced later in childhood.

## ***METHODS***

### *Data*

This study used data from FFCWS, a longitudinal, birth cohort study of 4,898 children born between 1998 and 2000 in 20 large U.S. cities with populations of 200,000 or more (Reichman, Teitler, Garfinkel, & McLanahan, 2001). The FFCWS oversampled non-marital births with about three fourths of children born to unmarried parents coming from, for the most part, low-income and non-White families (Pilarz & Hill, 2017). Baseline interviews were conducted with mothers and fathers at the hospital shortly after the child's birth. Subsequent interviews included telephone interviews with mothers and fathers which collected data about the parents when children were approximately 1, 3, 5, 9, and 15 years old. Primary caregiver interviews, predominantly completed by mothers, collected data about children when children were 3, 5, 9, and 15 years old. A detailed description of protocols can be found in the FFCWS sample and design paper (Reichman et al., 2001). This study used data from the baseline, 1, 3, and 5 year interviews with mothers and the 3 and 5 year primary caregiver interviews.

The analytic sample consisted of biological mothers and their respective child enrolled in the study. Inclusion criteria included: (1) mothers' participation in all of the interviews used in this analysis, (2) maternal work force participation during the child's first year of life, (3) exclusion of children diagnosed with a developmental condition (autism or attention deficit disorder (ADHD)) at age 5, as these conditions may confound the relationship between maternal

work-family stress and child aggression, (4) complete information on the exposure of interest, work-family stress, and (5) complete information on the outcome, child aggression scale.

We excluded 2,526 mother-child pairs (52% of baseline sample) for which the mother did not participate in all of the interviews. Another 619 pairs (26%) were excluded due to lack of work force participation during child's first year of life. Seventy-nine pairs (5%) were dropped for a child diagnosis of autism or ADHD at age 5. Those missing any items on the work-family stress scale collected when child was 1, 3, and 5 years, or the child aggression scale collected when child was 3 and 5 years were also excluded (127 pairs (8%) and 183 pairs (12%) respectively). The final analytical sample included 1,364 mother and child dyads (**Appendix: Figure A1.1**).

### *Measures*

#### Dependent variable

*Child aggression.* Child aggression was assessed via mothers' responses to aggression-related items from the Child Behavior Checklist (CBCL), collected when child was 3 (19 items) and 5 years (20 items), with a total range of 0-36 at age 3 and 0-35 at age 5. Generally, the CBCL assesses children's internalizing (i.e., anxious, depressive, and over-controlled) and externalizing (i.e., aggressive, hyperactive, noncompliant, and under-controlled) behaviors (Achenbach & Ruffle, 2000). The aggression items were summed and standardized to yield a continuous child aggression score. The CBCL has previously been used with parents of one-year old children and found to be valid and to predict later behavioral problems (Van Zeijl et al., 2006). Construct validity has been demonstrated in a study among children, comparing the CBCL aggressive subscale to Diagnostic and Statistical Manual of Mental Disorders (DSM)-oriented scales (Ebesutani et al., 2010).

### Primary independent variable

*Work-family stress (WFS).* Work-family stress was assessed via mothers' responses to 3 items related to her ability to balance work and family demands, collected when children were 1, 3, and 5 years old. Mothers reported how often they experienced each item: "my shift and work schedule (cause/caused) extra stress for me and my child/children", "where I (work/worked), it (is/was) difficult to deal with child care problems during working hours", "in my work schedule I (have/had) enough flexibility to handle family needs". Item responses ranged from 1 = never to 4 = always, with a total range of 3-12. Item 3 was reverse coded to align with the negative phrasing of items 1 and 2. A variable for high work-family stress was created as an indicator for whether a mother scored >8, based on data distribution (~90th percentile). This cut point captured the highest (i.e. most stressed) decile of mothers as related to reporting work-family stress. These items were derived from Arthur Emlen's Work Flexibility Scale, comprised of 5 items validated across different samples. Items from this scale have been used in previous FFCWS research (Castillo, Welch, & Sarver, 2012).

### Covariates

To adjust for potential confounding variables that may be associated with both mothers' WFS and child aggression, we included covariates related to characteristics of mother, work context, and family/household environment. The inclusion of these covariates is supported by prior research on work-family stress and family-related outcomes, including child behavior (Amstad et al., 2011; McLoyd et al., 2008).

*Maternal covariates* included a categorical measure of education (less than high school, high school or equivalent, some college or technical school, college graduate) and a continuous variable for age, measured at baseline. Chronic depression was included as an indicator variable

for whether the mother satisfied a diagnosis of depression, as determined by the Composite International Diagnostic Interview - Short Form (score CIDI-SF), during at least 2 time points when her child was ages 1, 3, or 5 years.

*Work-related covariates* included number of hours worked per week and weeks worked per year, included as continuous time-varying variables, measured when children were 1, 3, and 5 years. Nontraditional work hours were included as a time-varying indicator variable, constructed for mothers who reported working at least one nontraditional work schedule: evenings, nights, weekends, different times each week, measured when children were 1, 3, and 5 years.

*Family/household environment covariates* included measures of parent and partner relationships, childcare, and income. Violent or controlling relationship with her partner was included as a time-varying indicator of whether the mother reported that the biological father or her partner sometimes or often engaged in one or more of six violent or controlling behaviors: “isolates you from friends/family”, “tries to prevent you from going to work/school”, “withholds/tries to control your money”, “slaps or kicks you”, “hits you with fist or dangerous object”, “forces you to have sex/do sexual things”, measured when children were 1, 3, and 5 years. Childcare multiplicity was measured when child was 1 year old as an indicator variable representing mothers who reported currently using at least 2 different care arrangements. This concept of childcare has been used in prior FFCWS studies examining child care and child behavior (Pilarz & Hill, 2017). Number of children under 18 years living in household was measured continuously when children were 1, 3, and 5 years, and included as a time-varying covariate. Pre-tax household income was measured as a continuous variable standardized around

mean 0, measured at baseline, derived from a constructed variable with imputed values included in the dataset.

Similar to other papers examining child behavior in the FFCWS (Lee et al., 2015; Pilkauskas, Brooks-Gunn, & Waldfogel, 2018), we discussed child age as it is defined by wave of data collection (e.g. age 1 at wave 2, age 3 at wave 3, age 5 at wave 4). Child behavior is related to child age. Specifically, aggressive and defiant behavior is an important part of normal child and adolescent development, therefore judgement about the significance of the level of antisocial behavior has to be made in the context of the child's age (National Collaborating Centre for Mental Health, 2013). Within the FFCWS there is a range of child ages represented at each wave of data capture. Despite the ranges, we opted not to control for child age in our final model because the majority of children fell within +/- 6 months of the target age at interview (82.5% within 6 months of target age at wave 2, ~ age 1 year; 99.3% at wave 3, ~ age 3 years; 97.5% at wave 4, ~ age 5 years).

### *Analytic Plan*

#### Preliminary Analysis

First, we calculated descriptive statistics of our analytic sample and key variables. We evaluated whether the demographics of the analytic sample were significantly different from the excluded sample, using Wilcoxon rank sum tests for continuous variables and chi-squared tests for categorical variables. We considered several covariates that may be associated with both work-family stress and child aggression and determined which covariates to include in the final model by independently regressing each covariate against the primary exposure (WFS) and the outcome (child aggression) at each time point. Those covariates demonstrating a joint association, in bivariable analysis, with both WFS and aggression at the  $p < 0.2$  level of

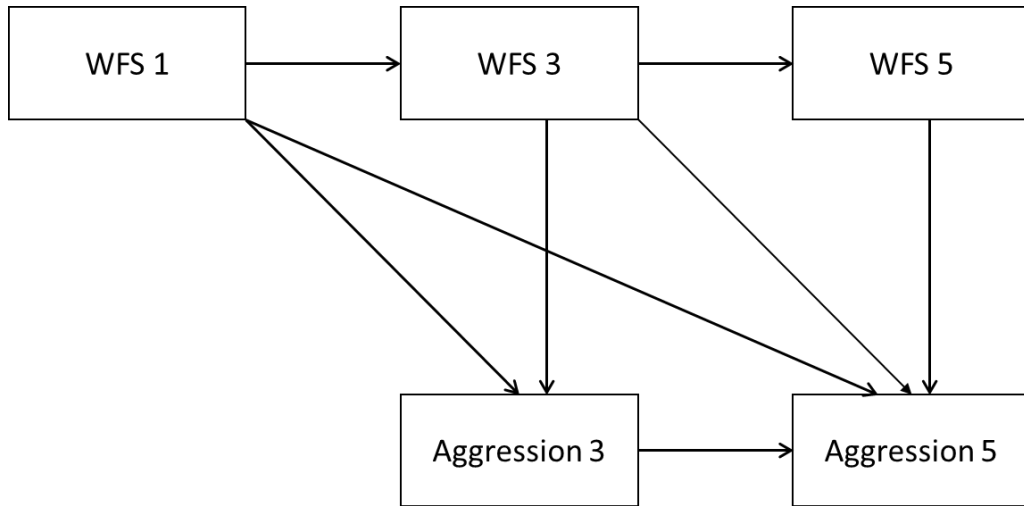
significance, at any wave of data collection (ages 1, 3, or 5), were kept in the final model (**Appendix:** Table A1.1).

### Primary Analysis

Path analysis was employed to jointly test associations between WFS measured at three time points (when children were 1, 3, and 5 years) and child aggression measured at two time points (when children were 3 and 5 years) (**Figure 1.1**). Structural equation modeling, more broadly, is an appropriate method for this analysis because of its suitability to test multiple associations simultaneously, including the direct and indirect associations of all predictors while taking into account a variety of covariates. First, an unadjusted model was run to determine the crude association between WFS and child aggression score, over time. Second, we conducted multivariable analyses to account for a range of maternal, work, and family/household-related variables that could potentially confound the relationship between WFS and aggression. All statistical modeling was conducted using SEM in StataSE version 15.

Satisfactory model fit was indicated by a Comparative Fit Index (CFI) and Tucker Lewis Index (TLI)  $> 0.90-0.95$ , and root mean squared error of approximation (RMSEA)  $< 0.05-0.08$  (Hu & Bentler, 1999). The traditional goodness-of-fit criterion of a nonsignificant chi-square test was relaxed because the chi-square value is known to be influenced by large sample sizes (Cheung & Rensvold, 2002).

**Figure 1.1. Analytic Model Associating Work-family Stress and Childhood Aggression**



### Missing Data

The sample was restricted to those mother-child pairs with complete information on WFS and child aggression scores. Rates of missingness for WFS and child aggression items are detailed in **Appendix:** Table A1.2. Among the analytic sample, there was a small proportion of missing data on covariates included in the final model, ranging from 0 to 4.5%. To account for missing data in the sample we used full information maximum likelihood estimates, adjusting the likelihood function so that each case contributed information on the variables that were observed (Enders & Bandalos, 2001), using the method(mlmv) option in Stata.

## ***RESULTS***

### Preliminary Analysis and Descriptive Results

**Table 1.1** provides sample descriptive statistics for our analytic sample (n=1,364), excluded sample (n=3,534) and the full FFCWS cohort (N=4,898). The analytic sample is racially and ethnically diverse, 59% Black Non-Hispanic, 20% White, 18% Hispanic, 3% other. Fifty-nine percent of the mothers had a high school education or less and 59% reported being

married to or cohabitating with the child’s biological father or another partner. Sixty-six percent of mothers reported working nontraditional work hours, including evenings, nights, weekends, or different times each week. We determined that there were several significant differences in the demographics of our analytic sample compared to the excluded sample. Namely, there were significant differences in demographics related to mothers’ racial/ethnic composition, educational attainment, and relationship status. Additionally, the distribution of household incomes and the number of children living in the household were significantly different in the analytic sample compared to the excluded sample.

WFS levels ranged from 3-12 at each wave (age 1, mean: 4.87, SD: 1.99, scale reliability demonstrated by Chronbach’s  $\alpha=0.59$ ; age 3, mean score: 4.89, SD: 2.05,  $\alpha=0.62$ ; age 5, mean: 4.92, SD: 2.00,  $\alpha=0.61$ ). At age 1, 9.82% of sample was categorized as high WFS, at age 3 11.44% categorized as high WFS, and at age 5 10.12% categorized as high WFS. Aggression scores ranged from 0-36 at age 3 (mean: 11.54, SD: 6.59,  $\alpha = 0.88$ ); and 0-35 at age 5 (mean: 10.75, SD: 6.08,  $\alpha= 0.85$ ).

**Table 1.1: Characteristics of FFCWS Families: Full Sample (N=4,898), Analytic Sample (n=1,364), and Excluded Sample (n=3,534)**

Note: p-values reference comparisons between analytic and excluded samples

	Full Sample (N=4,898)	Analytic Sample (n=1,364)	Excluded Sample (n=3,534)	p-value
Mother’s race/ethnicity, baseline				<0.001***
White, Non-Hispanic	21.0	20.2	21.4	
Black, Non-Hispanic	47.5	58.5	43.2	
Hispanic	27.3	18.0	30.8	
Other	4.0	3.2	4.3	
missing	0.2	0.2	0.3	
Mother’s education, baseline				<0.001***
< High school	39.7	30.7	43.1	
High school or equiv	25.3	28.3	24.1	
Some college, trade, technical	24.3	29.2	22.4	
College, graduate, or professional	10.7	11.7	10.3	
missing	0.1	0.2	0.1	



**Table 1.1 (Continued)**

Relationship Status, child age 1 ( <i>married/cohabitating with biofather or partner</i> )				0.003**
Yes	55.3	58.8	53.9	
missing	11.3	0.4	15.5	
Partner violent/controlling, child age 1				0.214
Yes	12.5	11.5	12.8	
missing	0	0	0	
Pre-tax household income, last 12 months (w imputed values), baseline				<0.001***
<=10,000	25.1	20.6	26.8	
10,001-30,000	42.4	44.1	41.7	
30,001-60,000	15.0	15.6	14.7	
>60,000	17.6	19.7	16.8	
missing	0	0	0	
Number of children <18 in household, child age 1				<0.001***
0	0.5	0.1	0.6	
1-2	56.9	65.1	53.8	
3-4	25.2	28.1	24.0	
>5	17.5	6.7	21.6	
missing	0	0	0	
Child sex				0.195
Male	52.4	51.0	53.0	
missing	0.02	0	0.03	
Child low birthweight, baseline				0.419
Yes	9.9	9.4	10.1	
missing	2.8	2.3	3.1	
Child temperament, child age 1; mean (SD) ( <i>a measures of the child's tendency to become easily and intensely aroused, age 1</i> )	2.8 (1.1)	2.8 (1.0)	2.8 (1.1)	0.474
[range]	[1-5]	[1-5]	[1-5]	
missing	11.9	0.6	16.2	
Childcare multiplicity, child age 1				<0.001***
Yes	66.9	53.2	72.1	
missing	0	0	0	
Maternal age (years), baseline; mean (SD)	25.3 (6.0)	24.8 (5.8)	25.4 (6.1)	0.003**
[range]	[15-43]	[15-43]	[15-43]	
missing	0.1	0	0.1	
Child age (months), child age 1; mean (SD)	15.0 (3.5)	15.3 (3.5)	14.9 (3.4)	<0.001***

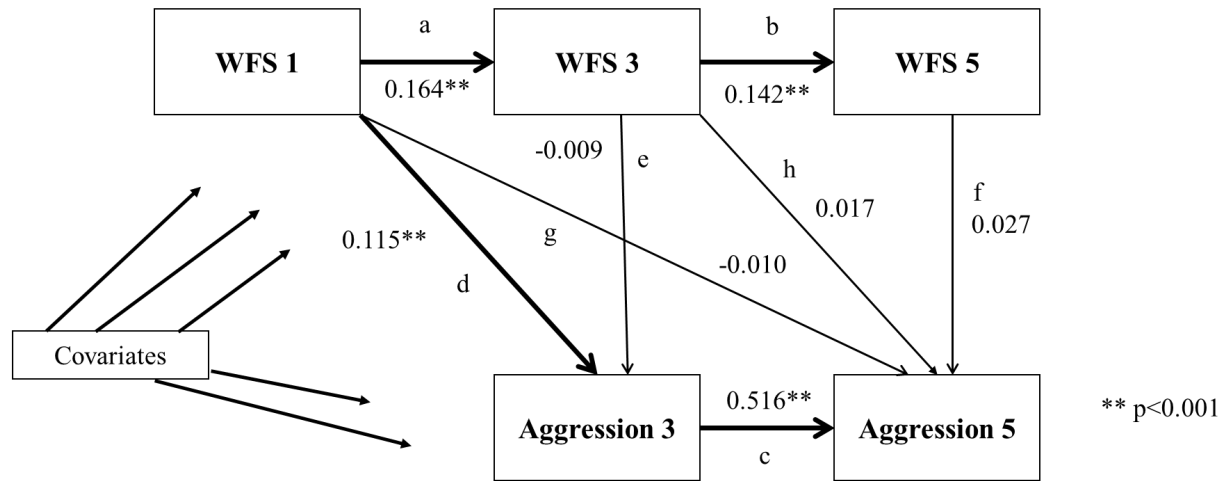
**Table 1.1 (Continued)**

[range]	[9-30]	[9-30]	[9-30]	
missing	11.1	0.2	15.3	
Mother's work, hours/wk, child age 1; mean (SD)	35.5 (11.9)	35.7 (11.7)	35.5 (11.9)	0.662
[range]	[1-80]	[1-80]	[1-80]	
missing	18.3	0.2	25.3	
Mother's work, weeks/year, child age 1; mean (SD)	34.4 (18.1)	35.0 (17.7)	34.0 (18.3)	0.149
[range]	[1-52]	[1-52]	[1-52]	
missing	39.5	4.5	53.0	
Mother's work, nontraditional hours, child age 1				0.128
Yes	56.0	66.2	52.0	
missing	17.5	0.1	24.2	
Mother's chronic depression				0.062
Yes	11.9	13.3	11.4	
missing	0	0	0	

### Primary Analyses & Model Results

*Direct Paths.* Path analysis results testing the association between WFS and aggression are presented in **Figure 1.2** and described below. Standardized coefficients are reported for all paths. After adjusting for a host of covariates related to mothers, their work, and their family/household environments, WFS1 was significantly positively associated with aggression scores at age 3 (**path d**) ( $\beta = 0.115$ ,  $p=0.001$ ). There were also significant positive associations between WFS over time ((**path a**)  $\beta = 0.164$ ,  $p<0.001$  WFS1 to WFS3; (**path b**)  $\beta = 0.142$ ,  $p<0.001$  WFS3 to WFS5). Aggression scores at age 3 were significantly positively associated with aggression scores at age 5 (**path c**) ( $\beta = 0.516$ ,  $p<0.001$ ). The unadjusted model demonstrated similar results and additionally detected a significant positive association between WFS5 and aggression at age 5 (path f) (**Appendix: Figure A1.2**).

**Figure 1.2. Adjusted Path Model Results Testing Associations between WFS and Childhood Aggression, Standardized Coefficients (n=1,364)**



*Covariates including mother's education, mother's age, household income, violent/controlling relationship with partner, # children < 18 years in household, weeks worked/year, hours worked/week, nontraditional work hours, mother's chronic depression, were included to predict exposure (work-family stress) and outcome (aggression), at each time point. Multiplicity in childcare arrangements at age 1 was used to predict WFS1 only.*

**Indirect Paths.** Two positive and significant indirect paths were observed in our adjusted model. First, there was a significant indirect association between WFS1 and aggression score at age 5 ( $\beta = 0.059$ ,  $p < 0.001$ ), mediated through aggression score at age 3. Second, there was a significant indirect effect between WFS at age 1 and WFS at age 5 ( $\beta = 0.023$ ,  $p < 0.001$ ) mediated through WFS at age 3.

**Model Fit.** Fit statistics for our model were as follows:  $\chi^2(56) = 91.97$ ,  $p = 0.002$ ; CFI = 0.978; TLI = 0.911; RMSEA = 0.065. Following standards for acceptable model fit (Kline, 2015), these observed statistics suggest that the model has adequate fit with the exception of the  $\chi^2$  statistic.

## **DISCUSSION**

Using data from a cohort of socioeconomically disadvantaged, urban mothers and their children, we found that WFS reported during child's first year was significantly associated with

child aggression scores at age 3 and indirectly associated with aggression scores at age 5 through aggression scores at age 3. The indirect effect we observed shows an association between early exposure of WFS and later childhood aggression and supports a strategy for early intervention. Our results also indicate that WFS experienced when children were 1 year was associated with WFS when children were 3 years, which in turn was associated with WFS when children were 5 years, demonstrating that the experience of WFS may be persistent in mothers' lives, and therefore the spillover stress experienced by her children is chronic. Adjusting for a host of covariates related to mothers, their work, and the household/family environment attenuated these associations but they remained significant.

Prior work has documented associations between early life externalizing behaviors, like aggression, defiance, and destructive behavior (Fanti & Kimonis, 2017) with individual and family-level exposures, such as, maternal depression, and parent-child conflict (Abulizi et al., 2017; Kochanska, Kim, & Boldt, 2013). Recognizing that child behavior may also be influenced by conditions and experiences of mothers' employment provides an additional target for intervention. According to 2017 data from the Bureau of Labor Statistics, 62% of women with children under 3, and 59% of women with children under 1 year participate in the labor force (Bureau of Labor Statistics. Women in Labor Force data book. Source: Current Population Survey (CPS)/Graph by the Women's Bureau, 2017), thereby implications of maternal WFS could be relevant to the majority of women and their families.

This study offers several strengths. First, by modeling the data longitudinally, we are able to examine the temporal sequence of associations, particularly important because the association between WFS and child aggression could be subject to reverse causation. It is possible that child aggression leads to greater WFS. We did not consider this directionality in

our analytic model because the three items comprising the WFS measure capture aspects of work schedule flexibility and stress imposed by the work environment, qualities that are unlikely to be affected by child behavior. Second, the FFCWS offers rich data related to mothers, children, households, and work contexts, allowing us to control for a variety of potential confounders, an essential strength given current evidence about the multilevel and complex relationship between mothers' stress and subsequent child behavior. Third, child aggression scores were measured using the CBCL, a widely used, cross-culturally validated scale assessing child behavior that demonstrated strong internal validity for the analytic sample. Finally, it is likely that WFS poses a disproportionate burden on low-income households and our study sample allows us to explore this association in a socioeconomically disadvantaged, racially and ethnically diverse population.

Of critical concern is the possibility that our findings suffer from missing data bias. We eliminated 52% of the original sample due to non-participation in surveys used in this analysis. It is likely that those families who actively participate in the study (i.e., those in our analytic sample) are more advantaged compared to those who do not consistently respond to interviews over time. Comparing the demographics of our analytic sample with the excluded sample revealed that the analytic sample is significantly higher education, has a larger proportion of married mothers, and fewer children living in the household, therefore these findings may only be generalizable to a potentially less fragile sample of families compared to the FFCWS cohort. Additionally, those families missing data on WFS and child aggression likely represent both higher stress and aggression scores. Participants may fail to provide this information if they determine their responses are not socially desirable. Excluding them, therefore, would result in an upward bias of our observed results. We also believe there are limitations to the WFS measure. This score, comprised of 3 items, was limited to questions about schedule and

flexibility, demonstrating only moderate scale reliability. A more robust scale is critical to a deeper understanding about *how* WFS contributes to aggression in children. Also, these analyses may suffer from reporting bias. The child aggression measure is based on mothers' self-reports. It is possible that stressed mothers may be more critical of and/or sensitive to their child's behavior and thus score them higher on the aggressive scale, resulting in an upward bias of the observed association between WFS and aggression. Alternatively, more stressed mothers may be less engaged with their children and less observant of or affected by their child's behavior, thereby attenuating the association we observed. The magnitude and directionality of potential reporting bias is not known. Lastly, the conclusions drawn from this research are not causal. Future research should be designed to disentangle causal relations between these key variables (e.g., an experimental study focused on reducing maternal WFS and measuring possible subsequent reductions in child aggression).

## ***CONCLUSIONS***

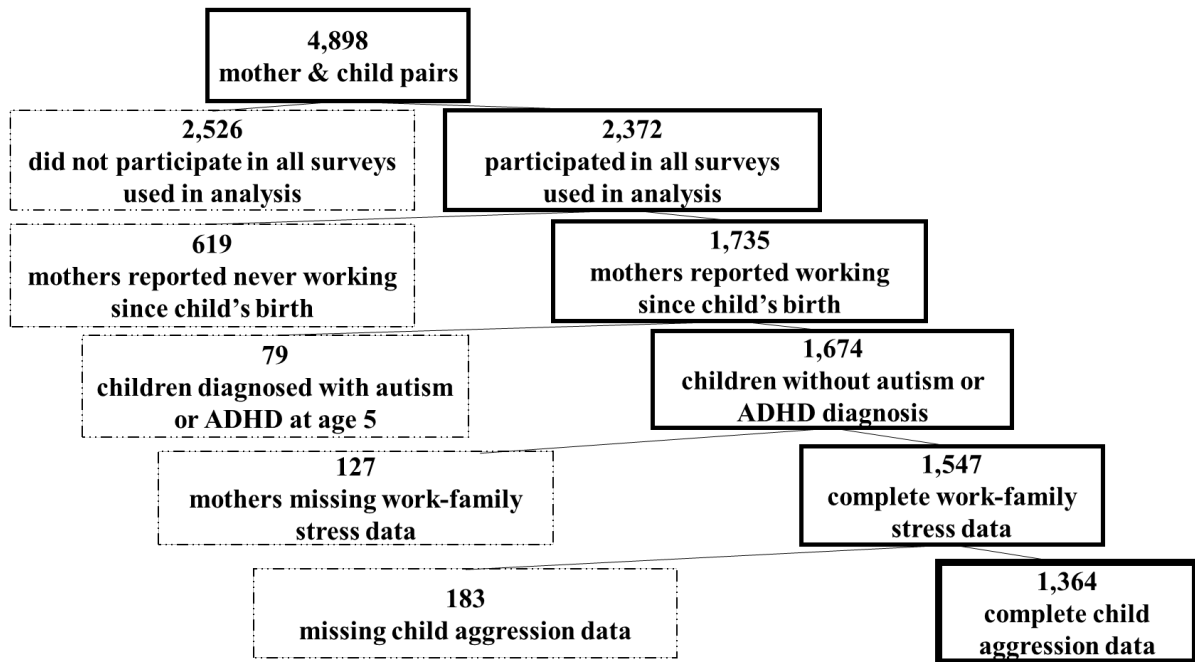
Findings from this study suggest that programs and/or policies that decrease WFS and facilitate improved work-family balance early in motherhood, particularly during child's first year of life, may reduce childhood aggression. Such programs could include tax incentives to encourage companies to provide paid parental leave for hourly employees, increasing amount of and/or access to subsidies for childcare assistance, developing programs in tandem with existing infrastructure that serves socioeconomically disadvantaged mothers and children (e.g. WIC, early intervention programs, Head Start) to provide extended hour and/or emergency childcare services. Several large corporations (e.g., Starbucks, Walmart) have begun providing parental leave benefits to hourly employees (Miller, 2018). Walmart provides the same parental leave to

both salaried employees and full-time hourly employees (16 weeks for birth mothers; 6 weeks for other parents, fully paid). Starbucks provides 6 weeks paid leave for both part-time and full-time hourly employees (Miller, 2018).

In addition to improving policies and programs related to parental leave and childcare, social service programs addressing the health and educational needs of at risk children (e.g., Head Start) could provide supplemental behavioral interventions to address issues with self-regulation and early aggression as part of their kindergarten readiness curriculum. Given the strong association observed between early aggression scores and later aggression scores, it is important to identify early signs of aggression, supporting those “early starters” and their caregivers with resources and programs that offer behavioral strategies and caregiver support.

Paper 1 Appendix

Figure A1.1: Inclusion and Exclusion Processes for the Analytic Sample (n=1,364) from the Fragile Families and Child Wellbeing Study (FFCWS)





**Table A1.1: Bivariable Associations between Covariates and (1) Work-Family Stress (WFS), and (2) Child Aggression Score**

\* significant at  $\alpha=0.2$  level

Covariates	WFS (Primary Exposure) & Child Aggression (Outcome)				
	WFS (age 1)	WFS (age 3)	WFS (age 5)	Aggression (age 3)	Aggression (age 5)
Maternal race/ethnicity					
White	-0.2784	0.1097	0.0561	-0.4211	-0.4235
Black Non-Hispanic	0.1550	-0.1009	-0.1271	-0.1163	0.0191
Hispanic	-0.0685	-0.0086	-0.0511	0.5831	0.5441
Other	0.4114	0.2341	0.7374*	0.3199	-0.5534
Maternal education at child's birth					
< High school	0.4146*	0.4660*	0.2435	1.5526*	2.0597*
High school or equiv	0.0126	-0.2602*	-0.2543	0.4368	0.2898
Come college, tech	-0.2032	-0.1551	0.1772	-0.9498*	-1.0814*
College or grad	-0.6575*	-0.2424	-0.4702*	-2.1462*	-2.6362*
Maternal age at child's birth	-0.0137	-0.0268*	-0.0109	-0.1039*	-0.1087*
Household income at child's birth					
<\$10,000	0.5164*	0.3632*	0.3882*	0.3924	1.1827*
\$10,001-\$30,000	-0.3132*	0.0044	0.1007	0.9943*	0.7964*
\$30,001-\$60,000	-0.3411	0.0880	-0.4570*	-0.6540*	-0.8862*
>\$60,000	0.1356	-0.5634*	-0.2803	-1.4135*	-1.7294*
Relationship status	-0.1740	-0.1491	0.0095	-0.5680*	-1.1991*
Violent/controlling relationship	0.9184*	0.3640*	1.0861*	1.8652*	1.8541*
Number children in hh <18 yrs	0.1429*	0.1111*	0.0140	0.3934*	0.2968*
Child age	0.0585	0.0476	0.2400*	-0.2251	0.1222
Child sex	-0.0571	-0.1310	0.0747	-1.1821*	-0.5670*
Child low birthweight	-0.1808	0.0676	0.0955	0.5380	0.9572*
Childcare stability	-0.1802	0.0441	-0.2279	-1.1902*	-0.8067*
Childcare multiplicity	0.2239	0.1158	0.4909*	0.8838*	-0.4410
Number weeks worked/year	-0.0098*	-0.0146	-0.0204*	-0.0359*	-0.0194*
Number hours worked/week	0.0091	0.0211*	0.0283*	-0.0235*	0.0231*
Nontraditional work hours	0.4449*	0.8471*	0.3788*	1.0741*	0.8913*
Maternal chronic depression	0.6723*	0.8318*	1.3139*	3.1584*	2.7815*

**Table A1.2: Missing Data on Work-Family Stress Items and Child Aggression Score Items, by Study Wave**

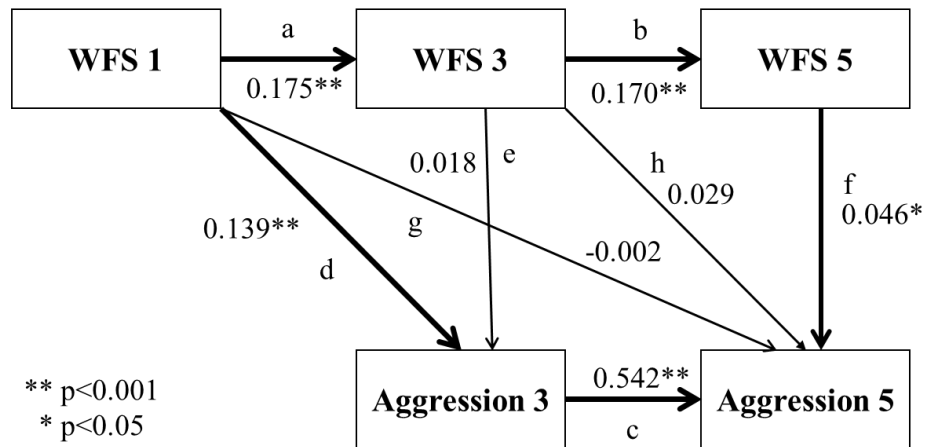
Work-Family Stress		
Item	N	% missing
Wave 2 (Age 1)		
Always/sometimes/never-my work schedule causes extra stress	0	0
Always/sometimes/never-it's difficult to deal w/childcare probs during wrkg hours	25	1.5
Always/sometimes/never-my schedule allows me to handle family needs	12	0.7
% missing ANY WFS items – dropped from analysis	34	2.0
Wave 3 (Age 3)		
Always/sometimes/never-my work schedule causes extra stress	55	3.3
Always/sometimes/never-it's difficult to deal w/childcare probs during wrkg hours	55	3.3
Always/sometimes/never-my schedule allows me to handle family needs	55	3.3
% missing ANY WFS items – dropped from analysis	57	3.4
Wave 4 (Age 5)		
Always/sometimes/never-my work schedule causes extra stress	49	2.9
Always/sometimes/never-it's difficult to deal w/childcare probs during wrkg hours	50	3.0
Always/sometimes/never-my schedule allows me to handle family needs	48	2.9
% missing ANY WFS items – dropped from analysis	51	3.1
Child Aggression Score		
Wave 3 (Age 3)		
He/she can't stand waiting, wants everything now	92	5.5
He/she is defiant	22	1.3
His/her demands must be met immediately	8	0.5
He/she destroys things belonging to his family or oth children	95	5.7
He/she is disobedient	4	0.2
He/she doesn't seem to feel guilty after misbehaving	6	0.4
He/she is easily frustrated	3	0.2
He/she gets in many fights	5	0.3
He/she hits others	7	0.4
He/she hurts animals or people without meaning to	96	5.7
He/she has angry moods	5	0.3
He/she physically attacks people	99	5.9
Punishment doesn't change (his/her) behavior	9	0.5
He/she screams a lot	4	0.2
He/she is selfish or won't share	5	0.3
He/she is stubborn, sullen, or irritable	7	0.4
He/she has temper tantrums or hot temper	4	0.2
He/she is uncooperative	10	0.6
He/she wants a lot of attention	7	0.4
% missing ANY aggression items – dropped from analysis	158	9.4
Wave 4 (Age 5)		

**Table A1.2 (Continued)**

He/she argues a lot	2	0.1
He/she brags or boasts	6	0.4
He/she is cruel, bullies and shows meanness to others	4	0.2
He/she destroys (his/her) own things	3	0.2
He/she destroys things belonging to family or others	3	0.2
He/she is disobedient at home	5	0.3
He/she is disobedient at school or in childcare	12	0.7
He/she is easily jealous	3	0.2
He/she gets in many fights	2	0.1
He/she physically attacks people	2	0.1
He/she screams a lot	2	0.1
He/she shows off or clowns around	4	0.2
He/she talks too much	5	0.3
He/she teases a lot	2	0.1
He/she threatens people	3	0.2
He/she is unusually loud	6	0.4
True/not true: child is stubborn, sullen or irritable?	103	6.2
True/not true: child wants a lot of attention?	102	6.1
True/not true: child has sudden changes in mood or feelings?	102	6.1
True/not true: child has temper tantrums or a hot temper?	102	6.1
% missing ANY aggression items – dropped from analysis	133	8.0

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**Figure A1.2. Unadjusted Path Model Results Testing Associations between WFS and Childhood Aggression, Standardized Coefficients (n=1,364)**



Significant positive associations were detected between WFS and child aggression scores: (**path d**,  $\beta = 0.139$ ,  $p < 0.001$  WFS age 1 to aggression score age 3; **path f**,  $\beta = 0.046$ ,  $p = 0.049$  WFS age 5 to aggression score age 5). Also, significant positive associations observed between WFS over time (**path a**)  $\beta = 0.175$ ,  $p < 0.001$  child age 1 WFS to child age 3 WFS; (**path b**)  $\beta = 0.170$ ,  $p < 0.001$  child age 3 WFS to child age 5 WFS). Similarly, aggression scores were significantly associated between child age 3 and child age 5 (**path c**) ( $\beta = 0.542$ ,  $p < 0.001$ ). No significant associations were detected between WFS at child age 1 and aggression score at age 5 (path g), WFS at age 3 and aggression scores at age 3 (path e) or 5 (path h).

Figure A1.2

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## Paper 2

### Quality of fathers' co-parenting inversely associated with child television viewing

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## ABSTRACT

**Objective.** To examine the association between three measures of fathers' engagement (co-parenting, instrumental support provided to child's mother, participation in activities with his child) and child television (TV) viewing among 3 and 5 year olds.

**Methods.** Using data from 1,313 families from the Fragile Families and Child Wellbeing Study, we used mixed effects linear regression models to test associations between father engagement and child TV viewing. Father engagement was constructed as three separate variables based on mothers' reports. Quality of co-parenting was constructed as a summed score of 6 items related to how much mothers trusted and valued fathers' participation in parenting. Instrumental support were constructed as a summed score of 4 items describing how often father shared household and childcare responsibilities with mother. Participation in activities with his child was constructed by averaging the number of days/week father participated in a variety of activities with his child, related to showing affection, playing, eating, and entertaining. Television viewing was based on mothers' reports of the average number of hours/day her child watches TV.

**Results.** In unadjusted models, only co-parenting was significantly associated with child TV viewing. No significant association were detected between instrumental support and TV viewing or participation in activities with child and TV viewing. We observed a significant age by co-parenting interaction effect such that fathers' co-parenting was significantly negatively associated with child TV viewing when children were 3 years old ( $\beta = -0.087$ ,  $p < 0.001$ ), and not significantly associated with child TV viewing when children were 5 years old ( $\beta = -0.001$ ,  $p = 0.973$ ). After adjusting for child, father, and family/household covariates co-parenting

remained a significant predictor of child TV viewing when children were 3 years old ( $\beta = -0.057$ ,  $p = 0.040$ ). Each one point increase in co-parenting score was associated with, on average, 4 minutes less TV viewed by child per day.

***Conclusion.*** Fathers participate in family life and support their families in varied ways and benefits of engagement may vary by child age. In order to create targeted interventions, future research should consider which types and when father engagement may be most salient for specific child health outcomes.

## ***INTRODUCTION***

### *Television viewing and child health.*

The American Academy of Pediatrics recommends limiting screen use to 1 hour per day in children 2 to 5 years of age (Council on Communications and Media, 2016). According to Common Sense Media, a technology education nonprofit geared towards parents, educators, and policymakers, kids age 8 and under spend an average of 2 hours and 19 minutes a day with screen media (Rideout, 2017), more than double the current health recommendation. The majority of screen time, especially among younger children is spent watching television (TV). Rates of TV viewing are highest among low income children, independent of parent's education (Saunders & Vallance, 2017; Yang-Huang et al., 2017). Among children, TV viewing has been linked to increased sedentary behavior, decreased sleep and sleep quality, decreased health-related quality of life, poor physical health (e.g., increased BMI, musculoskeletal pain) and psychosocial health outcomes (e.g., self-esteem, anxiety, academic achievement) (Gopinath, Hardy, Baur, Burlutsky, & Mitchell, 2012; Hale & Guan, 2015; Saunders & Vallance, 2017). There is a large evidence base examining children's' TV viewing and health. Given that: (1) TV viewing is associated with poor physical and socio-emotional health outcomes, (2) children are watching more TV than recommended and the trends related to screen time use are increasing (Rideout, 2017), and (3) there are documented socioeconomic disparities in the amount of TV watched by children, it is important to study factors that influence TV viewing to identify potential levers for intervention, specifically among low socioeconomic families.

### *The role of fathers & research on father engagement.*

The role of father as caregiver has changed dramatically in recent decades (Parker & Wang, 2013). According to 2016 data from the Pew Research Center, fathers have nearly tripled

their time spent with children between 1965 and 2016, up from on average 2.5 hours per week to 8 hours per week, and more than doubled the time spent on household chores during that same time period (The Pew Research Center, 2018). Given the change in family dynamics, namely the shift to increased father involvement with childcare, it is essential for studies to consider fathers' role as caregiver and directly measure how fathers' participation may impact child health.

Researchers have conceptualized and operationalized father engagement many ways which complicates the process of determining how fathering is most beneficial to children (Adamsons & Johnson, 2013). Constructs for father engagement include cohabitation, duration of time spent with children and types of activities shared, quality of relationship with mother or primary caregiver, and various types of support provided to their families (e.g., instrumental, financial, and social) (Allport et al., 2018; Lamb, Pleck, & Levine, 1985). Prior research has documented associations between father engagement and child physical and mental health outcomes, quality of mother-father relationship, parental stress, and family cohesion (Allen & Daly, 2007; Allport et al., 2018; Guterman, Bellamy, & Banman, 2018; Nomaguchi, Brown, & Leyman, 2017).

Many studies that have addressed father engagement and its impact on child health have focused on socioemotional, cognitive, and academic outcomes in children (Castillo, Welch, & Sarver, 2011). Research considering the influence of father engagement on child weight status and weight-related behaviors, specifically, are lacking in the literature.

#### *Father engagement and child TV viewing.*

Prior research has demonstrated that parents influence their children's behavior through the environments they create at home (e.g., food environment, TVs in bedrooms) and by modeling (Davison, Francis, & Birch, 2005; O'Connor et al., 2017). Much of the parental influence on child weight-related behavior research examines measures of parental influence

directly related to modeling (time spent watching TV in home, watching TV with child, rules around how much TV children are able to watch) (Davison et al., 2005; Salmon, Timperio, Telford, Carver, & Crawford, 2005; Yalçın, Tuğrul, Naçar, Tuncer, & Yurdakök, 2002). There is less research exploring ways parents may influence their children's TV viewing through relationships and interactions that do not explicitly model or directly relate to TV viewing (Wong et al., 2017). Additionally, much of the research associating parental influence on child weight and weight-related behaviors, like TV viewing, has focused on mothers as primary caregivers (O'Connor et al., 2017; Wong et al., 2017). A recent study by Wong and colleagues that focused on fathers found that increases in fathers' caregiving, defined as preparing meals for child, taking child outside for walks or play in the yard, a park, or playground, looking after child while mother did other things, and performing other physical childcare tasks, were associated with decreases in childhood obesity (Wong et al., 2017). While this study tested for associations between father engagement and screen time hours, no statistically significant associations were found (Wong et al., 2017). In this study, black populations were underrepresented, comprising only 5% of the sample. Additional work is needed to explore the association between father engagement and child TV viewing in racially and ethnically diverse samples.

#### *Theoretical frameworks.*

Family systems and parenting theories support that fathers' engagement with their families, namely the relationships with their partners and children, influence parenting and child behavior. Bowens Family Systems Theory views the family as an emotional unit and uses systems thinking to describe the complex interactions in the unit (Kerr, 2002). The connectedness and reactivity make the functioning of family members interdependent. A change in one person's functioning is predictably followed by reciprocal changes in the functioning of

others (Kerr, 2002). People solicit each other's attention, approval, and support and react to each other's needs, expectations, and upsets. Within the family unit, sources of stress and support influence parenting behavior and subsequent child development (Belsky, 1984). Supported by the Social Ecological Model, the research described herein assumes that children are nested within the context of their family, neighborhood, society, and culture and these multiple and interacting levels of influence shape child behavior (Bronfenbrenner, 1979).

*The present study.*

There is scant research specifically examining how father engagement is associated with child TV viewing. Additionally, prior work on father engagement and child health, for the most part, has investigated a single measure of father engagement, or engagement as it relates to modeling specific behaviors directly related to the research outcome. This research adds to the existing literature by (1) focusing on multiple broader aspects of fathers' engagement (not directly capturing TV-related behaviors) as predictors of child TV viewing, (2) examining these associations in a racially and ethnically diverse, predominantly low-socioeconomic sample of families, and (3) using longitudinal data to observe whether associations vary by child age, providing a more nuanced understanding of how and when father engagement demonstrates most significant associations.

Using data from the Fragile Families and Child Wellbeing Study (FFCWS), this study examines the following research question:

- Is father engagement, measured as quality of co-parenting, instrumental support provided to the child's mother, and participation in activities with his child, associated with child TV viewing when children are 3 and 5 years old?



On the basis of prior evidence and supported by theories related to family systems and parenting we hypothesize that father engagement, across all constructs (e.g., co-parenting, instrumental support, and participation in activities with children) will be negatively associated with child TV viewing at both age 3 and age 5.

## ***METHODS***

### *Data*

This study used data from FFCWS, a longitudinal, birth cohort study of 4,898 urban children born between 1998 and 2000 in 20 large U.S. cities to predominantly low-socioeconomic families (Reichman, Teitler, Garfinkel, & McLanahan, 2001). Baseline interviews were conducted with mothers and fathers at child's birth. Subsequent assessments included telephone interviews and in-home visits when the child was approximately 1, 3, 5, 9, and 15 years old. During interviews with mothers and fathers, information was collected on topics including attitudes, relationships, parenting behavior, and mental and physical health. Primary caregiver interviews, predominantly completed by biological mothers, collected information about child's behaviors and routines, mental and physical health, and characteristics of the home environment. Data for the current study came from mother, father, and primary caregiver interviews when children were 3 and 5 years old. Time invariant covariates came from additional waves of data (e.g., child temperament was collected when child was 1 year old; fathers' race/ethnicity, education, child sex were collected at baseline).

The analytic sample consisted of biological fathers and their respective child enrolled in the study. Families were included if (1) the biological father was cohabitating with the mother and child all or most of the time when the child was 3 and/or 5 years old, (2) primary caregiver

interviewers were completed when the child was 3 and 5 years old, and (3) complete information was available on child TV viewing (the primary outcome) when the child was 3 and 5 years old. We excluded 2,496 families (51% of baseline sample) due to the absence of a cohabitating father all or most of time when the child was 3 and/or 5 years old. We further excluded 1,067 families (44%) who did not complete primary caregiver interviewers when the child was 3 years (n=630) or 5 years (n=437) old. Finally, we excluded 22 families (2%) who were missing child TV viewing data at age 3 (n=4) or age 5 (n=18) (**Appendix**: Figure A2.1). Our final analytic sample included 1,313 families contributing 2,348 observations.

### *Measures*

#### Dependent variable

Child TV viewing. Average daily hours of television viewed by child was calculated from mothers' reports on how many hours/day her child watches TV during the week and on the weekend.

#### Primary independent variables

Father engagement. We examined three measures of father engagement (co-parenting, instrumental support to mother, and participation in activities with child), collected when children were 3 and 5 years old. We used mothers' reports of fathers' engagement, because mothers reported on all measures of engagement used in this analysis, whereby fathers self-reported on only one of the measures. For the measure in which we had data from both mothers and fathers (i.e. participation in activities with his child), we conducted a sensitivity analysis to examine how differences in reporting may have meaningfully influenced our results.

Co-parenting was constructed as a summed score of six items: (1) "when father is with child he acts like the father you want for the child," (2) "you can trust the father to take

good care of the child,” (3) “father respects the rules you make for the child,” (4) “father supports the way you raise the child,” (5) “you and father can talk about the problems that come up with raising the child,” and (6) “you can count on father for help when you need someone to look after child for a few hours”. Item responses ranged from 1 = never to 4 = always, with a total range of 6-24.

Instrumental support, quantified how often father shared household and childcare responsibilities with mother, and was constructed as a summed score of four items: (1) “he looks after (CHILD) when you need to do things?”, (2) “he run errands (for you) like picking things up from the store?”, (3) “he fixes things around your home, paints, or helps make it look nicer in other ways?”, (4) he takes (CHILD) places (he/she) needs to go, such as to daycare or the doctor?”. Item responses ranged from 1 = never to 4 = often, with a total range of 4-16.

Participation in activities with his child was constructed by averaging the number of days/week father participated in a variety of activities with child, related to showing affection, playing, eating, and entertaining (e.g., singing songs, reading stories, playing inside and outside). The item about how often father watches TV or videos with his child, collected when children were 5 years old, was omitted from the calculated score because this item is associated with our study outcome. Participation in activities scores ranged from 0-7.

### Covariates

To adjust for potential confounding factors that may be associated with both father engagement and child TV viewing, we included covariates related to characteristics of the father, child, and family/household environment. The inclusion of these variables is supported by prior literature on father engagement and child weight and weight-related behaviors (Allport et al., 2018; Wong et al., 2017).

*Father-related covariates*, based on fathers' reports, included education, race/ethnicity, and age, collected at baseline. Additionally, depression was included as an indicator variable for whether father was likely to satisfy a diagnosis of depression when his child was 3 years old, as determined by the Composite International Diagnostic Interview - Short Form (CIDI-SF). Several variables related to fathers' work were included because work obligations and schedule may impact opportunities for active parenting, providing support to mother, and engaging with one's child. Employment-related covariates included employment status, hours worked per week, working nontraditional hours, and working more than one job concurrently

*Child-related covariates*, included child sex and temperament. Research demonstrates that fathers tend to be more engaged with sons compared to daughters and more involved in caregiving tasks with sons than with daughters (Manlove & Vernon-Feagans, 2002). Similar to other papers examining child behavior in the FFCWS (Lee, Altschul, & Gershoff, 2015; Pilkauskas, Brooks-Gunn, & Waldfogel, 2018), we discuss child age as it is defined by wave of data collection (e.g. age 3 at wave 3, age 5 at wave 4).

*Family/household-related covariates*, based on mothers' reports, included marital status, number of children under 18 years old living in household, and pre-tax household income.

### *Analytic Plan*

#### Preliminary Analyses

First, we calculated descriptive statistics of our analytic sample and key variables. We evaluated whether the demographics of the analytic sample were significantly different from the excluded sample, using Wilcoxon rank sum tests for continuous variables and chi-squared tests for categorical variables. Because we used mother-reported measures of father-engagement, we conducted supplemental sensitivity analysis, separately running the model using fathers' reports

of participation in activities, and mothers' reports of fathers' participation in activities, in order to determine if differences in reporting meaningfully influenced our results.

Among the eligible sample, there was some missing data on covariates, ranging from 0 to 10%. For those variables missing more than 5% of data, we conducted Wilcoxon rank sum tests to compare whether mean child TV viewing was significantly different between the sample missing data on specific covariates included in the final model (fathers' age, fathers' employment, fathers' work hours, father working more than one job concurrently, fathers' nontraditional work hours, fathers' depression, fathers' participation in activities with child) and those not missing data on these covariates.

### Primary Analyses

We used mixed effects linear regression models, adjusting for multiple observations per individual, to test the association between fathers' engagement and child TV viewing when children were 3 and 5 years old. First, models were run to test the association between the three father engagement variables (i.e., co-parenting, instrumental support to mother, and participation in activities with child), separately, with child TV viewing. In these models, we also included a main effect for child age coded as a binary variable and an age by father engagement interaction term to explore the potential moderating effect of child age on the relation between father engagement and child TV viewing. Then, we conducted multivariable analyses, including any significant father engagement variables from our simple models, the corresponding age by engagement interaction term(s), and father-, child-, and family/household-related covariates. We conducted complete case analysis, dropping those observations with missing data on covariates. The sample size for each analysis is based on the maximum sample available. Sample size differs across analytic models because of missing data. All statistical modeling was conducted

using the mixed command in StataSE version 15. We used the lincom command to calculate age-specific betas, SEs, p-values, and confidence intervals for father engagement variables in cases where the interaction between father engagement by age was significant.

## ***RESULTS***

### Preliminary Analyses & Descriptive Results

**Table 2.1** provides descriptive statistics for our analytic sample (n=1,313). The sample was racially and ethnically diverse, with the majority being from minority groups. Educational attainment and household income were generally low, with approximately 58% of fathers reporting a high school education or less. Eleven percent of fathers were depressed when their child was 3 years old. We determined that there were several significant differences in the demographics of our analytic sample compared to the excluded sample. Namely, fathers' racial/ethnic composition and educational attainment were significantly different in the analytic sample compared to the excluded sample. Our analytic sample also had a significantly higher proportion of working fathers (78%) compared to the excluded sample (44%). Summary statistics of father engagement variables are described in **Table 2.2**. Correlations between these engagement measures ranged from .19 – .57. Average daily TV hours viewed by child ranged from 0-17 when children were 3 years old (mean: 3.06, SD: 2.15); and 0-19 when children were 5 years (mean: 2.72, SD: 1.85).

**Table 2.1: Demographic Characteristics of Families in Analytic Sample (n=1,313) Compared to Excluded Sample (n=3,585)**

	Analytic Sample (n=1,313)	Excluded Sample (n=3,585)	p-value
Fathers' Characteristics (father's report)			
Race/ethnicity, baseline (%)			<0.001***
White, Non-Hispanic	27.2	15.0	

**Table 2.1 (Continued)**

Black, Non-Hispanic	40.1	52.4	
Hispanic	28.9	27.2	
Other	3.7	4.7	
missing	0.1	0.7	
Education, baseline (%)			<0.001***
< High school	28.2	25.8	
High school or equiv	29.4	25.1	
Some college, trade, technical	24.8	16.3	
College, graduate, or professional	16.8	6.0	
missing	0.9	26.8	
Age (years), baseline (mean (SD))	28.7 (7.0)	27.6 (7.2)	<0.001***
[range]	[15-53]	[15-53]	
missing (%)	8.5	26.7	
Employed – work for regular pay in last week, child age 3 (%)			<0.001***
Yes	77.7	43.8	
missing	7.1	42.5	
Work hours/wk, child age 3 (mean (SD))	44.5 (10.9)	43.7 (12.4)	0.009**
[range]	[1-80]	[1-80]	
missing (%)	8.0	43.9	
Nontraditional work hours, child age 3 (%)			<0.001***
Yes	59.1	40.1	
missing	7.7	43.4	
Work more than 1 job concurrently in 12 months period, child age 3 (%)			0.272
Yes	13.9	9.1	
missing	10.0	46.3	
Depression, child age 3 (%)			<0.001***
Yes	10.7	9.2	
missing	6.9	42.3	
Child Characteristics			
Child sex (%)			0.207
Male	51.0	53.0	
missing	0	0	
Child temperament, child age 1; mean (SD) (mother's report)	2.7 (1.0)	2.9 (1.1)	<0.001***
[range]	[1-5]	[1-5]	
missing (%)	3.7	14.9	
Family/Household Characteristics (mother's report)			
Pre-tax household income, last 12 months, child age 3 (%)			<0.001***
<=10,000	14.9	23.9	
10,001-30,000	31.8	31.4	
30,001-60,000	29.2	15.7	

**Table 2.1 (Continued)**

>60,000	23.8	9.8	
missing	0.4	19.2	
Married, child age 3 (%)			<0.001***
Yes	56.1	17.3	
missing	0	19.9	
Number of other children <18 in household, child age 3 (%)			0.001**
0	1.0	2.4	
1-2	61.8	49.9	
3-4	30.7	23.3	
>5	6.4	5.4	
missing	0.2	19.1	

**Table 2.2: Summary Statistics of Father Engagement Measures, by Child Age**

Variable	Range	Mean	SD	Chronbach's $\alpha$	Missing (%)
AGE 3					
Co-parenting	6-24	22.52	2.14	0.78	0.7
Instrumental support	4-16	13.67	2.42	0.68	0.3
Participation in activities (ave. days/wk)	0-7	4.01	1.27	--	7.9
AGE 5					
Co-parenting	6-24	22.10	2.87	0.84	1.9
Instrumental support	4-16	13.16	3.21	0.83	3.8
Participation in activities (ave. days/wk)	0-7	3.35	1.53	--	11.0

From the sensitivity analysis comparing mothers' and fathers' reports of fathers' participation in activities with his child, we observed a significant positive association between fathers' reports of participation in activities with child and child TV viewing when children were 3 years old ( $\beta=0.153$ ,  $p=0.006$ ). No significant association between mothers' reports of fathers' participation in activities and child TV viewing was observed ( $\beta=-0.017$ ,  $p=0.714$ ) (**Appendix: Table A2.1**).



Of the covariates with more than 5% missing data, those families missing data on variables related to fathers' employment (employment status, work hours/week, whether father worked more than one job concurrently, working nontraditional hours) demonstrated significantly higher child TV viewing compared to those with complete data on variables related to fathers' employment. There were no significant differences in mean child TV viewing among families missing or not missing data on the other covariates tested (**Appendix:** Table A2.2).

### Primary Analyses & Model Results

In the first series of analyses each measure of father engagement was modeled as a predictor of child TV viewing, accounting for child age and an age by engagement interaction. As shown in Model 1 of **Table 2.3**, the co-parenting by age interaction was significant ( $\beta=0.086, p=0.003$ ) and co-parenting was significantly inversely associated with child TV viewing when child was 3 years old ( $\beta= -0.087, p<0.001$ ). No significant associations were observed between instrumental support and child TV viewing, or father's participation in activities with child and child TV viewing (**Table 2.3**, Models 2 & 3).

In our multivariable model (**Table 2.3**, Model 4), co-parenting remained a significant predictor of child TV viewing when children were 3 years old ( $\beta= -0.065, p=0.043$ ). Accounting for child, father, and family/household covariates, each one point increase in co-parenting score was associated with, on average, 4 minutes less TV viewed by child per day. Co-parenting did not significantly predict TV viewing when children were 5 years old ( $\beta= 0.008, p=0.696$ ).

**Table 2.3: Results from Primary Analyses Testing Associations between Measures of Father Engagement and Child TV Viewing, by Child Age**

Model 1: Model Testing Associations between Co-Parenting and Child TV Viewing, by Child Age  
(n=2,592 observations from n=1,312 families)

Variables	B (SE)	p-value	95% CI
Co-parenting x child age	0.0858 (0.0284)	0.003*	(0.0302, 0.1415)
Co-parenting			
At age 3	-0.0865 (0.0243)	<0.001**	(-0.1342, -0.0387)
At age 5	-0.0006 (0.0183)	0.973	(-0.0365, 0.0353)

Model 2: Model Testing Associations between Instrumental Support and Child TV Viewing, by Child Age (n=2,572 observations from n=1,313 families)

Variables	B (SE)	p-value	95% CI
Instrumental support x child age	-0.0112 (0.0259)	0.664	(-0.0620, 0.0395)
Instrumental support	0.0107 (0.0216)	0.621	(-0.0316, -0.0530)

Model 3: Model Testing Associations between Participation in Activities with Child and Child TV Viewing, by Child Age (n=2,378 observations from n=1,297 families)

Variables	B (SE)	p-value	95% CI
Participation in activities with child x child age	-0.0329 (0.0515)	0.523	(-0.1339, 0.0681)
Participation in activities with child	0.0044 (0.0432)	0.920	(-0.0803, -0.0890)

Model 4: Multivariable Model Testing Associations between Co-parenting and Child TV Viewing, by Child Age, accounting for Father, Child, Household/Family Covariates\*  
(n=2,096 observations from n=1,056 families)

Variables	B (SE)	p-value	95% CI
Co-parenting x age	0.0649 (0.0320)	0.043*	(0.0021, 0.1277)
Co-parenting			
At age 3	-0.0572 (0.0278)	0.040*	(-0.1117, -0.0026)
At age 5	0.0077 (0.0198)	0.696	(-0.0310, 0.0464)

\*Model 4 accounts for: child temperament, and sex; father's age, race/ethnicity, education, marital status, employment status, work hours, whether worked more than one job concurrently, whether worked nontraditional work schedule, depression; household income, and number of other children in the household

## ***DISCUSSION***

Using data from a cohort of predominantly socioeconomically disadvantaged, urban families, we found that, in two-parent households, higher co-parenting by fathers was associated with less TV viewing by children at age 3 and not at age 5. In contrast, no relations between instrumental support or fathers' participation in activities with his child were associated with child TV viewing. Notably, these findings indicate that co-parenting may be more associated with child behaviors and routines, like TV viewing, compared to other measures of father engagement, and that its association is significant for younger children only. In this study, higher co-parenting scores were indicated by more support, trust, and communication between parents related to their role as parents. It is possible that quality of co-parenting influences routines, like TV viewing, more directly than other measures of engagement because it captures a measure of synergy (or conflict) regarding how a child is being raised, ostensibly including perceptions about the child's daily routines and behaviors. Our finding that this association was only significant when children were 3 years old and not when they were 5 years old may be a result of younger children being less exposed to environments and relationships outside of the home. It is possible that the effect of co-parenting on TV viewing is significant for younger children because their routines and behaviors are predominantly influenced by their parents, whereby older children may additionally be influenced by school and peers.

This study offers several strengths. Using longitudinal data, we were able to explore the association between father engagement and child TV viewing over several years of early childhood, and investigate whether the associations varied by child's age. By including multiple measures of father engagement we could observe whether fathers' participation in family life had specific and perhaps different associations with child TV viewing. The richness of the FFCWS

data permitted us to account for a robust set of covariates and thereby decrease the likelihood of omitted variable bias. Finally, the diversity of the FFCWS cohort allowed us to generalize our findings to two-parent families of diverse racial and ethnic backgrounds.

It is important to note study limitations. Due to missing data, our results cannot be interpreted as generalizable to the entire FFCWS cohort. We determined that our analytic sample was relatively higher income and more fathers were employed representing a more advantaged group than the FFCWS as a whole. While the analytic sample also had a higher proportion of non-Hispanic white fathers compared to the excluded sample, it was still racially and ethnically diverse (27% white, 40% black, 29% Hispanic). Given that our study population was comprised of cohabitating heterosexual couples, it is also unclear whether these findings are applicable to single- or same-sex parent households. Our findings may suffer from missing data bias as a result of conducting complete case analysis and dropping those observations missing fathers' employment data. We demonstrated that those missing father employment data were associated with significantly higher TV viewing. It is possible that those fathers who failed to report employment information represent a more vulnerable group (e.g., less consistently or legally employed) and so their engagement may be lower, resulting in a downward bias of our observed results. Like other studies, we detected significant differences in reporting by mothers and fathers (Coley & Morris, 2002; Lee, Sanchez, Grogan-Kaylor, Lee, & Albuja, 2018), thus this research may suffer from reporting bias. The measure of child TV/video viewing fails to capture all screen time use. This may be less problematic given the young age of the children in our analytic sample, who may be less likely to engage with other forms of screen time (e.g., phone, tablet, computer). It is possible that mothers consider fathers' TV viewing with their child to impact the quality of his co-parenting. This would challenge the construct validity of

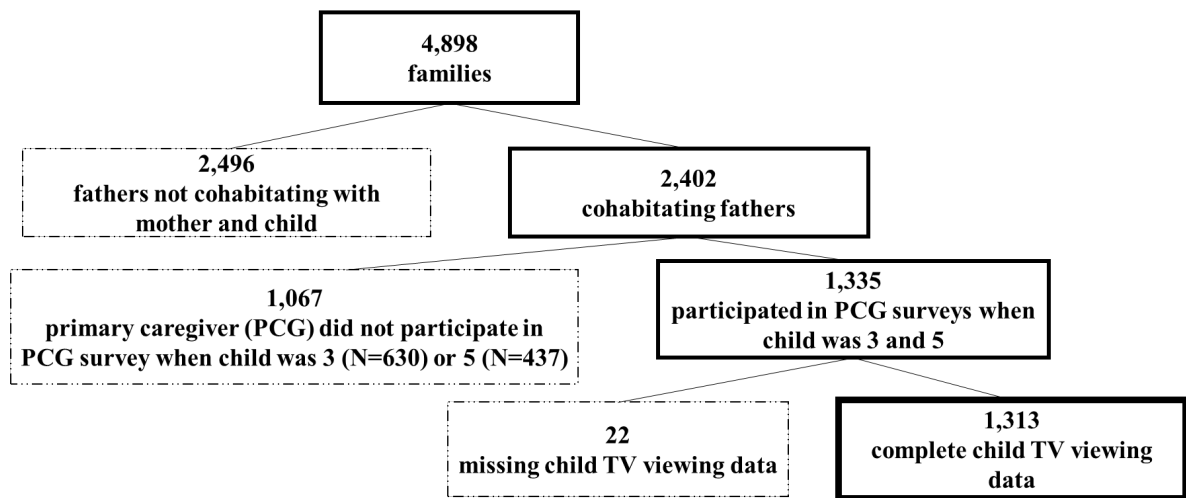
our co-parenting measure. We are comforted that none of the items about co-parenting explicitly ask about TV viewing. Lastly, the conclusions drawn from this research are not causal. Experimental studies designed to increase father engagement and measure subsequent child TV viewing could help disentangle causal relations between these key variables. Future research should explore aspects of parents' relationships, household context, and characteristics of parents (e.g., work schedule, parenting stress, parent-child relationship quality) to further understand the mechanisms underlying this association.

## ***CONCLUSION***

Previous research has demonstrated that quality of co-parenting has been associated with parent's relationship quality and satisfaction (McClain & Brown, 2017) and child behavior, particularly externalizing behaviors (Choi, Parra, & Jiang, 2019; Parkes, Green, & Mitchell, 2018). Generally, father engagement, in the absence of abuse, is positive for families and has been inversely associated with maternal stress and positively associated with early childhood development (Jeong, McCoy, Yousafzai, Salhi, & Fink, 2016; Nomaguchi et al., 2017). Results from this study indicate that improving quality of co-parenting may provide an intervention target by which to decrease screen time use among children. Many existing parenting interventions focus on parent-child interactions and responsive parenting (Adams et al., 2018; Eshel, Daelmans, Mello, & Martines, 2006). Interventions to address screen use should additionally focus on co-parenting, and supplement parenting modules with activities that build trust between parents, improve communication, and establish family processes and expectations for family functioning.

**Paper 2 Appendix**

**Figure A2.1: Inclusion and Exclusion Processes for the Analytic Sample (n=1,313) from the Fragile Families and Child Wellbeing Study (FFCWS)**



**Table A2.1: Results from Model Testing Association between Fathers' Participation in Activities with Child and Child TV Viewing, by Child Age; by Parent Reporting (n=1,201)**

Variables	$\beta$	p-value
Mother-reported		
Fathers' participation in activities with child	-0.0174	0.714
Fathers' participation in activities x child age	-0.0290	0.609
Father self-reported		
Participation in activities with child	0.1525	0.006**
Participation in activities x child age	-0.1136	0.084

**Table A2.2: Wilcoxon Rank Sum Test Results Comparing Mean Child TV Viewing among the Samples Missing and Not Missing Covariates Included in Final Model**

Variable (% missing)	Child TV hours Mean (SD)	p-value
Father's age (8.5)		
Missing	2.95 (2.15)	0.759
Non-missing	2.89 (2.00)	
Father employed (7.1)		
Missing	3.13 (2.09)	0.035*
Non-missing	2.87 (2.01)	
Father's work hours (8.0)		
Missing	3.12 (2.09)	0.036*
Non-missing	2.87 (2.01)	
Father works > 1 job (10.0)		
Missing	3.21 (2.18)	0.005**
Non-missing	2.86 (1.99)	
Father's nontraditional work hrs (7.7)		
Missing	3.14 (2.08)	0.029*
Non-missing	2.87 (2.01)	
Father's depression (6.9)		
Missing	3.12 (2.11)	0.055
Non-missing	2.88 (2.01)	
Father's participation in activities with child (9.4)		
Missing	2.76 (1.95)	0.199
Non-missing	2.91 (2.02)	



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## Paper 3

### **Mothers' parenting stress positively associated with child aggression: Does father engagement moderate the association?**

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## ABSTRACT

**Objective.** To examine the association between mothers' parenting stress experienced when children were 1 year old and child aggression at age 3, and to explore the potential moderating effect of father engagement.

**Methods.** We used linear regression models to test (1) the association between mothers' parenting stress and child aggression, and (2) a moderating effect of father engagement on this association. Participants (n=2,151 families) were from the Fragile Families and Child Wellbeing Study, a birth-cohort of majority socioeconomically disadvantaged, racial/ethnic minority urban families. Mother-reported parenting stress was collected when children were 1 year old and constructed as an average score of 4 items. Child aggression was measured via mothers' responses to aggression-related items from the Child Behavior Checklist (CBCL), collected when children were 3 years old. Father engagement was constructed as an indicator variable representing fathers who scored above the sample median on all three mother-reported measures of co-parenting, instrumental support provided to mother, and participation in activities with his child.

**Results.** In the unadjusted model, parenting stress was significantly positively associated with child aggression ( $\beta = 0.078$ ,  $p < 0.001$ ) and there was a significant stress by father engagement moderation effect ( $\beta = 0.055$ ,  $p = 0.034$ ), such that compared to families with low father engagement, families with high father engagement demonstrated a higher magnitude association between parenting stress and aggression. In models that adjusted for household/family, mother,

child, and father covariates, parenting stress remained a significant predictor of aggression. In the adjusted models, however, the interaction of stress by father engagement was not significant.

**Conclusion.** Based on this analytic sample, households with engaged fathers are meaningfully different from those of less engaged fathers (e.g. higher income, higher maternal education, less relationship abuse). Future research should aim to expose which characteristics associated with father engagement have the most salient impact on how parenting stress is associated with child aggression.



## ***INTRODUCTION***

### *Childhood aggression.*

Children who display high levels of aggression throughout life, beginning in childhood, are likely to face academic and social difficulties that may lead to poor psychosocial outcomes later (Reef, Diamantopoulou, van Meurs, Verhulst, & van der Ende, 2010). Aggression, defined as behavior “directed toward a specific other person or object with intent to hurt or frighten” (Zeanah, 2018) can be a normal part of child development (e.g. toddler tantrums) and also a marker for associated later aggression (Moffitt, 1993). The origins of aggression are studied via multiple pathways (e.g. individual factors like temperament and gender, family dynamics such as parenting practices and parental conflict, environmental factors such as exposure to violence in homes and neighborhoods) (Reebye, 2005). Childhood aggression may disproportionately affect socioeconomically disadvantaged children who may be more exposed to family instability and violence (Chang, Wang, & Tsai, 2016). Because childhood aggression is associated with later social difficulties and health outcomes among both perpetrators and victims (Moore et al., 2014), it is important to interrogate what we currently know about the antecedents of aggression and attempt to identify conditions or circumstances that may buffer these associations.

### *Parenting stress and child behavior.*

There is a large body of research examining parents’ stress and child behaviors like aggression. Less literature specifically considers parenting stress, stress that results from ones’ role as a parent, as opposed to parental stress, the experience of being a stressed parent (regardless of source of stress). Parenting stress has been associated with poor outcomes in children, including aggressive behavior via poor parenting practices and family functioning (Deater-Deckard, 1998). A prospective study of children with and without chronic conditions

demonstrated that parenting stress scores measured when children were ages 1, 2, and 3 years old were the only significant predictors of behavior scores when children were 4 years old. In that study, health status, child temperament, mother-child relationship, and maternal education were also tested as predictors (Goldberg et al., 1997). There is experimental evidence associating parenting stress and child aggression. An intervention for families of children referred to treatment for aggression, randomized families to receive a supplemental component that addressed parental stress. The group that received the supplemental stress component was associated with lower post-test parental stress scores. Importantly, children whose parents received the additional stress intervention, compared with those who did not, showed less severe antisocial behavior, fewer problem behaviors at home, and fewer overall externalizing symptoms (Kazdin & Whitley, 2003). Another parenting intervention showed significant positive effects in decreasing parenting stress, but no group differences in child externalizing problems. This study had a small sample (n=22) and while no significant associations with child externalizing problems were revealed, the direction of treatment effect was as expected (Javier, Coffey, Schragger, Palinkas, & Miranda, 2016).

*Father engagement and mothers' stress.*

There are many ways to operationalize father engagement. Measures of engagement range from gross duration of time (e.g., days/week) father sees child, to more nuanced measures of quality of time spent with child, ways father supports the child's mother, and financial or in-kind support he provides to his family. Prior research using data from the Fragile Families and Child Wellbeing Study (FFCWS) examined three distinct dimensions of fathers' engagement (co-parenting, sharing in child related chores, and participating in activities with child) as they related to parenting stress (Nomaguchi, Brown, & Leyman, 2017). This research found

significant negative associations between both father sharing in child-related chores and participating in activities with his child on mothers' parenting stress. Co-parenting was negatively associated with parenting stress in the random effects and not the fixed effects model, meaning that unobserved confounding may have explained this association. Research in a sample of unmarried African-American women in New York City detected no association between mothers' reports of time father spent with his child and mothers' parenting stress (Jackson, 1999). This research only detected significant associations between mothers' characteristics (e.g. educational attainment, depression) with parenting stress. This study was cross-sectional, limited by a relatively small sample.

#### *Theoretical frameworks.*

Family systems and parenting theories support that parents' interactions with each other and their children influence child behavior. Specifically, stress and support provided by parents to each other are key factors that influence parenting behavior and subsequent child development (Belsky, 1984). Bowens Family Systems Theory applies systems thinking to consider the family as a complex unit, where the functioning of individual members influences the functioning of others (Kerr, 2002). Like much of the prior research considering parenting stress, this study is supported by role strain theory, the idea that parenting stress is a function of being unable to fulfill the requirements and expectations of one's parenting role due to insufficient resources to cope with the demands (Nomaguchi, Brown, et al., 2017; Pearlin, 1989). Finally, adopting a Social Ecological perspective on child development, this study assumes that children are embedded within and affected by their multiple environments (e.g. family, neighborhood, society, culture) (Bronfenbrenner, 1979).

*The present study.*

While there is extensive literature on how stress and family dynamics are associated with child aggression, much of it is focused on general parental stress, parenting practices like harsh discipline (Lee, Altschul, & Gershoff, 2015), and parental conflict. This research adds to the existing literature by (1) focusing on mothers' stress from her parenting role (2) examining this in a racially and ethnically diverse, socioeconomically disadvantaged sample of families, and (3) using a comprehensive measure of father engagement that considers multiple ways fathers may participate in family life.

Using data from the Fragile Families and Child Wellbeing Study (FFCWS), this study examines the following two research questions:

- Is mothers' parenting stress associated with child aggression?
- Does father engagement moderate the association between mothers' parenting stress and child aggression?

On the basis of prior evidence and supported by theories related to family systems and parenting we hypothesize that mothers' parenting stress will be positively associated with child aggression scores. Additionally supported by role strain theory, we hypothesize that father engagement will moderate the association between mothers' parenting stress and child aggression, so that families with highly engaged fathers will demonstrated a lower magnitude of association between parenting stress and child aggression compared to families with less engaged fathers.

## ***METHODS***

### *Data*

This study used data from FFCWS, a longitudinal, birth cohort study of 4,898 children born between 1998 and 2000 in 20 large U.S. cities with populations of 200,000 or more (Reichman, Teitler, Garfinkel, & McLanahan, 2001). The FFCWS oversampled non-marital births with about three fourths of children born to unmarried parents coming from low-income and non-White families (Pilarz & Hill, 2017). Baseline interviews were conducted with mothers and fathers at the child's birth. Subsequent assessments included telephone interviews (when child was 1, 3, 5, 9, and 15 years old) and in-home visits (when child was 3, 5, 9, and 15 years old). During interviews with mothers and fathers, information was collected on topics including attitudes, relationships, parenting behavior, and mental and physical health. Primary caregiver interviews, completed during in-home visits predominantly by biological mothers, collected information about child's behaviors and routines, mental and physical health, and characteristics of the home environment. Data for the current study came from mother interviews at baseline and when the child was 1 year old, and the primary caregiver interview when the child was 3 years old.

The analytic sample consisted of biological mothers and their respective child enrolled in the study. Families were included if (1) mothers participated in the interviews used in this analysis, (2) fathers were present, defined as having seen his child in the last 30 days based on mothers' reports, (3) there was complete data on at least 75% of items used to generate scores for the variables of interest: parenting stress when the child was 1 year old (exposure), child aggression when the child was 3 years old (outcome), and father engagement when the child was 1 year old (hypothesized moderator). We excluded 1,774 families (36% of baseline sample) who

did not participate in all interviews used in this analysis. We further excluded 209 families (7%) who reported an absent father. Seven hundred sixty-four families (26%) were excluded due to missing scores on key variables used in this analysis: 382 families (13%) excluded for missing parenting stress score, 10 families (0.4%) excluded for missing child aggression score, and 372 (15%) excluded for missing father engagement score. (**Appendix:** Figure A3.1). Our final analytic sample included 2,151 families.

### *Measures*

#### Dependent variable

Child aggression was assessed via mothers' responses to aggression-related items (19 items total) from the Child Behavior Checklist (CBCL), collected when the child was 3 years old. Generally, the CBCL assesses children's internalizing (i.e., anxious, depressive, and over-controlled) and externalizing (i.e., aggressive, hyperactive, noncompliant, and under-controlled) behaviors (Achenbach & Ruffle, 2000). Item responses ranged from 0 = not true to 2 = very true. The aggression items were averaged to yield a continuous child aggression score, with a total range of 0-1.95, mean: 0.59, and Chronbach's  $\alpha=0.87$ , demonstrating high scale reliability. Scores that included at least 15 items (79% of items in scale) were included in this analysis. The CBCL has previously been used with parents of children as young as one-year old and found to be valid and to predict later behavioral problems (Van Zeijl et al., 2006).

#### Primary independent variable

Parenting stress was constructed as an average score of four items, collected when child was 1 year old: (1) "being a parent is harder than I thought it would be"; (2) "I feel trapped by my responsibilities as a parent"; (3) "I find that taking care of my child(ren) is much more work than pleasure"; (4) "I often feel tired, worn out, or exhausted from raising a family". Item

responses ranged from 1 = disagree to 4 = strongly agree, with a total average range of 1-4, mean: 2.15, Chronbach's  $\alpha=0.58$ . Scores that included at least 3 items (75% of items in scale) were included in this analysis. Parenting stress items were derived from the JOBS Child Outcome Survey conducted by Child Trends and Abidin's Parent Stress Inventory (Abidin, 1995). Abidin's full Parenting Stress Index (PSI) has been validated across diverse populations, including low socioeconomic, African-American, and Latino samples (Abidin, 1995). This 4-item measure of parenting stress has been examined in previous FFCWS research (Nomaguchi, Brown, et al., 2017; Nomaguchi, Johnson, Minter, & Aldrich, 2017).

#### Moderating variable

Father engagement was constructed as an indicator variable representing those fathers who scored above the median in the analytic sample on all three measures of father engagement (co-parenting, providing instrumental support to his child's mother, participating in activities with his child), measured when children were 1 year old.

Co-parenting was constructed as the average of six items: (1) "when father is with child he acts like the father you want for the child," (2) "you can trust the father to take good care of the child," (3) "father respects the rules you make for the child," (4) "father supports the way you raise the child," (5) "you and father can talk about the problems that come up with raising the child," and (6) "you can count on father for help when you need someone to look after child for a few hours". Item responses ranged from 1 = never to 4 = always, with a total average range of 1-4, mean: 3.72, median: 3.83, Chronbach's  $\alpha=0.81$ . Scores that included at least 5 items (83% of items in scale) were included in this analysis.

Instrumental support, quantified how often the father shared household and childcare responsibilities with the mother, and was constructed as an average of four items: (1) "he looks

after (child) when you need to do things?”, (2) “he run errands (for you) like picking things up from the store?”, (3) “he fixes things around your home, paints, or helps make it look nicer in other ways?”, (4) he takes (child) places (he/she) needs to go, such as to daycare or the doctor?”. Item responses ranged from 1 = never to 4 = often, with a total average range of 1-4, mean: 3.24, median: 3.50, Chronbach’s  $\alpha=0.78$ . Scores that included at least 3 items (75% of items in scale) were included in this analysis.

Participation in activities with child was constructed by averaging the number of days/week father participated in a variety of activities with child at age 1, related to showing affection, playing, eating, and entertaining (e.g., singing songs, reading stories, feeding bottle). Participation in activities scores ranged from 0-7, mean: 3.90, median: 4.10. Scores that included at least 8 items (80% of items in index) were included in this analysis.

### Covariates

To adjust for potential confounding factors that may be associated with both parenting stress and child aggression, we included covariates related to characteristics of the mother, child, father, and the family/household environment. The inclusion of these variables is supported by prior literature on parenting stress, child behavior, and father engagement.

*Mother-related covariates* included education, race/ethnicity, and age, collected at baseline. Other covariates, collected when children were 1 year old, included: depression coded as an indicator variable for whether mother was likely to satisfy a diagnosis of depression, as determined by the Composite International Diagnostic Interview - Short Form (CIDI-SF); and, mothers’ employment coded as an indicator for whether mother reported ever working since her child’s birth.



*Family/household-related covariates*, collected when children were 1 year old, included marital status to biological father, cohabitation with biological father, number of children under 18 years old living in the household, and pre-tax household income. A measure of relationship abuse was included as an indicator of whether the mother reported that the biological father or current partner sometimes or often engaged in one or more of six violent or controlling behaviors: “isolates you from friends/family”, “tries to prevent you from going to work/school”, “withholds/tries to control your money”, “slaps or kicks you”, “hits you with fist or dangerous object”, “forces you to have sex/do sexual things”. Childcare multiplicity was constructed as an indicator variable representing mothers who reported using at least 2 different care arrangements. This concept of childcare has been used in prior FFCWS studies examining child care and child behavior (Pilarz & Hill, 2017).

*Child-related covariates* included binary variables for child sex and low birthweight, collected at baseline, and a continuous child temperament score collected when child was 1 year old.

### *Analytic Plan*

#### Preliminary Analyses

First, we calculated descriptive statistics of our study sample and key variables. We evaluated whether the demographics of the analytic sample were significantly different from the excluded sample, using Wilcoxon rank sum tests for continuous variables and chi-squared tests for categorical variables. Similarly, we compared the demographics of families with highly engaged fathers to families with less engaged fathers and used bivariable logistic regression models to examine the associations between father engagement and household/family covariates.

## Primary Analyses

To test the association between mothers' parenting stress when children were 1 year old and child aggression scores at age 3, and further test whether father engagement moderated this association, we used linear regression models. First, a bivariable model was run to test the association between parenting stress and child aggression score. Second, we included a main effect for father engagement and a parenting stress by father engagement interaction term to explore the potential moderating effect of father engagement on the relation between mothers' parenting stress and child aggression. Next we entered covariates clustered by type, creating models that adjusted for household characteristics; household, mother, and child characteristics; household, mother, child, and father characteristics. We conducted complete case analysis, dropping those observations with missing data on covariates. The sample size for each analysis is based on the maximum sample available. Sample size differs across analytic models because of missing data. All statistical modeling was conducted using reg in StataSE version 15. We used the lincom command to calculate parenting stress betas, SEs, p-values, and confidence intervals accounting for any significant interaction effects of father engagement by parenting stress.

## ***RESULTS***

### Preliminary Analyses & Descriptive Results

**Table 3.1** provides descriptive statistics for our analytic sample (n=2,151 families). The sample was racially and ethnically diverse, with the majority being from minority groups. Household incomes were generally low, with approximately 62% of households reporting an annual pre-tax income of less than \$30,000. There were several significant differences in the

demographics of our analytic sample compared to the excluded sample. Comparing the analytic sample to the excluded sample, a significantly higher proportion of mothers reported working (74% vs. 58%), being married to (36% vs. 19%) or cohabitating with (70% vs. 35%) child's biological father. Among the analytic sample, missing data on covariates ranged from 0 to 2.9%. Table A3.1 (**Appendix**) compares demographics between the samples of families with highly engaged fathers to families with less engaged fathers. Among families with highly engaged fathers, there was a significantly lower proportion of depressed mothers (9% vs. 18%), a higher proportion of male children (55% vs. 50%), and a higher proportion of cohabitation with child's biological father (89% vs. 62%). We also determined that parenting stress scores were significantly lower in the sample of highly engaged fathers compared to families with low father engagement (mean: 1.98 vs. 2.22,  $p < 0.001$ ). Using bivariable logistic regression, we observed that income was associated with father engagement such that compared to families earning less than \$10K/year, those earning more than \$30K had two times the odds of having a highly engaged father ( $p < 0.001$ ). Similarly, the likelihood of high father engagement was higher among families with married parents (OR: 1.77,  $p < 0.001$ ) and more educated mothers (compared to less than high school education, some college OR: 1.43,  $p = .004$ ; college graduate, OR: 1.83,  $p < 0.001$ ).

Ninety-nine percent of parenting stress scores were constructed with complete information (4 items) and ninety-six percent of aggression scores contained complete information (19 items). Three measures were used to construct the father engagement indicator variable. Ninety-nine percent of co-parenting scores were constructed with complete information (included all 6 items), 99% of the instrumental support scores had complete information (4 items), and 97% of the participation in activities scores had complete information (10 items). Summary of score

compositions are described in **Appendix**, Tables A3.2, A3.3, & A3.4. In the analytic sample, 31% of fathers were categorized as high engagement (scored above the sample median on all three engagement measures), 69% were categorized as low engagement.

**Table 3.1: Demographic Characteristics of Families in Analytic Sample (n=2,151) Compared to Excluded Sample (n=2,747)**

	Analytic Sample (n=2,151)	Excluded (n=2,747)	p-value
<b>Mothers' Characteristics</b>			
Race/ethnicity, baseline (%)			<0.001**
White, Non-Hispanic	25.2	17.7	
Black, Non-Hispanic	47.2	47.7	
Hispanic	23.6	30.2	
Other	3.8	4.1	
missing	0.2	0.3	
Education, baseline (%)			<0.001**
< High school	34.2	43.9	
High school or equiv	26.6	24.2	
Some college, trade, technical	26.0	22.9	
College, graduate, or professional	13.1	8.8	
missing	0.1	0.2	
Age (years), baseline (mean (SD))	25.5 (6.1)	25.1 (6.0)	0.111
[range]	[15-43]	[15-43]	
missing (%)	0	0.2	
Employed – worked since child's birth, child age 1 (%)			<0.001**
Yes	74.0	57.6	
missing	0	0	
Depression, child age 1 (%)			0.065
Yes	14.8	13.0	
missing	0	0	
<b>Child Characteristics</b>			
Low birthweight, baseline (%)			0.414
Yes	9.5	10.2	
missing	2.9	2.8	
Child sex, baseline (%)			0.526
Male	51.9	52.8	
missing	0	0.0	
Child temperament, child age 1; mean (SD) (mother's report)	2.8 (1.0)	2.9 (1.1)	0.001
[range]	[1-5]	[1-5]	

**Table 3.1 (Continued)**

missing (%)	0.4	20.9	
<b>Family/Household Characteristics</b>			
Father engagement, child age 1 (%)			0.065
High	31.1	10.5	
missing	0	69.3	
Pre-tax household income, last 12 months, child age 1 (%)			<0.001**
<=10,000	20.5	28.7	
10,001-30,000	41.9	42.8	
30,001-60,000	16.0	14.2	
>60,000	21.7	14.3	
missing	0	0	
Married to biological father, child age 1 (%)			<0.001**
Yes	36.1	19.4	
missing	0	20.5	
Cohabitation with biological father, child age 1 (%)			<0.001**
Yes	70.3	35.4	
missing	0	20.8	
Relationship abuse, child age 1 (%)			<0.001**
Yes	15.4	10.1	
missing	0	0	
Number of other children <18 in household, child age 1; mean (SD)	2.3 (1.3)	2.3 (1.3)	0.499
[range]	[0-10]	[0-9]	
missing (%)	0.2	20.0	
Childcare multiplicity, child age 1 (%)			0.005*
Yes	64.7	68.6	
missing	0	0	

### Primary Analyses & Model Results

In the first series of analyses we modeled parenting stress as a predictor of child aggression. As shown in Model 1 of **Table 3.2**, parenting stress was significantly positively associated with child aggression ( $\beta = 0.101$ ,  $p < 0.001$ ). In Model 2, parenting stress was a significant predictor of aggression ( $\beta = 0.078$ ,  $p < 0.001$ ), and there was a significant positive interaction between parenting stress by father engagement ( $\beta = 0.055$ ,  $p = 0.034$ ). Parenting stress had a stronger magnitude of association with child aggression in families with high father

**Table 3.2: Results from Primary Analyses Testing Associations between Mothers' Parenting Stress on Child Aggression, including Potential Moderation by Father Engagement, coefficients (95% confidence intervals)**

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

	Model 1 (n=2,151)	Model 2 (n=2,151)	Model 3 (n=2,141)	Model 4 (n=2,072)	Model 5 (n=2,072)
Parenting stress	0.101 (0.078, 0.123)***	0.078 (0.052, 0.105)***	0.074 (0.047, 0.100)***	0.049 (0.023, 0.075)***	0.049 (0.023, 0.075)***
Father engagement	---	-0.172 (-0.281, -0.064)**	-0.136 (-0.244, -0.028)*	-0.123 (-0.229, -0.018)*	-0.120 (-0.226, -0.014)*
Stress * engagement	---	0.055 (0.004, 0.105)*	0.048 (-0.002, 0.098)	0.045 (-0.004, 0.094)	0.045 (-0.004, 0.094)
Model 1: Unadjusted model					
Model 2: Model 1 + father engagement, engagement by stress interaction					
Model 3: Model 2 + mother's race/ethnicity, education, income, marital status, # other children <18 years in home, abusive relationship, childcare multiplicity					
Model 4: Model 3 + maternal age, maternal employment status, maternal depression, low birthweight, temperament, child sex					
Model 5: Model 4 + cohabitation with father					

engagement ( $\beta=0.133$ ,  $p<0.001$ ) compared to families with low father engagement ( $\beta=0.078$ ,  $p<0.001$ ); not reported in table. In our models controlling for household, mother, child, and father covariates (Models 3, 4, 5), parenting stress remained a significant predictor of aggression. The interaction between parenting stress by father engagement was not significant in any of the adjusted models.

## ***DISCUSSION***

In a sample of predominantly low-income, racial/ethnic minority families, we found that mothers' parenting stress was significantly positively associated with child aggression. Additionally, we observed that father engagement significantly moderated this relationship in the unadjusted model, such that compared to low father engagement, high father engagement was associated with a greater magnitude of association between mothers' parenting stress and child aggression. This finding contradicts our hypothesis that high father engagement would buffer the effects of mothers' parenting stress on child aggression and urges us to question the construct validity of the father engagement variable. While this variable may adequately capture aspects of relationship quality between the father and mother, and father and child, it may not capture how much time a father spends at home which could be critical to the association between mothers' parenting stress and child aggression. It is possible that highly engaged fathers, as defined by this construct, are also more highly educated, more employed, work longer hours, and thereby spend less time at home. Alternatively, the positive interaction effect may also be a result of father engagement confounding the relationship between mothers' parenting stress and aggression. Results indicate that engagement is significantly associated with parenting stress scores (exposure). Since engagement and parenting stress were measured at the same time

point, it is impossible to rule out that engagement is a common cause of stress and aggression, and thus may both confound and moderate this association. It is important to note that our results indicated that father engagement, overall, is beneficial as it relates to child aggression. The main effect of father engagement was significantly negatively associated with aggression in all models tested.

The significance of the moderation result observed in our unadjusted model is likely a result of omitted variable bias. In the analytic sample, high father engagement is associated with higher income, education, and other potential life advantage. There may be a stronger association between parenting stress and child aggression among families with high father engagement because there are less competing stressors related to child aggression in this group. After taking into account other characteristics related to stress and child aggression, characteristics that disproportionately impacted the group with low father engagement, the effect of father engagement on the association between mothers' parenting stress and child aggression diminished.

This study offers several strengths. The FFCWS collects multiple measures of father engagement, thus we were able to create a robust indicator of engagement that included aspects of co-parenting, support, and quality of time spent with his child. The richness of the data set enabled us to control for a variety of potential confounding variables. Our outcome (aggression score) was measured using a widely validated scale and missingness in our outcome was low in our analytic sample (0.4% dropped from analysis for missing aggression score). Finally, exploring the association between stress, child aggression, and father engagement in a fragile cohort, comprised of predominantly unmarried and low-income families is particularly relevant



since this group may be at heightened risk for parenting stress, child aggression, and low father engagement.

It is imperative to note study limitations. Missing data poses a major concern to both the validity and generalizability of our findings. We excluded 26% of our sample who were missing scores on key variables used in this analysis. It is likely that those families missing data on parenting stress and father engagement are meaningfully different from those not missing this information such that those missing these data may represent both higher stress and aggression scores (i.e. a more fragile sample). Excluding them would result in an upward bias of our observed results. Comparing the demographics of our analytic sample with the excluded sample revealed that the analytic sample is significantly higher income, higher education, and has a larger proportion of working mothers, therefore these findings may only be generalizable to a relatively more advantaged sample of families compared to the FFCWS cohort. While controlling for many covariates reduced the likelihood of omitted variable bias, the inclusion of multiple variables made it difficult to tease apart which effects confounded the interaction of father engagement by stress on the association of stress on child aggression.

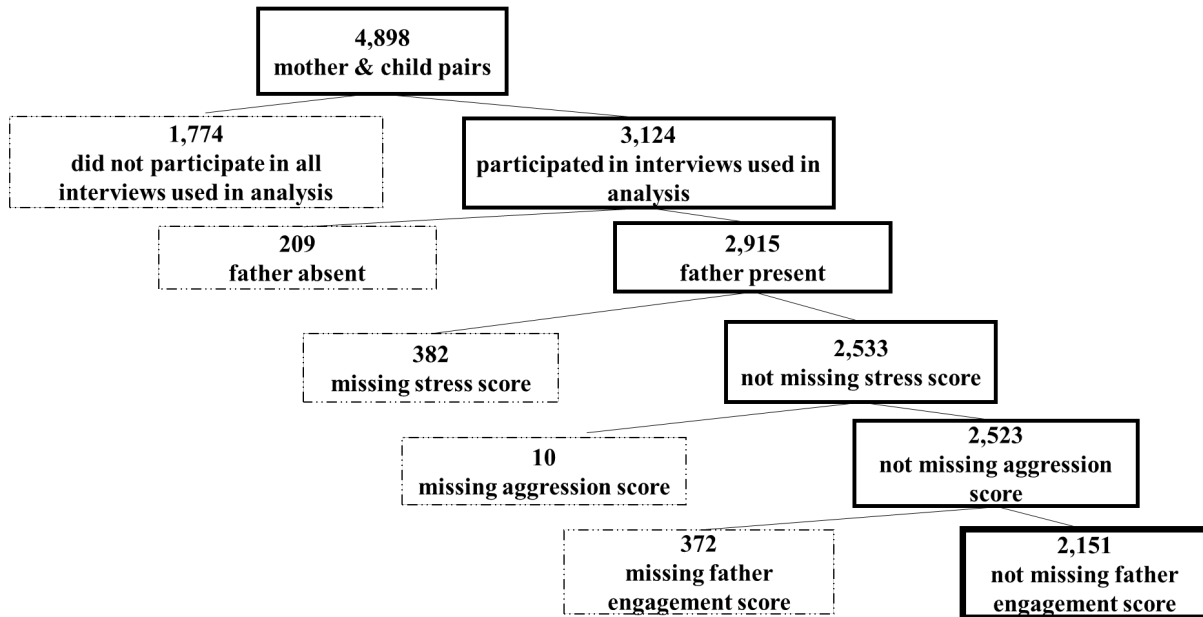
## ***CONCLUSION***

This study revealed results that warrant deeper investigation into how families of highly engaged fathers may be meaningfully different from those of less engaged fathers. Concerns about construct validity spotlight the need to examine which characteristics of engagement are adequately captured by the construct(s) used in fatherhood research. For example, it is important to interrogate whether constructs of father engagement are associated with characteristics that impact fathers' abilities to regularly participate in home life (e.g. work hours, number of jobs,

regularity of employment). Prior research has demonstrated that interventions aimed to improve father engagement offer benefits to both children and parents (Guterman, Bellamy, & Banman, 2018). Further elucidating how father engagement is beneficial to families may motivate programs and providers that serve families with children (e.g., home visiting programs, pediatric primary care physicians and staff, school and after-school programs) to incorporate father engagement in their activities. For example, fathers groups organized through schools, churches, and health care centers could encourage fathers' participation in their children's lives, provide opportunities for shared activities, and also create a forum for advice and support between fathers. Additionally, policies like paid paternal leave would facilitate early father involvement in his child's life, and perhaps normalize higher levels of father engagement from his child's birth (Allport et al., 2018). Better understanding the context within which father engagement operates may help clarify who best to target with such programs.

**Paper 3 Appendix**

**Figure A3.1: Inclusion and Exclusion Processes for the Analytic Sample (n=2,151) from the Fragile Families and Child Wellbeing Study (FFCWS)**



**Table A3.1: Demographic Characteristics of Families with High Father Engagement (n=668) Compared to Families with Low Father Engagement (n=1,483)**

	High Engagement (n=668)	Low Engagement (n=1,483)	p-value
<b>Mothers' Characteristics</b>			
Race/ethnicity, baseline (%)			0.088
White, Non-Hispanic	28.4	23.8	
Black, Non-Hispanic	43.7	48.8	
Hispanic	23.8	23.5	
Other	3.9	3.7	
missing	0.2	0.2	
Education, baseline (%)			<0.001**
< High school	29.2	36.5	
High school or equiv	25.6	27.1	
Some college, trade, technical	28.4	24.9	
College, graduate, or professional	16.8	11.5	
missing	0	0.1	
Age (years), baseline (mean (SD))	25.8 (6.1)	25.3 (6.1)	0.032*
[range]	[15-43]	[15-43]	
missing (%)	0	0	
Employed – worked since child's birth, child age 1 (%)			0.016*
Yes	77.4	72.5	
missing	0	0	
Depression, child age 1 (%)			<0.001**
Yes	9.0	17.5	
missing	0	0	
<b>Child Characteristics</b>			
Low birthweight, baseline (%)			0.105
Yes	7.9	10.2	
missing	3.1	2.8	
Child sex, baseline (%)			0.031*
Male	55.4	50.4	
missing	0	0	
Child temperament, child age 1; mean (SD) (mother's report)	2.6 (1.0)	2.8 (1.0)	<0.001**
[range]	[1-5]	[1-5]	
missing (%)	0.2	0.5	
<b>Family/Household Characteristics</b>			
Pre-tax household income, last 12 months, child age 1 (%)			<0.001**
<=10,000	17.8	27.1	
10,001-30,000	32.6	35.5	
30,001-60,000	31.3	24.1	

**Table A3.1 (Continued)**

>60,000	18.3	13.4	
missing	0	0	
Married to biological father, child age 1 (%)			<0.001**
Yes	45.4	32.0	
missing	0	0	
Cohabitation with biological father, child age 1 (%)			<0.001**
Yes	88.9	62.0	
missing	0	0	
Relationship abuse, child age 1 (%)			<0.001**
Yes	7.0	19.2	
missing	0	0	
Number of other children <18 in household, child age 1; mean (SD)	2.3 (1.4)	2.3 (1.3)	0.050*
[range]	[1-10]	[0-9]	
missing	0.2	0.3	
Childcare multiplicity, child age 1 (%)			0.092
Yes	62.1	65.9	
missing	0	0	
Parenting stress score; mean (SD)	1.98 (0.60)	2.22 (0.66)	<0.001**
[range]	[1-4]	[1-4]	
missing	0	0	

**Table A3.2: Missing Data in Parenting Stress Scale, %**

	# items included in score	N (%)
Parenting stress scale (6 items)	0 – missing all items	380 (13.0)
	1	2 (0.1)
	2	0 (0)
	<b>3</b>	<b>11 (0.4)</b>
<b>At least 75% of items</b>	<b>4</b>	<b>2,522 (86.5)</b>

**Table A3.3: Missing Data in Aggression Scale, %**

	# items included in score	N (%)
Aggression scale (19 items)	0 – missing all items	4 (0.2)
	1	0 (0)
	2	0 (0)
	3	0 (0)
	4	0 (0)
	5	0 (0)
	6	1 (0.0)
	7	0 (0)
	8	0 (0)
	9	0 (0)
	10	1 (0.0)
	11	0 (0)
	12	1 (0.0)
	13	1 (0.0)
14	2 (0.1)	
<b>At least 75% of items</b>	<b>15</b>	<b>0 (0)</b>
	<b>16</b>	<b>0 (0)</b>
	<b>17</b>	<b>5 (0.2)</b>
	<b>18</b>	<b>90 (3.6)</b>
	<b>19</b>	<b>2,428 (95.9)</b>

**Table A3.4: Missing Data in Father Engagement Scales and Index, %**

Measure	# items included in score	N (%)	
Co-parenting scale (6 items)	0 – missing all items	219 (8.5)	
	1	0 (0)	
	2	0 (0)	
	3	0 (0)	
	4	3 (0.1)	
	<b>At least 75% of items</b>	<b>5</b>	<b>23 (0.9)</b>
	<b>6</b>	<b>2,333 (90.5)</b>	
Instrumental support scale (4 items)	0 – missing all items	123 (4.8)	
	1	1 (0.0)	
	2	0 (0)	
	<b>At least 75% of items</b>	<b>3</b>	<b>7 (0.3)</b>
	<b>4</b>	<b>2,447 (94.9)</b>	
Participation in activities index (10 items)	0 – missing all items	441 (17.1)	
	1	5 (0.2)	
	2	3 (0.1)	
	3	3 (0.1)	
	4	9 (0.4)	
	5	11 (0.4)	
	6	6 (0.2)	
	7	6 (0.2)	
	<b>At least 75% of items</b>	<b>8</b>	<b>18 (0.7)</b>
	<b>9</b>	<b>54 (2.1)</b>	
<b>10</b>	<b>2,022 (78.43)</b>		
FATHER ENGAGEMENT (dichotomous variable; high = scoring above median on all 3 measures engagement)	0 – missing all items	28 (1.1)	
	1	72 (2.9)	
	2	272 (10.8)	
	<b>3</b>	<b>2,151 (85.3)</b>	

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