

# Effect of Father Engagement on Children's Behavior Problems and Academic Achievement

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# Improvements in Measurement

- Our measures of fathering have improved so dramatically over the last decade
- We could or would not measure dimensions of fathering beyond residence.
- Now we know that a lot of fathering occurs outside of marriage or cohabitation
- Family structure matters for child outcome
  - Little evidence that frequency of Visitation by nonresident fathers does not.
  - Father engagement matters and we are beginning to measure it for all fathers, not just resident
- Want to explore the topic of Why study prenatal involvement through the lens of the life course perspective of early father involvement on children's behavior and academic achievement
- This is a data talk not a big picture talk

# Motivation

- We know that children in poor families and families of color have lower academic achievement and higher incidence of behavioral problems, but
- Several recent studies have shown that early father involvement in diverse families, can promote young children's education preparation and toddlers' cognitive and language skills (Fagan and Iglesias 1999 and Tamis-Le Monda, Shannon, Cabrera and Lamb 2004)
- Family instability in poor families and families of color is common and because few large scale, longitudinal samples follow diverse families over time.
- So we don't know if the effects of early father involvement persist into the later school years.
- Despite family instability, children of color are more likely to have contact with their nonresident fathers than white children (Cabrera, Ryan, Mitchell, Shannon, and Tamis-LeMonda 2008, Edin 2000; Flanagan and West 2004, Edin McLanahan 2005),
- Although racial differences in nonresident father-child contact may decline over time (Mincy, Pouncy, Zilinawala 2013).

# Effects of Engagement by Resident and Nonresident Fathers.

- Furstenberg, Books-Gunn, & Morgan (1987) showed that family breakup reduces children's school achievement in adolescence, but we don't know about the effects the things that both resident and nonresident father actually do with their children (father engagement) on academic achievement and behavior.
- Several studies have shown that low-income fathers' engagement in nurturing and learning activities is positively associated with cognitive, vocabulary, and language skills, of 2 and 3 year olds (Tamis-LeMonda et. al., 2004; Duursma, Pan, and Raikes, 2008, Tamis-LeMonda, Baumwell, Cristofaro (2012)
- But these studies tell us little about the effects of engagement at later critical stages of child development.

# Does early father involvement have lasting effect on poor children and children of color?

- What I know about this question emerges from two studies
  - Early involvement of unmarried fathers (present at birth, financial support during pregnancy, other help) predicts later father engagement, especially when unmarried fathers later marry or cohabit with the mothers and children (residence) (Cabrera, Fagan, Farrie, 2008)
  - Early father engagement in learning activities is positively associated with 5<sup>th</sup> grade academic achievement, after controlling for early and later father residency and the quality of 5<sup>th</sup> graders relationships with their fathers. (McFadden, Tamis-Lamonda, Cabrera (2011)
    - Early or later father residency was not significantly associated with 5<sup>th</sup> grade academic achievement, nor did they moderate the association between early father engagement in learning activities and 5<sup>th</sup> grade academic achievement
    - By contrast, children who reported higher quality relationships with their fathers had higher measures of academic achievement.

# Critique

- These findings are important and suggestive, but they fail to establish the causal effect of father engagement on academic achievement because:
  - They control for father residency after early father engagement occurs (post treatment)
  - They fail to control for a host of variables that could affect residency, father engagement, and the later academic achievement.

# Our aim

- I. Estimate the causal effect of **father engagement at 5 years old on children's academic achievement and behavior problems at 9 years old (transitioning to the 4<sup>th</sup> grade)**.
  - I. Using previously unavailable data on children's academic achievement and behavior problems near the 4<sup>th</sup> grade, measured by several reports/ indicators.
  - II. After controlling for rich set of predictors, including fathers residence at birth.
  - III. Examine if fathers residence at birth moderates the effect, if any, of father engagement on children's later achievement and behavioral outcomes.
  - IV. Use a variety of models that account for highly skewed distribution of most of our measures of behavior and academic achievement.

# Data

- I. Fragile Families and Child Wellbeing Study, N= 4,898 observations, based on the same number of live births (3,711 non-marital and 1,187 marital).
  - A. First wave: at time of birth
  - B. Consecutive waves: child's age 1, 3, 5 and 9 (wave 5).
  - C. Fifth wave was conducted from August 2007 through April 2010 (when children were approximately 9 years old and transitioning from the 3<sup>rd</sup> to 4<sup>th</sup> grade when,
    1. the performance of poor children and children of color drops noticeably below the performance of non-poor and white children (fourth grade slump) perhaps because
    2. children transition from learning to read to reading to learn, when children shift focus from reading mechanics to using reading skills to learn and acquire new information from text (Chall (1983, 1996).
- II. Our main causal inference strategy is temporal ordering
  - A. Our behavioral and achievement outcomes of interest are measured at the 5<sup>th</sup> wave,
  - B. Treatment variables (father engagement) measured at fourth wave (when children were 5 years old).
  - C. Demographic and other predictors measured at baseline (birth).



# Outcome Measures (1): Children's Behavioral Problems.

- Achenbach Child Behavior Checklist/6-18 (**CBCL/6-18**), a widely accepted measure of identifying behavioral problems for children at age 6 to 18 (Achenbach & Rescorla, 2001).
- Primary caregivers were asked 103 items using a Likert-type scale to rate their child's behavior from 0 (Not true) to 2 (Very true or often true).
- Selected items incorporated the following subscales:
  - Anxious/Depressed (13 items,  $\alpha=0.80$ ),
  - Withdrawn/Depressed (8 items,  $\alpha=0.71$ ),
  - Somatic Complaints (11 items,  $\alpha=0.77$ ), Social Problems (11 items,  $\alpha=0.74$ ),
  - Thought Problems (15 items,  $\alpha=0.78$ ),
  - Attention Problems (10 items,  $\alpha=0.86$ ),
  - Rule-Breaking Behavior (17 items,  $\alpha=0.82$ ),
  - Aggressive Behavior (18 items,  $\alpha=0.88$ ),
  - Internalizing Problems (Anxious/Depressed + Withdrawn/Depressed + Somatic Complaints,  $\alpha=0.88$ ),
  - Externalizing Problems (Rule-Breaking Behavior + Aggressive Behavior,  $\alpha=0.92$ ), and Total CBCL (103 items,  $\alpha=0.96$ ). Items in each scale were, , and standardized to make every scale have zero as a mean value and one as a standard deviation.
- To facilitate interpretation of the results we used standardized measures to make every scale have zero as a mean value and one as a standard deviation.

## Outcome Measures (2): Children's Behavioral Problems (Cont'd).

- Teacher's assessment of child's behavior at 9 years, derived from
  - 28 items from the Conner's Teacher Rating Scale-Revised Short form (CTRS-R: Conners, 2001),
    - teachers were asked to rate the child's behavior from 0 (Not true at all: never, seldom) to 3 (Very much true: very often, very frequent) on:
      - Oppositional Problems 5 items,  $\alpha=0.93$ ),
      - Cognitive Problems/Inattention (5 items,  $\alpha=0.88$ ), Hyperactivity (7 items,  $\alpha=0.92$ ), and Attention Deficit Hyperactivity Disorder (ADHD)(12 items,  $\alpha=0.95$ ).
  - 25 items from the Social Skills Rating System (SSRS: Gresham & Elliott, 1990).
    - teachers were asked to rate the child's behavior from 0 (Never) to 3 (Very Often)
      - Social Skills Problems (22 items,  $\alpha=0.96$ ),
      - Cooperation Problems (11 items,  $\alpha=0.95$ ),
      - Assertion Problems (5 items,  $\alpha=0.89$ ),
      - Self-Control Problems (10 items,  $\alpha=0.95$ ),
      - Social Skills Externalizing Problems (6 items,  $\alpha=0.92$ ), and
      - Social Skill Internalizing Problems (6 items,  $\alpha=0.85$ ).
- Just like the CBCL measure, items in each subscale of the Teacher-interviewed behavioral survey were standardized.

# Outcome Measures (3): Academic Achievement.

- Woodcock Johnson Tests of Achievement (Woodcock, McGrew & Mather, 2001).
  - Comprehensive battery of 22 tests to measure reading, mathematics, oral language abilities and academic knowledge (Wendling, Schrank, Schmitt, 2007).
  - The Fragile Families home visitation study includes 2 subtests the first is
    - Reading
      - Comprehension.
      - Word recognition
    - Mathematical skills were measured by the applied problems subset 10 of the Woodcock Johnson Tests of Achievement.
  - Test scores were standardized for an easier interpretation of results.
- Teacher evaluations of student performance in reading and literacy, and mathematics, which may include biases related to student or family characteristics (Bergh, Denessen, Hornstra, Voeten & Holland (2010)

# Treatment Variable: Father Engagement

- Age appropriate activities , measured by the number of days per week that the father engaged in the activity
- Each item was coded 0 – 7, with 0 indicating that the father did not engage in the activity during the week, and 7 indicating that the father has engaged in the activity every day of the week.
- Eight items:
  - sings songs or nursery rhymes with his child,
  - reads stories to his child,
  - tells stories to his child, plays inside with blocks, toys or Legos with his child,
  - tells his child he appreciated something he or she did,
  - plays outside in the yard or park with his child,
  - takes his child to a special event, activity or outing, and
  - watches a video or television program with his child.
- Scores on the eight items were averaged and standardized for an easier interpretation of results.

# Empirical strategy (I)

- I. Our models for all but one of our outcomes are of the form:

$$Y_{it} = \alpha + \beta_1 FE_{it-1} + \beta_2 FNR_{it0}^* + FE_{it-1} + \beta_3 FNR_{it0} + \sigma X_{it0} + e_{ij}$$

## Empirical strategy (I) (Cont'd)

- A.  $Y_{it}$  represents a continuous measure of academic achievement or child behavioral problems for the  $i$ -th 9-year old child (Woodcock Johnson, CBCL, CTRS-R/ SSRS) :
- B.  $FE_{it-1}$  Father engagement at 5-years old
- C.  $FNR_{it0}$  Whether father was non-resident at birth
- D.  $\beta_1$ , the effect of engagement when the child was 5 years old of fathers who were resident at birth on the outcome measured when the child was 9 years old.
- E.  $\beta_1 + \beta_2$ , the effect of engagement when the child was 5 years old of fathers who were non resident at birth on the outcome measured when the child was 9 years old.
- F.  $\beta_3$  represents the effect of having a non resident father at birth on the outcome (omitted category is resident fathers at birth)
- G.  $X_{it0}$  vector of predictors measured at baseline
- H.  $\sigma$  is the corresponding vector of parameters

# Engagement vs. Residence

- I. This formulation allows us to test the hypothesis that engagement by resident fathers has a different effect on behavior or achievement than engagement by non-resident fathers, a similar question to that posed by Cabrera ....., without including post-treatment predictors in the model.
- II. This is important for 2 reasons:
  - A. Effects of family structure on child outcomes is well-established, while the effects of engagement are not, especially for poor families and families of color, where transitions to nonresidential fatherhood are very high.
  - B. Engagement is one of the few fathering constructs for which a common measure is available for resident and non-resident fathers.

# Empirical strategy (II)

I. Our models for teacher evaluations is :

$$Y_{ijt} = \alpha_{ij} + \beta_{1j} FE_{it-1} + \beta_{2j} FNR_{it0} * FE_{it-1} + \beta_{3j} FNR_{it0} + \gamma_j X_{it0} + e_{ij}$$

II.  $Y_{ijt}$  represents the teacher's assessment of the child's performance in math or reading and literacy for the  $i$ -th, 9-year-old child and  $j$  represents the teacher's choices :

- I. "below average", "average" or "above average"
- II. Reference category: "below average"



# Estimators

- I. Woodcock Johnson scores are normally distributed, so we estimate this model using OLS
- II. Both behavioral measures (CBCL and CTRS-R/ SSRS )are highly skewed, so OLS would inflate the variance of parameter estimates. So we use a GEE estimator for these outcomes, which is quasi-max likelihood properties.
- III. Teacher evaluations are ordered Likert scales, so we tried and ordered logit estimator, however, we reject the hypothesis of proportional odds for the teacher evaluations of math, so we estimate this model using a generalized ordered logit estimator.

# Estimators Summarized

Reporter/Measure	Behavior	Reading	Math
Primary Caregiver	GEE		
Teacher	GEE	Ordered Logit	Generalized Ordered Logit
Woodcock Johnson		OLS	OLS



# Results: Child Behavior Problems

# Possible Sample Selection

- We considered whether the exclusion of observations made to derive our complete case samples resulted in any selection bias. We excluded children
  - not included in the in-home survey (CBCL) and those for whom teacher evaluations or behavioral assessments were unavailable.
  - for whom data on our outcome, treatment, or control variables were missing.
- To examine whether these exclusions are likely to cause selection bias in our analytical sample, we examined whether there were significant differences between the demographic characteristics of the core sample and each of our analytic samples.

**Table 1.** Descriptive Statistics for Family Characteristics in Each Core and Analytic Sample

	Core Sample of FF		CBCL Analytic Sample		Teacher Analytic Sample		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
<b>Race</b>							
<i>White</i>	0.210		0.232		0.210		***
<i>Black</i>	0.475		0.490		0.459		
<i>Hispanic</i>	0.273		0.246		0.248		
<i>Others</i>	0.040		0.032		0.034		
<b>Educational Attainment</b>							
<i>Less than High School</i>	0.347		0.298		0.292		***
<i>High school</i>	0.303		0.317		0.303		
<i>Some College</i>	0.243		0.263		0.270		*
<i>College or More</i>	0.107		0.122		0.126		*
Household Income	\$ 31,987.51	(31,567.26)	\$33,633.76	(32,578.24)	\$34,690.68	(33,246.32)	**
Male	0.522		0.523		0.525		
N	4,898		2,241		1,599		

**Table 2.** Generalized Estimating Equation Model Predicting Effect of Father engagement on Internal and External Problems

	CBCL (Standardized)		Teacher-Reported Survey (Standardized)	
	Internalizing Problems	Externalizing Problems	Internalizing Problems	Externalizing Problems
Father engagement at Wave 4 (Standardized)	-0.081** (0.028)	-0.088** (0.028)	-0.026 (0.035)	-0.060 (0.034)
Not resident with Father at Baseline	-0.001 (0.050)	-0.026 (0.047)	0.031 (0.062)	0.065 (0.058)
Interaction term ( <i>Father engagement at wave<sub>4</sub> X Not resident with father at baseline</i> )	0.028 (0.045)	-0.005 (0.042)	-0.002 (0.056)	-0.021 (0.053)
<i>N</i>	2,241	2,241	1,599	1,599

**Table 3.** Generalized Estimating Equation Model Predicting Effect of Demographic Characteristics on Internal and External Problems

	CBCL (Standardized)		Teacher-Reported Survey (Standardized)	
	Internalizing Problems	Externalizing Problems	Internalizing Problems	Externalizing Problems
<b>Race</b>				
<i>White (Reference)</i>				
<i>Black</i>	-0.168** (0.052)	-0.094 (0.052)	-0.018 (0.069)	0.341*** (0.067)
<i>Hispanic</i>	-0.024 (0.060)	-0.220*** (0.060)	-0.049 (0.084)	-0.042 (0.077)
<i>Others</i>	0.072 (0.118)	0.016 (0.118)	-0.011 (0.134)	0.072 (0.137)
<b>Educational Attainment</b>				
<i>Less than High School (Reference)</i>				
<i>High school</i>	-0.079 (0.054)	-0.051 (0.054)	-0.016 (0.064)	-0.006 (0.060)
<i>Some College</i>	-0.162** (0.057)	-0.151** (0.056)	-0.076 (0.073)	-0.001 (0.066)
<i>College or More</i>	-0.085 (0.082)	-0.168* (0.081)	-0.299** (0.115)	-0.127 (0.100)
Household Income (log+1)	-0.053* (0.022)	-0.063** (0.022)	-0.029 (0.017)	-0.045** (0.015)
Male	0.005 (0.040)	0.193*** (0.039)	0.143** (0.056)	0.345*** (0.048)
N	2,241	2,241	1,599	1,599

**Table 4.** Generalized Estimating Equation Model Predicting Effect of Father engagement on Primary Care-Reported Behavioral Problems

CBCL (Standardized)	Standardized Coefficients of Father engagement at Wave 4			
	Including Interaction term		Excluding Interaction term	
Anxious	-0.068	*	-0.066	**
	(0.029)		(0.022)	
Withdrawn	-0.033		-0.034	
	(0.027)		(0.021)	
Somatic Complaints	-0.104	***	-0.076	***
	(0.027)		(0.022)	
Social Problems	-0.104	***	-0.099	***
	(0.031)		(0.023)	
Thought Problems	-0.054		-0.068	**
	(0.029)		(0.022)	
Attention Problems	-0.106	***	-0.089	***
	(0.030)		(0.023)	
Rule-Breaking Behavior	-0.071	**	-0.084	***
	(0.027)		(0.019)	
Aggressive Behavior	-0.090	**	0.086	***
	(0.028)		(0.021)	
Total CBCL	-0.100	***	-0.095	***
	(0.029)		(0.022)	
N	2,241		2,241	



**Table 4.** Generalized Estimating Equation Model Predicting Effect of Father engagement on Teacher-Reported Behavioral Problems

Teacher-Reported Survey (Standardized)	Standardized Coefficients of Father engagement at Wave 4			
	Including interaction term		Excluding interaction term	
Oppositional Problems	-0.036 (0.031)		-0.041 (0.024)	
Cognitive Problems/Inattention	0.027 (0.038)		-0.003 (0.027)	
Hyperactivity	-0.075 (0.032)	*	-0.067 (0.026)	**
ADHD	-0.087 (0.037)	*	0.071 (0.028)	*
Social Skills Problems	-0.108 (0.043)	*	-0.079 (0.030)	**
Cooperation Problems	-0.115 (0.042)	**	-0.074 (0.031)	*
Assertion Problems	-0.069 (0.040)		-0.047 (0.029)	
Self-Control Problems	-0.100 (0.041)	*	-0.086 (0.029)	**
N	1,599		1,599	



# Results: Academic Achievement

**Table 1. Differences in Baseline/Sample Means**

	Full Sample at Baseline	WJ Analytic Sample		Full Sample at Baseline	Teacher Evaluation	
<b>Race</b>						
White	0.211	0.220		0.211	0.258	***
Black	0.476	0.498	†	0.476	0.467	
Hispanic	0.273	0.250	*	0.273	0.241	**
Others	0.040	0.032	†	0.040	0.034	
<b>Educational Attainment</b>						
Less Than High School	0.347	0.315	**	0.347	0.287	***
High School	0.303	0.311		0.303	0.310	
Some College or Technical School	0.243	0.257		0.243	0.275	**
College or More	0.107	0.116		0.107	0.128	*
Male	0.524	0.517		0.524	0.520	
Household Income	\$31,994	\$33,048		\$31,994	\$34,862	**
Father Residency at Birth	0.393	0.399		0.393	0.376	
N	4,898	2,521		4,898	1,715	

**Table 2.** OLS Estimates of the Effect of Father Engagement on Woodcock Johnson

	Reading (Standardized)		Math (Standardized)	
Father engagement at Wave 4 (Standardized)	0.03 (0.02)	†	0.01 (0.02)	
Father residence at birth	-0.04 (0.04)		-0.06 (0.04)	
Male	-0.25 (0.04)	***	-0.06 (0.04)	†
Child born below 2,500 grams	-0.26 (0.07)	***	-0.31 (0.07)	***
Household Income (logged)	0.05 (0.01)	**	0.05 (0.01)	***
N	2,521		2,529	

(Cont.) Table 2. Woodcock Johnson

	Reading (Standardized)		Math (Standardized)	
<b>Race</b>				
<i>White (Reference)</i>				
<i>Black</i>	-0.18 (0.05)	***	-0.27 (0.05)	***
<i>Hispanic</i>	-0.21 (0.06)	***	-0.12 (0.06)	*
<i>Other Race</i>	0.04 (0.10)		0.04 (0.13)	
<b>Educational Attainment</b>				
Less than High School (Reference)				
High School	0.09 (0.05)	*	0.06 (0.05)	
Some College or Tech School	0.29 (0.06)	***	0.34 (0.05)	***
College or More	0.66 (0.08)	***	0.62 (0.08)	***
Mother's <b>WAIS-R</b> Score	0.10 (0.02)	***	0.10 (0.02)	***
<i>N</i>	2,521		2,529	

**Table 3.** Ordered and Generalized Ordered Logit Estimates of Effects of Engagement on

	Teacher Evaluation (Reading and Literacy)		Teacher Evaluation (Mathematics) Below Average to Average		Teacher Evaluations (Mathematics) Average to Above Average	
<b>Race</b>						
<i>White (Reference)</i>						
<i>Black</i>	.7630 (.093)	*	.5089 (.080)	***	.8023 (.119)	†
<i>Hispanic</i>	.9697 (.134)		.5635 (.098)	***	1.067 (.176)	
<i>Other Race</i>	1.439 (.389)		.5887 (.199)		1.101 (.332)	
<b>Education Attainment</b>						
Less than High School (Reference)						
High School	1.031 (.126)		1.070 (.145)		.9769 (.157)	
Some College or Tech School	1.638 (.220)	***	1.630 (.253)	**	1.543 (.258)	**
College or More	2.260 (.454)	***	2.839 (.776)	***	2.318 (.545)	***
N	1,715		1,712		1,712	

(Cont.) **Table 3.** Result of Teacher Evaluation

	Teacher Evaluation (Reading and Literacy)		Teacher Evaluation (Mathematics) Below Average to Average		Teacher Evaluations (Mathematics) Average to Above Average	
Father Engagement at Wave 4 (Standardized)	1.118 (.069)	†	.9672 (.073)		.9157 (.068)	
Interaction term (Father engagement at wave 4 X Not resident with father at baseline)	.7956 (.080)	*	.9467 (.108)		1.056 (.139)	
Mother's WAIS-R Score	1.223 (.062)	***	1.174 (.070)	**	1.115 (.069)	†
Male	.5915 (.054)	***	.8805 (.095)		.9909 (.111)	
Child born below 2,500 grams	.7227 (.117)	*	.6442 (.116)	*	.4871 (.117)	**
Household Income (Logged)	1.077 (.039)	*	1.109 (.043)	**	1.191 (.066)	**
N	1,715		1,712		1,712	

# Interpretation of Results

Teacher Evaluations in Reading and Literacy and Mathematics each have three potential outcomes:

- Below Average
- Average
- Above Average

Reading and Literacy Teacher Evaluations pass the proportional odds test, while mathematics does not.

This assumes the following:

- The effect of engagement on reading and literacy is the same at both cut points while it is not the same for the effect of engagement on mathematics
- The odds ratio on the mathematics analysis reflects the effect of father engagement on the odds that students are assessed by their teacher to be average versus below average and the odds of the child being assessed above average versus average or below



# Conclusions

- The effect of father engagement on child behavior problems is no different for the children of resident and non-resident fathers
- But it is difficult to disentangle the effect of father engagement on academic achievement
  - There is suggestive evidence of an independent effect of father engagement on reading, but no evidence of such an effect on math
- The size of the effects of father engagement are similar in magnitude to the size of other variables, which are much more costly to change
  - Household income
  - Mother's education

# Next steps

- Include controls for mother's depression, fathers mental health and other factors, particularly early father engagement, that could affect later father engagement and child outcomes
- Control for selection into father engagement, perhaps using propensity scores.
- Consider alternative strategy for academic achievement in which early residence is used as a predictor of father engagement.