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# The effects of a universal short-term home visiting program: Two-year impact on parenting behavior and parent mental health

Gayane A. Baziyants<sup>a,\*</sup>, Kenneth A. Dodge<sup>a</sup>, Yu Bai<sup>b</sup>, W. Benjamin Goodman<sup>b</sup>, Karen O'Donnell<sup>c</sup>, Robert A. Murphy<sup>c</sup>

<sup>a</sup> Sanford School of Public Policy and Department of Psychology and Neuroscience, Duke University, Durham, NC 27708, United States of America

<sup>b</sup> Sanford School of Public Policy, Duke University, Durham, NC 27708, United States of America

<sup>c</sup> Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine, Durham, NC 27710, United States of America

## ARTICLE INFO

## Keywords:

Home visiting  
Parenting behavior  
Parent mental health  
Randomized control trial

## ABSTRACT

**Background:** At the time of childbirth, families face heightened levels of unmet need. These needs, if left unmet, can lead parents to engage in less positive parenting practices, which in turn, increase the risk of child maltreatment. Family Connects (FC) is a universal postnatal nurse home-visiting program designed to prevent child maltreatment by supporting all families in a community through one to three visits to improve parent mental health and parenting behaviors. A randomized controlled trial of FC demonstrated improving positive parenting and reducing postpartum depression through age 6 months.

**Objective:** To determine sustained (2-year) impact of random assignment to FC on parenting behavior and parent mental health and identify heterogeneity of effects.

**Participants and setting:** A representative subsample of 496 families that had been randomized to FC (255 treatment; 241 control) of infants born between July 1, 2009, and December 31, 2010, in Durham County, North Carolina.

**Methods:** Demographic characteristics were collected through hospital discharge data. Treatment-blinded interviewers collected maternal reports of parenting behavior and mental health at infant age two years. Moderation and subgroup analyses were conducted to estimate heterogeneity in impact of FC.

**Results:** Mothers assigned to FC engaged in more self-reported positive parenting relative to control mothers ( $B = 0.21$ ;  $p < 0.05$ ). Hispanic mothers assigned to FC reported greater sense of parenting competence ( $B = 1.28$ ;  $p < 0.05$ ). No significant main effect differences were identified for negative parenting, maternal depression, or father involvement.

**Conclusions:** Assignment to FC was associated with improvements in population-level self-reported scores of positive parenting 2 years post-intervention.

## 1. Introduction

Parents and caregivers have been considered active agents of children's development and well-being for centuries. Major life events

\* Corresponding author at: Sanford School of Public Policy and Department of Psychology and Neuroscience, Duke University, 201 Science Drive, P.O. Box 90315, Durham, NC 27708, United States of America.

E-mail address: [gayane.baziyants@duke.edu](mailto:gayane.baziyants@duke.edu) (G.A. Baziyants).

<https://doi.org/10.1016/j.chiabu.2023.106140>

Received 30 July 2022; Received in revised form 3 March 2023; Accepted 9 March 2023

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or changes in living circumstances, such as giving birth to an infant, may present families with heightened levels of need. These needs, if left unmet, pose risks that could compromise the development of young children and even negate positive impacts of early childhood intervention programs (Rank et al., 2021; Shonkoff & Fisher, 2013). With previous research suggesting over 94 % of mothers reporting one or more unmet needs at the time of infant birth, there is an urgency and an opportunity to focus interventions that strengthen the capabilities of parents and caregivers (Dodge, 2022). This article reports the impact of a brief, universal, perinatal parent-support home-visiting program on parenting behavior and parent mental health outcomes two years post intervention.

### 1.1. Parenting in context

Children's interactions with their parents and caregivers form the immediate microsystem that drives children's subsequent development (Bronfenbrenner, 1979). Because the parent-infant interaction system is nested within a broader social ecology, these interactions can vary depending on everyday stressors that can include economic hardships, social networks, neighborhoods, and overall parent mental health (Bronfenbrenner, 1979; Campbell et al., 2007; Nepl et al., 2016; Olds, 2008). Without support, home environments can become hectic, unstructured, and unpredictable with parents turning to severe parenting styles that negatively affect children's development (Evans et al., 2005).

Research is clear that parents unable to manage this level of stress can engage in neglectful parenting behaviors (Hillson, 1994). Parents may withdraw from child caregiving duties to avoid feelings of distress or turn to unhealthy coping mechanisms that further strain safe home environments for children (Bauch et al., 2022; Roscoe et al., 2018). Parents may become less responsiveness, less sensitive, and overall less nurturing in their interactions with their children (Kahng et al., 2008; Pereira et al., 2012; Ward & Lee, 2020). The inability to meet children's immediate needs has also been linked as a mediator in parent chronic mental health and subsequent child safety and maltreatment in the home (Roscoe et al., 2021). The lack of positive home environments has even played a role in failing to sustain the effects of high-quality Pre-Kindergarten programs (Han et al., 2020). Given the heightened levels of need at the time of infant birth, it is critical that a universal system of care is available to mothers, caregivers, and all birthing parents. This will ensure positive parenting behaviors from the earliest days of a child's life.

### 1.2. Home visiting as a parenting intervention

Home visiting as a method of service delivery can be traced back to the late 1800s (Astuto & Allen, 2009). Through demonstrated success in impacting family and child outcomes, the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program provides over \$400 million dollars each year to various states, tribal territories, and other entities (Health Resource & Service Administration: Maternal & Child Health, 2021). Home visitation programs vary greatly in their frameworks, curricula, and reference population. However, the overall purpose remains consistent across all: to promote positive parenting by both mothers, fathers, and all parenting partners to support families through home visitation service delivery (Astuto & Allen, 2009; Haskins et al., 2009; Health Resource & Service Administration: Maternal & Child Health, 2021). Unfortunately, of the hundreds of home visiting programs currently available in the United States, few have demonstrated lasting positive effects on parenting and parent mental health outcomes, particularly when implemented at scale (Michalopoulos et al., 2019).

### 1.3. Family Connects

Family Connects (FC) is a universal postnatal nurse home-visiting program designed to support parents at birth and provide families with community resources based on identified family needs (Dodge et al., 2013). The program is designed to reduce child maltreatment rates and improve population-level child and family outcomes (Goodman et al., 2021). FC consists of one to three home visits over the first 12 weeks of life and costs about \$700 per family. Currently, FC is being implemented across 17 different states, with ongoing efforts to implement fully at the national level (Family Connects Locations, 2022).

The FC program model is centered around three pillars of home visiting, community alignment, and data and monitoring (Dodge & Goodman, 2019). Under the home visiting pillar, every birthing mother is approached by program staff, ideally in a hospital shortly after birth, and offered to participate in the intervention. Given the universal reach of the FC program, there are no eligibility criteria apart from having given birth. A registered public health nurse visits the child's home, typically starting at child age of three weeks. During the initial visit, the nurse screens the family to identify family strengths and family needs in each of 12 factors in four domains centered around parenting, parental mental health, healthcare, and household safety and violence (Dodge et al., 2019). After identifying family needs, the nurse addresses each need by providing brief interventions or connecting the family to various community agencies. This second pillar, community alignment, brings together the hundreds of agencies in a community that serve birthing families through an electronic directory and community advisory boards. The third pillar is an integrated data system that links families and community services.

The FC protocol requires quarterly fidelity checks with all nurses to ensure proper adherence to the FC model. Previous FC evaluation demonstrated nurse adherence to protocol of 90 % and high inter-rater rate of agreement across assessment of risk ( $\kappa = 0.75$ ) (Dodge & Goodman, 2019; Landis & Koch, 1977). The protocol aimed to connect with both the mother and father, to the extent the mother agreed (Dodge & Goodman, 2019).

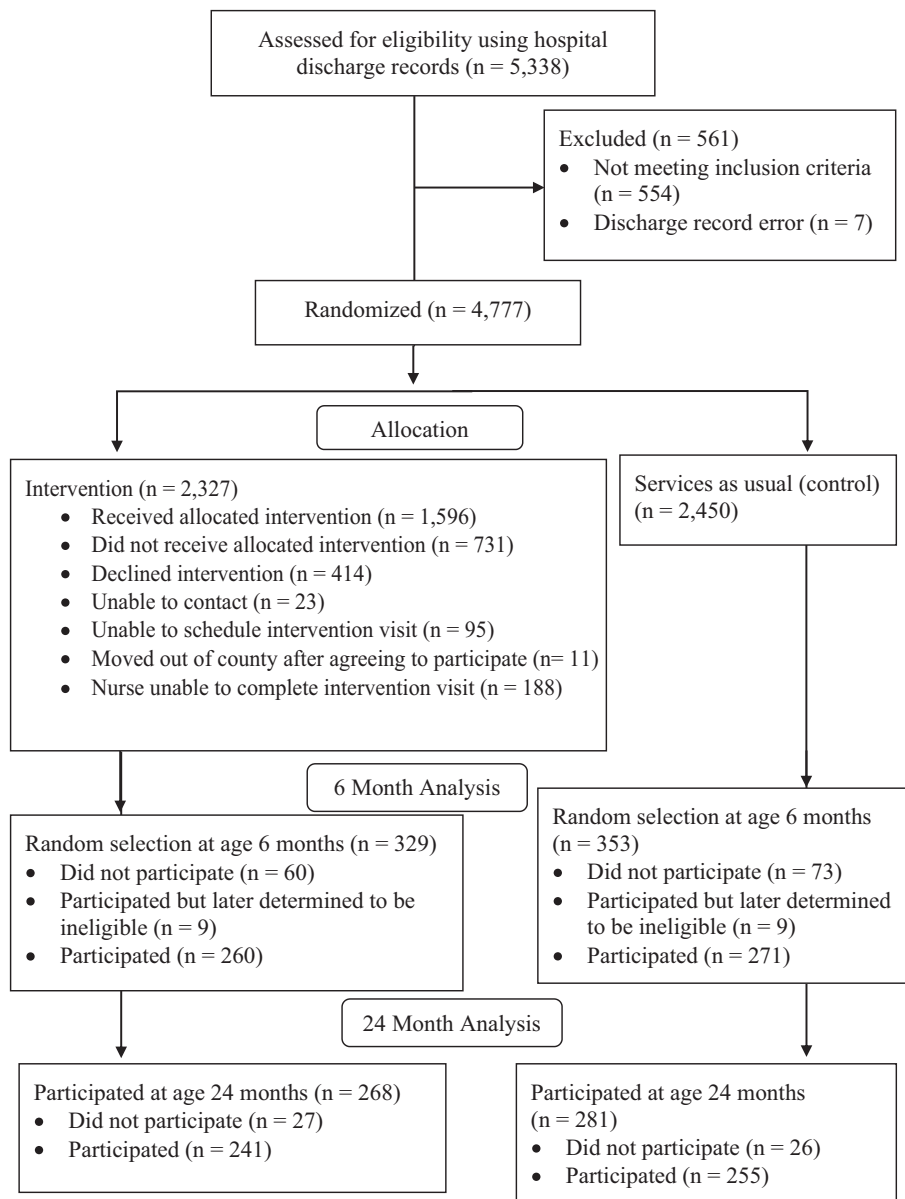


Fig. 1. CONSORT flow diagram for Family Connects RCT implementation and evaluation.

#### 1.4. Findings from 6-month evaluation of Family Connects

Intent-to-treat impact findings on the outcomes of parenting and parental mental health been evaluated through child age 6 months. At child age 6 months, mothers randomly assigned to FC reported engaging in more positive parenting behaviors ( $B = 0.10$ ; 95 % CI = 0.03, 0.17;  $p < 0.01$ ; effect size = 0.25). No other main effect differences were identified for other parenting outcomes of negative parenting, father involvement, or parenting sense of competence. For the outcome of mother mental health, mothers randomly assigned to FC were less likely to report possible depression ( $T = 7.7$  %;  $C = 11.8$  %) (Dodge et al., 2014). In response to identified needs, 44 % of mothers received referrals to community service providers and 49 % received brief intervention by the nurse. Nurses reported delivering an average of 13.8 out of 20 possible teachings with each family across topics of infant sleep, parenting, infant crying, and maternal anxiety. Materials provided by the nurse, discussions with the nurse, and nurse teachings were rated as most helpful by the mothers.

### 1.5. The current study

The primary goal of the current study was to evaluate impact of assignment to FC on parenting behavior and parent mental health at child age 2 years for the same sample that had been evaluated at age 6 months. Positive parenting outcomes and parent mental health through child age 2 years have not been investigated to test whether the initial positive impacts of random assignment to FC are sustained. The rationale for hypothesizing sustained impact is that if parents connect to tailored, ongoing community resources, this support will sustain positive mental health and positive parenting behavior across the child's first several years of life.

A secondary goal of this study is to determine whether there is significant heterogeneity in parenting and parent mental health impacts across the diverse demographic make-up of families in the study. Given the different needs and cultural make-up of each family in the sample, we hypothesize that some families may benefit more than others from random assignment to FC. Specifically, we hypothesize mothers of children born with an identified birth risk may demonstrate greater positive benefit of FC than mothers with children who were not born with an identified risk (Olds & Kitzman, 1993; Raikes et al., 2006). Additionally, we hypothesize that Hispanic mothers may also benefit more from FC, given that Hispanic families have been shown to be more engaged in home visiting programs (Lerner et al., 2004). Lastly, single-mother families may benefit more due to limited flow of resources and income available for these mothers (Daryanani et al., 2016; Kendig & Bianchi, 2008).

## 2. Methods

### 2.1. Study design

Implementation and impact of FC were evaluated through an RCT that included 4777 families of infants born between July 1, 2009, and December 31, 2010, in Durham County, North Carolina (NC) (Fig. 1). Treatment and control groups were randomly assigned a priori by the date of birth of the infant. Specifically, if the infant was born on even date, the family was assigned to receive FC. If the infant was born on an odd date, the family was assigned to the control group, or "services as usual". Families assigned to FC provided written consent for the intervention (Goodman et al., 2021). At six months of infant age, a representative subsample was selected to evaluate the impact of random assignment to FC (Goodman et al., 2019). This representative subsample was selected randomly from public birth records through a computer algorithmic rule that picked one infant from each day of birth across the 18 months of the trial. The families were blind to the goals of the study to remove any bias and were informed only that this was a study of infant development. If the family declined to participate, another family was randomly picked to reflect the same infant birth date and race/ethnicity. Out of 682 families selected in this manner, a final sample of 549 families agreed to participate in the original child age 6-month evaluation study, including 269 FC families and 280 control families.

As part of the current study, at child age 2 years, families were re-contacted to request a follow-up interview via an in-person home visit (unless remote interview was requested) to understand how their child was developing. Data collectors were also unaware of the family treatment status. For the purposes of this study, data were analyzed for the parenting and parent well-being domains. This trial was registered with [ClinicalTrials.gov](https://clinicaltrials.gov), NCT01406184, <https://clinicaltrials.gov/ct2/show/NCT01406184>. The Duke School of Medicine Institutional Review Board (IRB) approved all study procedures.

### 2.2. Participants

Of the original 549 families from the child age 6-month evaluation, 496 families (90.3 %; 255 treatment and 241 control) participated at the child age 2 years interview. There were no statistically significant differences in the baseline characteristics between the treatment families and control families (Table 1). The 53 families not retained as part of the final subsample for this child age 2-year evaluation were more likely to be of low socioeconomic status (measured through Medicaid status and educational attainment), a young mother, or of Hispanic origin (Table 2). Demographic characteristics were collected through hospital discharge data at the start of the study. Previously published between-group demographic comparisons using baseline mother and child characteristics from Table 1 demonstrated the study sample reflects the broader community of Durham, NC, where the study took place (Dodge et al., 2014; Goodman et al., 2019). Out of the 496 families that answered questions related to parenting and parent mental health, most mothers self-identified as Black, non-Hispanic (40.1 %) or White, non-Hispanic (28.6 %). Children born to these mothers were almost evenly split between male gender (47.2 %) and female gender (52.8 %), and 12.7 % of the children were born with one or more identified birth risks (birth weight < 2500 g, gestational age < 37 weeks, or birth complications/trauma as defined by the International Classification of Diseases, Ninth Edition (ICD-9) (Alonso-Marsden et al., 2013; Dodge et al., 2019; Goodman et al., 2019; World Health Organization, 1978)). A little over half of the mothers in the sample were partnered (61.3 %), and majority had completed at least high school (36.3 %) or up to graduate school level of education (36.5 %).

### 2.3. Measures

Mothers self-reported their parenting behavior and mental health by filling out the same questionnaires as those of the child age 6-month interview. This was done in an effort to evaluate the same parenting and parent mental health outcomes using the same measures as in the 6 month evaluations (Dodge et al., 2014). Mothers completed items from the *Warmth and Parenting Behaviors Questionnaire*, which consisted of child age-appropriate questionnaire items selected from the Mother-Child Neglect Scale (Lounds et al., 2004), the Parent-Child Conflict Tactics Scale (Straus et al., 1998), and the Durham Family Initiative Cross-Site Interview

**Table 1**  
Baseline characteristics of treatment and control group families (N = 496).

Characteristics	Control		Treatment		p-Value
	n	Percent	n	Percent	
Birth risk ever					
No	217	85.10	216	89.63	0.130
Yes	38	14.90	25	10.37	
Total	255	100	241	100	
Infant female					
No	112	43.92	122	50.62	0.135
Yes	143	56.08	119	49.38	
Total	255	100	241	100	
Single parent					
No	147	57.65	157	65.15	0.087*
Yes	108	42.35	84	34.85	
Total	255	100	241	100	
Medicaid/uninsured					
No	82	32.80	91	39.22	0.142
Yes	168	67.20	141	60.78	
Total	250	100	232	100	
Mother race					
White, non-Hispanic	64	25.1	78	32.37	0.309
Black, non-Hispanic	109	42.75	90	37.34	
Hispanic	26	10.2	26	10.79	
Other, non-Hispanic	56	21.96	47	19.5	
Total	255	100	241	100	
Young mother					
No	171	67.06	160	66.39	0.874
Yes	84	32.94	81	33.61	
Total	255	100	241	100	
New mother					
No	153	60	152	63.07	0.482
Yes	102	40	89	36.93	
Total	255	100	241	100	
Mother education (socioeconomic status)					
Less than 12th grade	75	29.41	60	24.9	0.222
High school or some college	96	37.65	84	34.85	
College or graduate school	84	32.94	97	40.25	
Total	255	100	241	100	

Note: The P-value comes from X<sup>2</sup> test between the treatment and control group.

\* p < 0.1.

(Durham Family Initiative, 2008). As part of the parenting outcome domain, mothers also completed the *Father Involvement Questionnaire*, which consisted of items selected from the Fragile Families and Child Well-being Study (Center for Research on Child Wellbeing, 2008), and a *Maternal Depression Scale* that contained all of the items from the Center for Epidemiological Studies Depression Scale (Radloff, 1977). Five dependent variables were generated. Not all questionnaire items were selected from the above measures at the child age 6-month evaluation in an effort. For example, questions related to interest in child's hobbies, school involvement, and other similar items were excluded. Pre-treatment measures of the five outcomes were not available.

### 2.3.1. Mother positive parenting

The mean of 7 items summing diverse positive parenting behaviors was scored, for example, "Read books with [CHILD]", "Did things just for fun with [CHILD] (played games like peek-a-boo, went to a fun place like a playground)", and "Comforted [CHILD] when she or he was upset" Scores were standardized and ranged from 0 (never in the past month) to 5 (>20 times in the past month) (alpha = 0.58).

### 2.3.2. Mother negative parenting

The mean of 16 questionnaire items summing diverse negative, neglectful, and harsh parenting was scored. Higher scores indicate greater negative parenting behaviors, for example, "Shouted, yelled, or screamed at [CHILD]", "Did not watch child as carefully as I thought I should, or had to leave [CHILD] home alone", "Spanked or slapped [CHILD]". Scores were standardized and ranged from 0 (never in the past month) to 5 (>20 times in the past month) (alpha = 0.53).

### 2.3.3. Father involvement

The mean of 10 questionnaire items indicating father parenting involvement was scored, for example, "Sing songs or nursery rhymes to (him/her)", "Tell stories to (him/her)", and "Hug or show physical affection to (him/her)". Father involvement was analyzed for single mothers and non-single mothers. Scores were standardized and ranged from 0 (never) to 3 (nearly every day) (alpha = 0.82).

**Table 2**  
Baseline characteristics of retained and dropped families.

Characteristics	Retained		Dropped		p-Value
	n	Percent	n	Percent	
Birth risk ever					
No	433	87.30	46	86.79	0.916
Yes	63	12.70	7	13.21	
Total	496	100.00	53	100.00	
Infant female					
No	234	47.18	26	49.06	0.795
Yes	262	52.82	27	50.94	
Total	496	100.00	53	100.00	
Single parent					
No	304	61.29	28	52.83	0.231
Yes	192	38.71	25	47.17	
Total	496	100.00	53	100.00	
Medicaid/uninsured					
No	173	35.89	9	18.00	0.011**
Yes	309	64.11	41	82.00	
Total	482	100.00	50	100.00	
Mother race					
White, non-Hispanic	142	28.63	7	13.21	0.005***
Black, non-Hispanic	199	40.12		32.08	
Hispanic	52	10.48	10	18.87	
Other, non-Hispanic	103	20.77	19	35.85	
Total	496	100	53	100.00	
Young mother					
No	331	66.73	24	45.28	0.002***
Yes	165	33.27	29	54.72	
Total	496	100	53	100.00	
New mother					
No	305	61.49	34	64.15	0.705
Yes	191	38.51	19	35.85	
Total	496	100	53	100.00	
Mother education (socioeconomic status)					
Less than 12th grade	135	27.22	26	49.06	0.001***
High school or some college	180	36.29	18	33.96	
College or graduate school	181	36.49	9	16.98	
Total	496	100	53	100.00	

Note: The P-value comes from  $X^2$  test between the treatment and control group.

\*\*  $p < 0.05$ .

\*\*\*  $p < 0.01$ .

#### 2.3.4. Parenting sense of competence

The mean of 20 questionnaire items indicating total sense of parenting competence, parenting satisfaction, and parenting efficacy was scored. Higher scores indicate greater parenting sense of competence. Sample items include “Being a parent is manageable, and any problems are easily solved”, “I would make a fine model for a new parent to follow in order to learn what she or he would need to know in order to be a good parent”, and “I honestly believe I have all the skills necessary to be a good parent to my child”. Scores were standardized and ranged from 1 (strongly disagree) to 6 (strongly agree) ( $\alpha = 0.70$ ).

#### 2.3.5. Mother depression score

The mean of 10 items reflecting depressive symptoms was scored, with higher scores reflecting greater depressive symptoms, for example, “I was bothered by things that usually don’t bother me”, “I felt depressed”, and “I had crying spells”. Scores were not standardized and ranged from 0 (rarely or none of the time in the past week) to 3 (most or all of the time in the past week) ( $\alpha = 0.87$ ). A dichotomous score (0 = no, 1 = yes) was also created to indicate possible clinical depression (Lewinsohn et al., 1997).

#### 2.3.6. Demographic variables

The list of demographic variables includes *infant medical risk at birth* (comprised of sum scores of infant birth weight, infant gestational age, or other birth complication/trauma as defined by International Classification of Diseases, Ninth Edition (ICD-9)), *infant gender* (0 = boy; 1 = girl), *mother single parent status* (0 = no; 1 = yes), *mother race* (1 = white, non-Hispanic; 2 = black, non-Hispanic; 3 = Hispanic; 4 = other, non-Hispanic), *mother age status* (0 = older than 25 years; 1 = 25 years old or younger), and *new mother status* (0 = no; 1 = yes). *Mother education* (1 = less than 12th grade; 2 = high school or some college; 3 = college or graduate school) and *mother health insurance status* (0 = private insurance; 1 = Medicaid/no insurance) are additional demographic variables included that capture mother socioeconomic status (Diemer et al., 2013). These demographic variables were controlled for as covariates in the models and analyzed individually to test for interaction effects, discussed in more detail below.

## 2.4. Statistical analysis

STATA version 17.0 was utilized to conduct a two-tailed intent-to-treat estimate on the impact of random assignment of FC on parenting behavior and parent mental health at child age 2 years. Ordinary Least Squares (OLS) regression models were used to estimate the impact of random assignment to FC on the outcomes of interest. The OLS model reflects the following equation,  $y_i = \alpha + \tau w_i + \beta x_i + \varepsilon_i$  where,  $y_i$  represents the average score to the parenting outcome variables and parent mental health outcome variables,  $\alpha$  is a constant,  $\tau$  is the average effect of random assignment to FC,  $w_i$  is a dummy indicator for assignment to FC,  $x_i$  are the covariates, and  $\varepsilon_i$  is the error term/other unobservable characteristics. The main effect models included the demographic covariates indicated above. A statistical significance of ( $p < 0.05$ ) was used as the criterion for analysis of the intent-to-treat main effect of random assignment to intervention for each of the five dependent variables.

Moderation analyses were conducted to estimate interaction effects between treatment and the demographic characteristics collected at baseline. Regression models were estimated individually for each of the eight demographic characteristics. A looser criteria of statistical significance testing was applied to explore possible heterogeneity in effects. If these exploratory interaction tests between treatment status and a demographic characteristic were statistically significant ( $p < 0.05$ ) or marginally significant ( $p < 0.1$ ), subgroup analyses were conducted to test further for heterogeneity in FC impact for different demographic groups. Subgroup analyses were not exploratory, and thus were implemented with a statistically significant value ( $p < 0.05$ ). Missing values were identified for 14 families in the demographic variable of mother health insurance status. Missing values were also present for the outcome variable, maternal depression symptoms (1 case) and father involvement (138 cases). Multiple imputation was utilized to create 10 data sets to account for this missingness (Schafer & Graham, 2002).

## 3. Results

### 3.1. Descriptive analyses

Table 3 lists the means for each outcome variable for treatment and control families. Table 5 includes a correlation table with all of the outcomes of interest.

**Table 3**  
Average scores across parenting and parent mental health outcomes by treatment status.

Variables	Control (n = 255)			Treatment (n = 241)		
	Mean	SD	n	Mean	SD	n
Mother positive parenting	4.46	0.55	255	4.59	0.47	241
Mother negative parenting	-0.10	2.58	255	0.10	2.46	241
Father involvement						
Single mothers	2.35	0.41	40	2.18	0.70	36
Non-single mothers	2.45	0.43	140	2.42	0.46	142
Parenting sense of competence	-0.14	2.92	255	0.14	2.30	241
Mother depression score	8.73	8.76	254	7.44	7.15	241

Note: SD = Standard Deviation.

**Table 4**  
Possible clinical depression scores.

Dichotomous score for clinical depression	Treatment		Control		Full sample	
	N	Percent	N	Percent	N	Percent
Not depressed (0)	212	87.97	214	84.25	426	86.06
Depressed (1)	29	12.03	40	15.75	69	13.94
Total	241	100	254	100	495	100

Notes:

T = Treatment; C = Control.

Dichotomous score for clinical depression was calculated using sum scores from the *Maternal Depression Scale* that contained all of the items from the Center for Epidemiological Studies Depression Scale (Radloff, 1977). Sum scores calculated using guidelines from Lewinsohn et al. (1997). A score of 0 was given if sum scores  $< 16$ . A score of 1 given if sum scores equal to or  $> 16$ .

**Table 5**  
Correlation table of parenting and parent mental health outcomes.

Outcome	Mother positive parenting	Mother negative parenting	Father involvement	Parenting sense of competence	Mother depression score
Mother positive parenting	–				
Mother negative parenting	0.10*	–			
Father involvement	0.10*	–0.15*	–		
Parenting sense of competence	0.08*	–0.08*	0.14*	–	
Mother depression score	–0.08*	0.27*	0.40*	–0.22	–

\*  $p < 0.01$ .

### 3.2. Findings

#### 3.2.1. Positive parenting

Mothers who were assigned to FC reported engaging in more positive parenting behaviors than did the control mothers ( $B = 0.21$ ; 95 % CI = 0.03, 0.39;  $p < 0.05$ , effect size = 0.25, Table 6). Moderation analysis indicate a marginally significant interaction between treatment status and infant birth risk status ( $B = -0.50$ ; 95 % CI =  $-1.03, 0.03$ ;  $p < 0.1$ , Table 7). Findings from subgroup analyses indicate a significant positive effect of random assignment to treatment within the group of infants born with no birth risk ( $B = 0.27$ ; 95 % CI = 0.09, 0.46;  $p < 0.01$ , Table 8). No other interaction effects were significant.

#### 3.2.2. Mother negative parenting

There was no significant difference between mothers who were randomly assigned to FC and mothers who were not in self-report scores of negative parenting behaviors (Table 6). Moderation analysis demonstrated a marginally significant interaction between treatment status and new mother status ( $B = -0.85$ ; 95 % CI =  $-1.78, 0.07$ ;  $p < 0.1$ , Table 7), and subgroup analyses revealed no significant effect of treatment for either first-time or multiparous mothers (Table 8). No other interaction effects were significant.

#### 3.2.3. Father involvement

No statistically significant difference in the main effect of treatment or interaction effects was found for father involvement (Tables 6 and 7).

#### 3.2.4. Parenting sense of competence

There was no significant difference between mothers who were randomly assigned to FC and mothers who were not in self-report scores of parenting sense of competence (Table 6). Moderation analysis revealed a significant positive interaction between being assigned to FC and identifying as a Hispanic mother ( $B = 1.65$ ; 95 % CI = 0.36, 2.94;  $p < 0.05$ , Table 7). Findings from subgroup analyses demonstrate a significant positive effect of random assignment to treatment among Hispanic mothers ( $B = 1.28$ ; 95 % CI = 0.30, 2.26;  $p < 0.05$ , Table 8). No other interaction tests were significant.

#### 3.2.5. Mother depression score

There was no significant difference between mothers who were randomly assigned to FC and mothers who were not in self-reported

**Table 6**  
Main effect analysis examining impact of random assignment to FC on parenting and parent mental health outcomes ( $N = 496$ ).

Outcome	Main effect				
	$b$ (s.e.)	95 % CI	p-Value	Cohen's d	95 % CI Cohen's d
Mother positive parenting	0.21** (0.09)	0.03, 0.39	0.02	–0.25	–0.30, –0.19
Mother negative parenting	0.09 (0.22)	–0.35, 0.53	0.69	–0.08	–0.13, –0.02
Father involvement <sup>a</sup>	–	–	–	–	–
Single mothers	–0.18 (0.20)	–0.59, 0.23	0.39	0.19	0.10, 0.28
Non-single mothers	–0.10 (0.12)	–0.33, 0.13	0.40	0.11	0.04, 0.18
Parenting sense of competence	0.17 (0.22)	–0.27, 0.61	0.45	–0.11	–0.16, –0.05
Mother depression score	–0.11 (0.09)	–2.29, 0.06	0.20	0.16	0.11, 0.21

#### Notes:

All variables presented in Table 1 are controlled for in the model.

Outcome variable, Father Involvement, controls for all variables in Table 1 except single parent status.

Robust standard errors in parenthesis.

Multiple imputation ( $m = 10$ ) was used to handle missing data.

Cohen's d = (Mean of control group – Mean of treatment group) / Pooled standard deviation).

CI = Confidence interval.

<sup>a</sup> Mothers were only asked about father involvement if they were in a relationship at the time of the 24-month interview.

\*\*  $p < 0.05$ .

**Table 7**

Interaction effects between random assignment to FC and baseline characteristics on parenting and parent mental health.

Variable	Mother positive parenting		Mother negative parenting		Father involvement (Single mothers)	
	<i>b</i> (s.e.)	95 % CI	<i>b</i> (s.e.)	95 % CI	<i>b</i> (s.e.)	95 % CI
T × Birth risk	-0.50* (0.27)	-1.03, 0.03	0.83 (0.66)	-0.47, 2.13	0.23 (0.52)	-0.83, 1.30
T × Infant gender	-0.03 (0.18)	-0.38, 0.32	0.38 (0.46)	-0.52, 1.28	0.17 (0.37)	-0.57, 0.90
T × Single parent	-0.11 (0.19)	-0.48, 0.25	-0.35 (0.48)	-1.30, 0.59	-	-
T × No insurance/Medicaid	0.06 (0.17)	-0.27, 0.39	-0.30 (0.46)	-1.21, 0.61	0.14 (0.52)	-0.91, 1.19
T × White, NH <sup>a</sup>	-	-	-	-	-	-
T × Black, NH	-0.12 (0.20)	-0.50, 0.27	-0.06 (0.52)	-1.09, 0.96	-0.04 (0.62)	-1.30, 1.21
T × Hispanic	-0.03 (0.27)	-0.56, 0.49	0.23 (1.02)	-1.78, 2.24	-0.62 (0.88)	-2.38, 1.14
T × Other, NH	0.00 (0.26)	-0.52, 0.52	0.38 (0.58)	-0.76, 1.51	-0.33 (0.77)	-1.85, 1.20
T × Young mother	-0.09 (0.19)	-0.47, 0.29	0.09 (0.51)	-0.91, 1.09	0.19 (0.45)	-0.73, 1.11
T × New Mother	-0.13 (0.18)	-0.48, 0.23	-0.85* (0.47)	-1.78, 0.07	0.65 (0.46)	-0.30, 1.61
T × Less than 12th grade <sup>b</sup>	-	-	-	-	-	-
T × High school or some college	-0.20 (0.25)	-0.68, 0.28	-0.84 (0.58)	-1.99, 0.31	0.12 (0.44)	-0.77, 1.00
T × College or graduate school	-0.21 (0.22)	-0.64, 0.22	-0.32 (0.56)	-1.42, 0.79	-0.25 (0.60)	-1.44, 0.95

Variable	Father involvement (Non-single mothers)		Parenting sense of competence		Mother depression score	
	<i>b</i> (s.e.)	95 % CI	<i>b</i> (s.e.)	95 % CI	<i>b</i> (s.e.)	95 % CI
T × Birth risk	0.20 (0.34)	-0.48, 0.87	0.96 (0.65)	-0.31, 2.24	0.01 (0.27)	-0.52, 0.53
T × Infant gender	-0.04 (0.23)	-0.49, 0.41	-0.01 (0.45)	-0.89, 0.88	-0.82 (1.44)	-0.45, 0.25
T × Single parent	-	-	-0.25 (0.47)	-1.18, 0.69	-0.11 (0.19)	-0.48, 0.26
T × No insurance/Medicaid	-0.19 (0.24)	-0.65, 0.28	0.49 (0.47)	-0.43, 1.41	-0.05 (0.17)	-0.39, 0.29
T × White, NH <sup>a</sup>	-	-	-	-	-	-
T × Black, NH	0.45 (0.36)	-0.26, 1.16	0.50 (0.59)	-0.67, 1.66	-0.22 (0.21)	-0.64, 0.20
T × Hispanic	-0.31 (0.36)	-1.02, 0.40	1.65** (0.66)	0.36, 2.94	-0.55* (0.29)	-1.13, 0.02
T × Other, NH	-0.17 (0.28)	-0.71, 0.37	0.29 (0.63)	-0.95, 1.53	0.16 (0.21)	-0.26, 0.58
T × Young mother	-0.12 (0.34)	-0.78, 0.54	-0.09 (0.49)	-1.05, 0.88	-0.13 (0.21)	-0.53, 0.28
T × New Mother	-0.20 (0.23)	-0.65, 0.24	0.06 (0.46)	-0.85, 0.96	-0.16 (0.18)	-0.52, 0.20
T × Less than 12th grade <sup>b</sup>	-	-	-	-	-	-
T × High school or some college	0.31 (0.39)	-0.46, 1.07	-0.67 (0.55)	-1.75, 0.42	-0.26 (0.24)	-0.73, 0.21
T × College or graduate school	0.24 (0.31)	-0.37, 0.85	-0.57 (0.54)	-1.63, 0.50	0.03 (0.20)	-0.36, 0.42

Notes: T = Treatment; NH=Non-Hispanic; CI = Confidence interval; All interaction terms were examined individually; All variables presented in Table 1 are controlled for in the model; Outcome variable, Father Involvement, controls for all variables in Table 1 except single parent status; Only the coefficient of the interaction term and its significant level are reported; Robust standard errors in parenthesis; Multiple imputation (m = 10) was used to handle missing data.

<sup>a</sup> White, NH is used as reference.

<sup>b</sup> Less than 12th grade is used as reference.

\*\* p < 0.05.

\* p < 0.1.

**Table 8**

Subgroup analysis of impact of random assignment to FC on parenting and parent mental health outcomes.

Variable	Mother positive parenting		Mother negative parenting		Parenting sense of competence		Mother depression score		N
	<i>b</i> (s.e.)	95 % CI	<i>b</i> (s.e.)	95 % CI	<i>b</i> (s.e.)	95 % CI	<i>b</i> (s.e.)	95 % CI	
<b>Birth risk ever</b>									
No	0.27*** (0.10)	0.09, 0.46	0.01 (0.24)	-0.47, 0.49	0.06 (0.24)	-0.41, 0.52	-0.12 (0.09)	-0.31, 0.06	433
Yes	-0.18 (0.28)	-0.74, 0.39	0.97 (0.83)	-0.69, 2.63	0.58 (0.63)	-0.69, 1.85	0.03 (0.28)	-0.53, 0.59	63
<b>Mother race</b>									
Hispanic	0.23 (0.28)	-0.33, 0.79	0.13 (0.93)	-1.74, 2.01	1.28** (0.49)	0.30, 2.26	-0.52* (0.27)	-1.07, 0.03	52
<b>New mother</b>									
No	0.26** (0.12)	0.03, 0.49	0.40 (0.27)	-0.13, 0.93	0.13 (0.28)	-0.41, 0.68	-0.05 (0.11)	-0.27, 0.16	305
Yes	0.13 (0.14)	-0.15, 0.42	-0.40 (0.39)	-1.17, 0.37	0.20 (0.38)	-0.55, 0.95	-0.24 (0.15)	-0.54, 0.06	191

Note:

All variables presented in Table 1 are controlled for in the model.

Robust standard errors in parenthesis.

Multiple imputation ( $m = 10$ ) was used, handle missing data.

CI = Confidence interval.

\*\*\*  $p < 0.01$ .\*\*  $p < 0.05$ .\*  $p < 0.1$ .

symptoms of depression (Table 6). Moderation analysis revealed a marginally significant interaction between treatment status and identifying as a Hispanic mother ( $B = -0.55$ ; 95 % CI =  $-1.13, 0.02$ ;  $p < 0.1$ , Table 7). Findings from subgroup analyses demonstrated a marginally significant effect of treatment on lowering depression scores among those identified as a Hispanic mother ( $B = -0.52$ ; 95 % CI =  $-1.07, 0.03$ ;  $p < 0.1$ , Table 8). Of the full sample of mothers in the study, 86 % were below the clinical cutoff for possible clinical depression (Treatment = 88 %; Control = 84 %) (Table 4). No other interaction tests were significant.

#### 4. Discussion

Findings from the current study demonstrate that random assignment to the Family Connects (FC) program has sustained impact on mother self-reported positive parenting behaviors through child age 2 years. The sustained finding, although relatively small, demonstrates the impact of a short-term (1–3 visits) home-visiting program. It is important to highlight that FC is not a parenting program, but rather a program that addresses the needs of the family immediately post birth. Mediation analysis should be conducted in future research to identify the possible mechanisms contributing to the sustained self-reported positive parenting at child age 2 years. Specifically, whether this small impact was sustained through specific parenting strategies provided by the nurse home visitor on the spot or through the helpfulness of the services and agencies the mothers were referred to. Another possible mechanism may be in the ability of the nurse home visitor to successfully assess each family across the twelve different domains. Then intervene on the spot or connect the family to the appropriate community agency who can better support the family in their specific need (Dodge, 2018; Goodman et al., 2019). As previous research on child abuse and neglect has demonstrated, the inability to meet children's immediate needs results in increased parent depression and increased neglectful parenting behaviors (Kahng et al., 2008; Pereira et al., 2012; Roscoe et al., 2018, 2021; Ward & Lee, 2020). Thus, FC may have promoted positive parenting through the simple connection to the needed service. Ultimately, the universal system of care provided by FC may have reduced the parental distress related to the time and effort needed in finding the services they may have needed. This proximal impact may have also freed up more time during their day to engage with the children and allow them to engage in more positive and intentional parent-child interactions.

The effect of FC on mother self-reported positive parenting was greater for mothers with infants who were not born with any identified birth risk. This finding is contrary to our original hypothesis that home visiting involvement would be higher for mothers with infants born with health risks (Olds & Kitzman, 1993; Raikes et al., 2006). However, these findings may indicate that treatment-assigned mothers with infants born with health risks focused more on their children's immediate medical and overall developmental needs rather than specific parenting behaviors (Hess et al., 2004; Teti et al., 1996). Thus, these mothers may have benefited more in their connections to agencies that served their specific medical care and child development needs. The sample of mothers with children born with any identified birth risk was only a small proportion of families (13 %), so the power to detect an effect in the group may also be limited. Future studies should replicate these findings for mothers with infants who were born with identified birth risk to determine which components of FC benefited them the most relative to other mothers.

Similar to the age 6-month evaluation, there were no significant main effect differences on mother negative parenting, father involvement, and parenting sense of competence through child age 2 years. The reduced depressive symptoms for mothers in the treatment group at the 6-month evaluation was not sustained at child age 2 years. Additionally, no specific heterogeneity of FC impact was present across the diverse racial/ethnic and socioeconomic groups in the sample, apart from mothers of Hispanic origin. As originally hypothesized, moderation analyses demonstrated that Hispanic mothers benefitted more from random assignment to FC. Specifically, in their self-reported scores of parenting sense of competence relative to mothers of other race/ethnicity groups. This

finding is consistent with other research that demonstrates Hispanic families placing greater emphasis on their children's success and cultivating a strong family unit (Huynh & Fuligni, 2008; Luo et al., 2014; Luo & Tamis-LeMonda, 2017). This may mean Hispanic families placed greater emphasis on utilizing this program. Connecting families to services may have explained marginally significant reduction in maternal depression as well (Beeber et al., 2010; Cabrera & Hennigar, 2019; Pachter et al., 2006). Future research efforts should place greater emphasis on these families and replicate these findings with a larger sample.

The nonsignificant main effect findings for father involvement at child age 2 year are not surprising given the lack of findings in the 6-month evaluation. Results from pre-RCT focus groups that were conducted when FC was being developed indicated that some mothers would not participate in the program if partner participation was required (Dodge & Goodman, 2019). This was due to interpersonal conflicts or challenges with scheduling. As a result, the FC protocol was updated to encourage father and partner participation but utilizes mother's discretion on if or when to involve the father/partner. Incorporating fathers in home-visiting programs could provide positive benefits for the family that include additional financial support, child emotional development, and other behavioral and psychological child development outcomes (Cabrera et al., 2000; Gold et al., 2020; Lewis & Kornrich, 2020). Strategies such as providing father peer-support groups, helping mothers embrace co-parenting, being diligent to recruit fathers to participate, and screening prenatally for possible partner conflicts may help engage father involvement in these programs (Cowan et al., 2008; Sandstrom, 2015).

While the main effects of random assignment to FC were not sustained across all outcomes measured in this study, other outcomes beyond the scope of this study have been sustained and published in previous research. These include longitudinal findings of FC impact on reducing emergency child medical care costs and child maltreatment rates at both child age 2 years and child age 5 years (Goodman et al., 2019; Goodman et al., 2021). No mediational analysis has been conducted to date to determine the specific mechanisms behind this reduction in child abuse and emergency medical care costs through child age 5 years. It may be due in part to the positive parenting finding from this study or it may be due entirely to the support parents received related to other risk factors of child abuse and neglect. These can include parent substance use, domestic violence, parental mental health, and child behavior problems (Barth, 2009). Nevertheless, future research should consider mediational analysis to determine if positive parenting at child age 2 years as a mediator in the observed outcomes at child age 5 years.

The lack of sustained impact across most of the parenting and parent mental health outcomes may also indicate a need for a longer duration of universal system of care. The positive longitudinal findings for emergency child medical care costs and child maltreatment rates demonstrate that FC may have a greater impact on reducing these population level outcomes, but other parenting and parent mental health outcomes may need a longer lasting intervention to meet the changing needs of parents. This long-term continuum of care is one that communities in Guilford County, North Carolina, and Tulsa Oklahoma are already implementing. These communities provide families with a continuous system of care, starting prenatally with the mother and continuing until the child reaches 3rd grade (Dodge, 2018; Get Ready Guilford Initiative, 2018; Sotolongo et al., 2019).

## 5. Limitations

The study has several limitations. The first limitation is regarding the study sample being limited to that of Durham, NC. Although Durham, NC, is comprised of a wide variety of racially and ethnically diverse families (54.5 % White, 35.9 % Black, 13.8 % Hispanic, 9.5 % other races), future studies should aim to replicate these findings with other samples from different sites (United States Census Bureau, 2021). These include sites with a greater racial/ethnic diversity composition, specifically with a greater Hispanic population, a greater sample of children born with an identified birth risk, cities larger than Durham, and those of rural communities. Increased sample sizes will improve power in subgroup analyses that were limited in the Hispanic subgroup of this study as well children born with an identified birth risk.

The second study limitation is the differential FC program effect across non-Hispanic families and families of low-income backgrounds. These non-significant program effects may be due to the short-term design of FC, which limits the long-term effectiveness of program outcomes. It may be plausible that different needs begin to emerge for these families over time. Future work should focus on specific needs that may arise for diverse populations.

The third limitation is related to the measures used in the study. The Cronbach's alpha for *Mother Positive Parenting* and *Mother Negative Parenting* were relatively low. This may be due in part to the design of the measures. Specifically, measures used in the study were considered indexes of a range of positive and negative parenting behaviors, rather than unitary constructs. Thus, the measures of interest sum a range of possible behaviors, limiting the expectation of high Cronbach's alpha. Longer measures or the use of whole measures may result in higher alphas and possibly different findings. Furthermore, all outcomes measured in this study were self-reported. This may explain the correlations in *Mother Positive Parenting* and *Mother Negative Parenting*, as well as *Mother Depression* and *Father Involvement* (Table 5). Future studies should consider implementing and analyzing observational data to limit response bias related to self-report data (Pratt et al., 2000; Rosenman et al., 2011).

Lastly, the mechanisms of the findings from this study may be challenging to analyze and any future mediational analysis should be interpreted with caution. The inability to measure impact and effectiveness of each of the community service agencies as well as the lack of mothers' pre-existing parenting practices may hinder some of the possible future mediational analysis that may be conducted.

## 6. Implications and conclusion

Overall, this study makes important contributions to the field of child neglect as it relates to mother and child well-being. This evaluation has shown that this universal, short-term, postnatal home visiting intervention program can improve population-level self-

reported positive parenting practices for all mothers randomly assigned to FC, as well as greater parenting sense of competence for Hispanic mothers. These sustained 2 years findings encourage the public funding and wide-scale dissemination of the FC program to improve early parenting behaviors. The FC program may be a preventative approach to addressing the presence of unmet needs that can lead to neglectful and abusive parenting practices.

### Funding/support

Funding was provided by The Duke Endowment and the Eunice Kennedy Shiver National Institute of Child Health and Human Development (R01HD069981).

### Role of the funder/sponsor

The funder did not have any role in the design and conduct of the study, or in the decision to submit the manuscript for publication. These include no role in the collection, management, analysis, interpretation, and writing of the report.

### Declaration of competing interest

None.

### Data availability

The data that has been used is confidential.

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