

The South Carolina Nurse-Family Partnership Study Pay for Success Report

To: Children’s Trust of South Carolina
CC: The Executive Committee of the South Carolina Nurse-Family Partnership Pay for Success Project
From: Dr. Margaret McConnell, Harvard T.H. Chan School of Public Health and the South Carolina Nurse-Family Partnership Study Team at J-PAL North America
Re: The South Carolina Nurse-Family Partnership Study: Pay for Success Report
Date: February 12, 2021

Reporting Context

The South Carolina Nurse-Family Partnership (NFP) Study is a randomized controlled trial of the Nurse-Family Partnership’s effect on families’ health and well-being. From 2016-2020, the South Carolina Department of Health and Human Services (SCDHHS) led a public-private partnership called Pay for Success (PFS) to scale NFP’s services across the state in the context of this randomized controlled trial.

As stipulated in the PFS Contract among SCDHHS, NFP, and Children’s Trust of South Carolina, this report provides interim results for four outcomes to enable Children’s Trust of South Carolina to determine success payments.

Some study participants’ outcomes could not be observed within this report’s timeframe because not enough time has elapsed for all mothers enrolled in the trial to have given birth and for their babies to have reached two years of age. After outcomes for all enrolled mothers and children can be observed, the study team will conduct an academic analysis to estimate NFP’s effects on a broader group of indicators of families’ health and well-being. The academic analysis results will likely differ from this interim PFS report due to the change in sample size and the broader range of data and outcomes analyzed. Detailed plans for academic analyses are reported in McConnell et al. (2020).¹

For more information about the South Carolina Nurse-Family Partnership Pay for Success Project or our broader evaluation, please visit our study website:

South Carolina Nurse-Family Partnership Study Pay for Success Project:

<https://www.hsph.harvard.edu/sc-nfp-study/pay-for-success/>

South Carolina Nurse-Family Partnership Study:

www.scnfpstudy.com

¹ McConnell MA, Zhou RA, Martin MW, et al. Protocol for a randomized controlled trial evaluating the impact of the Nurse-Family Partnership’s home visiting program in South Carolina on maternal and child health outcomes. *Trials*. 2020;21(1):997. doi:10.1186/s13063-020-04916-9

PFS Report Tables

Definitions and notes

- Study sample size:** 5,655 women were enrolled in the study, 3,794 of whom were randomly assigned to receive Nurse-Family Partnership services. This sample excludes all data from 12 participants who withdrew their consent to participate in the study.
- Unobserved sample:** Mothers whose outcomes are not observed for reasons defined in the pre-analysis plan (e.g., mothers with multiple births during index delivery for the preterm birth outcome, mothers who could not be matched to administrative data sources, and mothers with outcome values outside a predetermined range). This sample does not include the mothers who enrolled too late for their outcomes to be analyzed within this report's timeframe.
- PFS reporting sample:** Mothers whose outcomes can be observed within the timeframe of the current report. These samples are defined differently for each analysis. Please see the PFS pre-analysis plan for a detailed description of how the reporting samples are defined for each analysis. Data used in this report were extracted on 01/28/2021.
- Please refer to the PFS pre-analysis plan for outcome definitions (p: 6-10), the equations used to calculate the treatment effect (p: 12-14), and the baseline covariates included in the regression models (p: 14-15). Briefly, preterm birth is defined as having a live singleton birth where the obstetric estimate of gestation is fewer than 37 completed weeks; short birth interval is defined as having a subsequent live birth within 24 months of the index birth, and the number of injuries is defined as the number of child emergency department visits (outpatient) and hospitalizations (inpatient) from acute injury within the first 24 months of the index child's life.

Table 1.A. – Results for the PFS Impact Estimates

PFS Outcome	Estimated control group mean ¹	Estimated treatment group mean ²	Estimated treatment effect for mothers who received at least one NFP home visit ³	PFS impact estimate: Estimated treatment effect as a percent change⁴	Statistically significant at the 5% level	Sample size ⁵
Preterm Birth (%)	10.87%	10.64%	-0.23 percentage points	-2.12 percent change	No	4,843
			95% confidence interval: -2.11 to 1.64	95% confidence interval: -19.41 to 15.09		
Short Birth Interval (%)	13.84%	14.91%	1.09 percentage points	7.95 percent change	No	2,543
			95% confidence interval: -1.85 to 4.02	95% confidence interval: -13.37 to 29.05		
Number of Injuries	0.2841	0.2848	0.00073 injuries	0.26 percent change	No	2,314
			95% confidence interval: -0.054 to 0.056	95% confidence interval: -19.01 to 19.71		

¹ These regression-adjusted estimates represent the prevalence (preterm birth and short birth interval) and mean (number of injuries) for women who were randomly assigned to the control group.

² These regression-adjusted estimates represent the prevalence (preterm birth and short birth interval) and mean (number of injuries) for women who were randomly assigned to receive NFP.

³ These regression-adjusted estimates represent the estimated treatment effect for mothers who received at least one home visit expressed as a percentage point change for preterm birth and short birth interval and a change in the number of injuries.

⁴ This is the estimated treatment effect divided by the estimated control group mean. This is the PFS impact estimate that the PFS Contract uses to define PFS payments (see Table 6 in the Technical Appendix).

⁵ All mothers in the PFS reporting sample except the unobserved sample.

Table 1.B. – Results for the Coverage of Low-Income ZIP Codes Metric

LIZC coverage for treatment group (%)	Sample size ¹
47.15%	5,655

¹This includes all mothers randomized into the trial except those who withdrew consent.

Summary of results for PFS impact estimates

Preterm Birth

- We do not find statistically significant evidence that mothers participating in NFP had a reduced rate of preterm birth compared to the control group. The PFS point estimate suggests a 2.12% decrease in the rate of mothers experiencing preterm birth, relative to the average preterm birth rate in the control group of 10.87%. The confidence intervals indicate that the treatment effect on the rate of preterm birth could range from a 19.41% decrease to a 15.09% increase.

Short Birth Interval

- Within this partial sample, we do not find statistically significant evidence that mothers participating in NFP had a reduced rate of short birth intervals compared to the control group. The PFS point estimate suggests a 7.95% increase in the rate of subsequent births within 24 months of the index birth, relative to the rate of short birth intervals in the control group of 13.84%. The confidence intervals indicate that the treatment effect on the rate of short birth intervals could range from a 13.37% decrease to a 29.05% increase.

Child Injury

- Within this partial sample, we do not find statistically significant evidence that mothers participating in NFP experienced fewer acute injuries for their children compared to the control group. The point estimate suggests a 0.26% increase in the number of hospitalizations and emergency department visits for acute injury in the first 24 months of life in the treatment group compared to the control group. The confidence intervals indicate that the treatment effect on the number of child injuries could range from a 19.01% decrease to a 19.71% increase.

Low-Income ZIP Code Coverage

- 47.15% of the mothers in the treatment group were from ZIP codes designated as low-income in the PFS Contract.

Technical Appendix for PFS Report Tables

Definitions and notes

1. **Unobserved sample:** Mothers whose outcomes are not observed for reasons defined in the pre-analysis plan (e.g., mothers with multiple births during index delivery for the preterm birth outcome, mothers who could not be matched to administrative data sources, and mothers with outcome values outside a predetermined range). This sample does not include the mothers who enrolled too late for their outcomes to be analyzed within this report’s timeframe.

Table 2 – Unobserved samples for each outcome variable

PFS Outcome	Percent Unobserved (Number unobserved / PFS Reporting sample size)		P-value ¹
	Control group	Treatment group	
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Preterm Birth	13.79% (256/1,856)	14.30% (541/3,784)	0.61
Short Birth Interval	13.31% (131/984)	14.17% (279/1,969)	0.53
Number of Injuries	13.46% (121/899)	14.43% (259/1,795)	0.50
Low-Income ZIP Code	0% (0/1,861)	0% (0/3,794)	--

¹This P-value presented is from a chi-squared test comparing the percent of unobserved outcomes for the treatment and control groups. P-values over 0.05 indicate no statistically significant difference in our ability to observe mothers between the treatment and control groups.

* Indicates statistical significance at the 5% level.

Summary of results for Table 2:

- We find no evidence that the rate of unobserved outcomes differs between the treatment and control groups.

Table 3 – Receipt of NFP Home Visiting Services

	Percent who received at least one home visit (Number who received at least 1 visit / PFS reporting sample size)		Sample size ¹
--	Control Group Mean (unadjusted)	Treatment Group Mean (unadjusted)	--
Received at least 1 home visit from NFP	0% (0/984)	97.51% (1,919/1,968)	2,952
# of home visits from NFP	0	25.16	2,952

¹ This represents all mothers in the PFS reporting sample for the birth spacing outcome in order to summarize visitation patterns throughout pregnancy and the first 24 months of life.

Summary of results for Table 3:

- No mothers assigned to the control group received home visiting services from NFP.
- 97.5% of mothers assigned to the treatment group received at least one home visit.
- In the treatment group, mothers received an average (mean) of 25 home visits during pregnancy and the first 24 months of the child’s life.

Table 4. – Baseline Balance Testing

Sample size ¹	P-value ²
5,655	0.72

¹ This includes all mothers randomized into the trial except those who withdrew consent.

²The P-value presented is from a joint F-test of orthogonality on all covariates. Covariates include age, race, education, implementing agency, and other sample characteristics measured on the baseline survey. See pages 14-15 of the pre-analysis plan for a full list of covariates included in balance testing. Values over 0.05 indicate no significant difference in our ability to observe mothers between the treatment and control groups.

* Indicates statistical significance at the 5% level.

Summary of results for Table 4:

- We find no evidence that mothers' average characteristics at baseline differ across treatment and control groups. A full list of covariates included in this test are shown in Table 5.

Table 5. – Average characteristics across treatment and control groups included in baseline balance test

Variable	Treatment Group Average	Control Group Average
Enrolled at Carolina Health Centers	5.0%	5.2%
Enrolled at DHEC Low Country	11.3%	10.7%
Enrolled at DHEC Midlands	8.3%	9.1%
Enrolled at DHEC PeeDee	10.6%	11.6%
Enrolled at DHEC Upstate	7.8%	7.0%
Enrolled at Family Solutions of the Lowcountry	2.7%	2.5%
Enrolled at Prisma Health	23.1%	21.4%
Enrolled at Mcleod Health	15.3%	16.1%
Enrolled at Spartanburg Regional Hospital	15.9%	16.4%
Indicator for age at enrollment equal to 15, 16, or 17	9.2%	10.2%
Indicator for age at enrollment equal to or greater than 28	14.0%	13.4%
Race identified as Black	54.1%	54.4%
Race identified as other: American Indian / Alaska Native, Asian, or Native Hawaiian	2.8%	2.6%
Race identified as White	35.3%	35.2%
Ethnicity identified as Hispanic or Latina	10.6%	11.0%
Estimated number of weeks to delivery	25	25.2
Relationship with father of child - daily	77.9%	77.5%
Education - less than high school diploma	22.5%	21.9%
Education – High school diploma or equivalent	36.2%	34.1%
Education - some college, less than a bachelor's degree	33.6%	35.9%
Education - bachelor's degree or higher	7.5%	7.7%
Currently working for pay	52.1%	51.3%
Receiving one or more social service programs	64.1%	65.2%
Reported moving at least twice in the past 12 months	17.5%	18.2%
Currently lives with parents	42.1%	43.2%
Received at least one antenatal care visit before time of survey	86.4%	85.5%
Obtained care at hospital ER in past six months	51.0%	53.0%
Reported drinking alcohol in the three months before pregnancy	50.2%	49.8%
Reported smoking cigarettes in the three months before pregnancy	25.0%	26.9%
Received mental health treatment in the past year	13.3%	13.3%
PHQ2 Score of 3 or Higher	19.2%	18.9%
PSS-4 Score of 4 or Higher	65.1%	65.5%

Health self-reported as fair/poor	12.7%	11.0%
Normal pre-pregnancy BMI based on reported height and weight	35.8%	37.7%
Reports knowing where to receive family planning or birth control	55.5%	54.4%
Reports a desire for more children in the future	66.4%	66.8%

Table 6. – Payment threshold determined in SC PFS contract¹

PFS Outcome	Threshold where partial fixed payments begin	Threshold where complete fixed payments reached	Variable payment for any percent reduction
Preterm Birth	13.5% reduction in preterm births	15% reduction in preterm births	Total Project Participants x Control Group Mean x PFS Impact Estimate x \$29,514
Short Birth Interval	18% reduction in subsequent births within 24 months	20% reduction in subsequent births within 24 months	Total Project Participants x Control Group Mean x PFS Impact Estimate x \$2,437
Number of Injuries	23.4% reduction in hospitalizations for acute injury within the first 24 months of life	26% reduction in hospitalizations for acute injury within the first 24 months of life	Total Project Participants x Control Group Mean x PFS Impact Estimate x \$141
Low-Income ZIP Code	65% of mothers from low-income zip codes at the time of enrollment		--

¹ South Carolina Nurse-Family Partnership Study – Pay for Success Project:
<https://www.hsph.harvard.edu/sc-nfp-study/pay-for-success/>

Figure 7. – PFS impact estimates with payment threshold

