



Office of
Population Affairs

Enhancing a home visiting program to prevent rapid repeat pregnancies

LESSONS LEARNED FROM HEALTHY FAMILIES
HEALTHY FUTURES IN HOUSTON, TEXAS

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Purpose Statement

In this report, we share the findings from an impact and implementation study of a home visiting program, Healthy Families Healthy Futures (HFHF), in Houston, Texas. In 2015, HFHF was enhanced with Steps to Success (STS), a two-year curriculum developed and first tested in San Angelo, Texas. The STS curriculum engages teen mothers and their partners in discussions about optimal birth spacing, provides information on effective forms of contraception—particularly long-acting reversible contraceptives (LARCs)—and involves fathers in decision making about parenting and reproductive planning. Home visiting programs for families have demonstrated evidence of effectiveness on outcomes related to maternal and child health, parenting, child maltreatment, and domestic violence (Sama-Miller et al. 2017). However, these programs do not explicitly focus on the highly vulnerable teen parents and their young children, such as those funded by the Pregnancy Assistance Fund (PAF). Little is known about effective models for the families supported by the PAF program (Person et al. 2018) and, in particular, about approaches to reduce chances of a repeat pregnancy in the teenage years (Harding et al. 2020). This study provides much-needed evidence on effective approaches for improving outcomes for teen parents and their children by mediating the risk of a rapid repeat pregnancy.

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Executive Summary

The overall teen birth rate in the United States has declined by about 50 percent in the past decade, but the rate of repeat births to teens has been slower to improve: 16.7 percent of all births to teen mothers are repeat births, as compared to about 20 percent about a decade earlier (Dee et al. 2017; Martin et al. 2018). To address this issue, programs serving expectant and parenting teens increasingly emphasize healthy birth spacing, which includes sharing education on effective methods of contraception such as long-acting reversible contraceptives (LARCs).

In 2015, the Office of Population Affairs (OPA) at the U.S. Department of Health and Human Services (HHS) launched a rigorous evaluation of Steps to Success (STS) that was added to the Healthy Families Healthy Futures (HFHF) home visiting program offered by the Houston Health Department (HHD). STS is designed to reduce rapid repeat births by providing education on healthy birth spacing and contraception, including LARCs, to young parents. STS was first evaluated in San Angelo, Texas, under the supervision of the developer. The program was delivered in combination with a home visiting program based on Health Families America. After one year, that evaluation found that STS increased teen mothers' use of LARCs and decreased the incidence of unprotected sex (Rotz and Wood 2018).

For the current evaluation, OPA sought to assess the impacts and implementation of integrating a home visiting program (HFHF) enhanced with STS, delivered in a larger, urban context, outside of the optimized conditions in which it was first developed and tested in San Angelo. The study team recruited 248 young mothers for the study, primarily through local health clinics and schools, and then randomly assigned the young mothers either to a treatment group that was eligible to participate in HFHF enhanced with STS or to a control group. The control group was not offered any other program through the study.

Outcomes were measured by a survey administered 12 months after program intake, in five domains aligned with the program's logic model: (1) exposure to information related to program content, (2) contraception knowledge, (3) contraception use, (4) enhanced family functioning, and (5) child health and development. To estimate program impacts, we used ordinary least squares regression, controlling for demographics and baseline measures of the outcome variables, if available. We use both frequentist approaches (calculations of statistical significance) and Bayesian posterior probabilities to interpret the findings. Implementation was assessed through service logs completed by the case managers after each visit and through site visits, which included interviews, focus groups, observations, and case file reviews.

HFHF enhanced with STS significantly ($p < .05$) impacted exposure to information on parenting and birth control, with effects of 20.8 and 15.4 percentage points, respectively. Using Bayesian posterior probabilities, there is an 85 percent chance that the program had a favorable effect on these outcomes. We also calculate a probability of 77 percent that the program had a favorable impact on LARC use, but a probability of 89 percent that the program reduced knowledge of birth control pills; these two results were not statistically significant ($p = 0.17$ and 0.10 ,

respectively). Overall, these findings are primarily favorable and consistent with the program content and goals. Smaller-than-anticipated sample sizes due to recruitment challenges increased the chances for random error to affect the ability to detect statistically significant differences on many of our other outcomes; Bayesian posterior probabilities can therefore aid in interpreting the impact estimates.

These findings are also encouraging as it took HHD staff nearly a year after participants enrolled in the study to start putting systems and staff in place to deliver the program as intended. Despite early challenges, staff were able to provide content on contraception, birth spacing, parenting, and child development to most HFHF young mothers. The home visitors developed supportive relationships with their clients, and participating young mothers said they had a strong relationship with their home visitors, who were like a surrogate family member or a close friend.

I. Introduction

Teen pregnancy and birth rates in the United States declined significantly between 1991 and 2016, from about 62 per 1,000 females to about 20 per 1,000 (Martin et al. 2018). Yet, the repeat birth rate among teens—about one in six teen births—has not experienced such declines (Dee et al. 2017). Additionally, in 2013, one in three teens who had recently had a child did not use an effective method of contraception or did not use any contraception (Dee et al. 2017). Failure to use a highly effective method of birth control within three months of delivery is a strong predictor of a rapid repeat pregnancy, defined as a pregnancy within 18 months of a prior birth (Raneri and Wiemann 2007; Stevens-Simon et al. 2001; Coard et al. 2000).

A rapid repeat birth during adolescence increases the risk of poorer outcomes for both the mother and children. Teen mothers who experience rapid repeat pregnancies (within 18 months of the prior birth) are at significantly greater risk of having a stillbirth or preterm birth than are teen mothers who delay subsequent childbearing (Conde-Agudelo et al. 2006). They are also less likely to stay in or complete high school, to work or maintain economic self-sufficiency, or to have children who exhibit school readiness when older, as compared with other teen mothers (Klerman 2004). Research and findings from recent impact studies suggest that programs that provide education about effective methods of birth control can play a critical role in delaying a subsequent pregnancy among teens (Klerman 2004; Rotz et al. 2016; Covington et al. 2017; Harding et al. 2020).

Starting in 2015, the Office of Population Affairs (OPA) funded additional rigorous evaluations of a program designed to improve outcomes for teen parents, including delaying repeat births. As part of this effort, OPA identified Steps to Success (STS) as a promising program for study. STS is designed to reduce rapid repeat births by providing education to young parents on healthy birth spacing and contraception, including LARCs. The program is delivered in combination with a home visiting program that includes evidence-based components such as extensive training and supervision for home visitors; a parenting curriculum; and weekly visits that last up to two years after the child's birth but decrease in frequency as the family moves toward self-sufficiency.

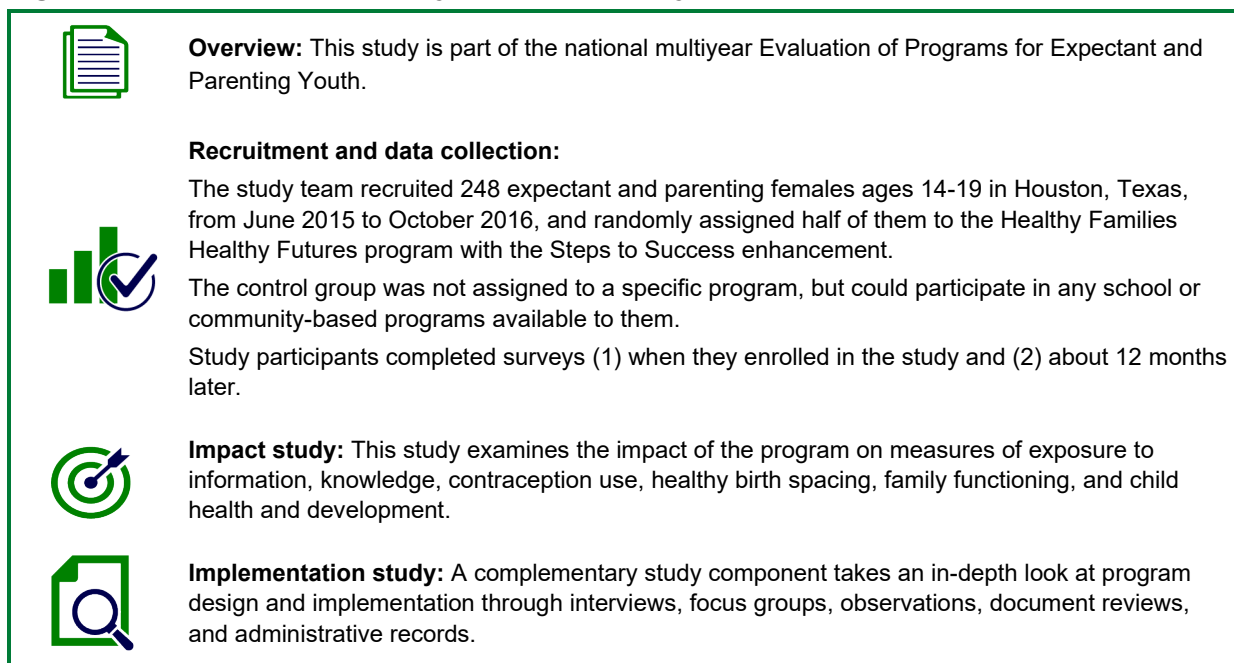
Healthy Families San Angelo (HFSA) in Texas developed STS and first implemented it, and through another contract, HHS tested its impacts and implementation. The study found that HFSA staff closely managed the program's rollout and delivery, with intensive involvement from the program's developer to maximize fidelity to the curriculum (Kisker et al. 2016). After one year, that evaluation found that STS increased teen mothers' use of LARCs and decreased their incidence of unprotected sex (Rotz and Wood 2018).

For the current evaluation, OPA sought to evaluate the implementation and impacts of integrating STS into a home visiting program offered in a larger, urban context, outside of the optimized conditions in which it was first tested in San Angelo. At the same time, to address growing concerns about rapid repeat pregnancies among teens, HHD was looking for ways to modify the program to incorporate components that more directly address contraception. For

more than a decade, HHD had been offering Healthy Families Healthy Futures (HFHF), a home visiting program for teen mothers modeled after Healthy Families America (HFA), which focuses on preventing child abuse by building parenting skills. By adding STS to their HFHF home visiting program, HHD would be able to enhance the current model, with an emphasis on delaying rapid repeat births and improving family functioning by including fathers in the reproductive planning and parenting discussions.

This impact and implementation evaluation of HFHF, enhanced with STS, began in 2015 (Figure I.1). Participants—pregnant and parenting females, ages 14 to 19—enrolled in the evaluation from May 2015 through October 2016. Participants were randomly assigned at the time of enrollment to either receive the intervention (HFHF enhanced with STS) or not. Evaluation participants not receiving the intervention continued receiving services available in their schools and communities, such as those offered through Women, Infants, and Children (WIC) clinics.

Figure I.1. Evaluation of Healthy Families Healthy Futures: A snapshot



The impact study was designed to measure the effectiveness of the program on exposure to information, knowledge, contraception use, healthy birth spacing, family functioning, and child health and development. The impact study also assessed the impacts of the program on program outcomes that are hypothesized to improve with one year of program exposure. The implementation study explored the delivery of the program by HHD staff in Houston, what teen mothers received, and how they responded to the program. The findings we present in this report

are based on data collected between June 2015 and October 2016, when the evaluation activities ended prematurely due to changes within HHD.¹

In the next chapter, we describe the HFHF program and the STS enhancement. We describe the impact study design, data sources, and analytic methods in Chapter III and present the findings on the impacts of the program on adolescent parents' outcomes in Chapter IV. In Chapter V, we discuss the program's delivery from the perspective of the staff who implemented it and describe the teen mothers assigned to receive HFHF and their experiences with the program. In the last chapter in the report, we present a brief conclusion and discuss considerations for future replication.

¹ Study data collection ended before the end of the program for most youth. The study does not have a record of visits conducted after October 2016.

II. The Healthy Families Healthy Futures Program Enhanced with Steps to Success

HHD began implementing HFHF over a decade ago, as a home visiting program for pregnant and parenting teens. The program primarily focuses on preventing child abuse and improving child outcomes. To address concerns about high rates of teen pregnancy and repeat births to teens in Texas, HHD sought to enhance the HFHF program to better respond to the needs of teen parents in their target communities. HHD decided to add to their programming Steps to Success (STS), a two-year curriculum designed to delay repeat births and engage fathers in healthy decision making and planning, and that is intended to be combined with a home visiting program. In this chapter, we describe the HFHF program in Houston and the enhancement with the STS curriculum.

A. The HFHF program in Houston

HFHF is HHD's home visiting program for expectant and parenting teens. HFHF focused mainly on improving parenting skills and preventing child abuse among teen mothers in southwest Houston. Pregnant and parenting adolescents participating in HFHF lived in areas where, according to staff reports, child abuse incidence was highest in the city. Poverty rates are also high in the region (United States Census Bureau and American FactFinder 2017), and access to reproductive health services for young mothers is low (Guttmacher Institute 2017).

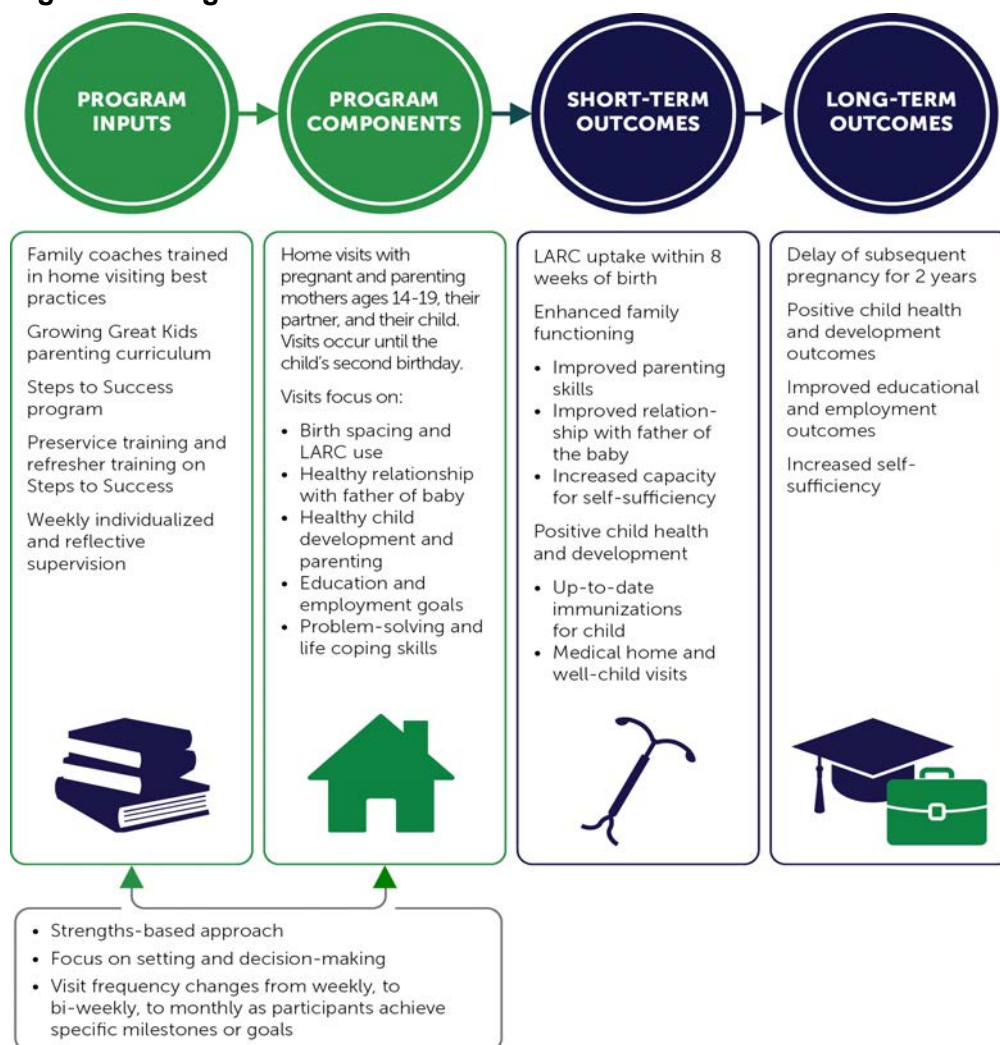
Before the current federal evaluation, HFHF frontline staff consisted of an outreach specialist, who recruited and enrolled teen mothers, and three home visitors, who delivered the program. Home visitors had five to seven active cases at a time, and the program served approximately 85 young mothers in a typical year, suggesting that each client received limited program dosage and duration. A supervisor was responsible for monitoring home visiting activities and day-to-day management of the program. The supervisor reported to an assistant director who had been recently appointed at the time of the start of the evaluation (2015). The assistant director oversaw four additional programs—Nurse Family Partnership (NFP), WIC, Project Milestone (out of WIC clinics), and My Brother's Keeper—all of which were larger in scope than the HFHF program.

The HFHF program did not have specific content requirements. Home visitors had access to the HFA parenting curriculum, Growing Great Kids, which they could use during their visits as needed. HFHF expected home visitors to facilitate fluid discussions on optimal parenting strategies, conduct child development assessments, and provide referrals to teen mothers for housing, health, and financial needs. Before the current evaluation started, staff had flexibility in terms of visit structure, and the requirements for content and frequency were minimal.

B. Adding Steps to Success to HFHF

STS is a two-year curriculum designed to work in conjunction with a home visiting program for young parents. The goal of STS is to address rapid repeat births by providing contraception knowledge, discussing life planning, and involving the father of the baby (or a significant other) in home visits and contraceptive decision making. With the STS enhancement, home visitors—who would now be known as “family coaches”—and young parents are expected to collaborate to define success in life, identify specific goals related to the family, reproductive health, education, and employment, and determine the steps the parent(s) would like to take to meet these goals (Figure II.1). The program uses a strengths-based approach—that is, it leverages participants’ talents, abilities, competencies, and strengths, rather than using a deficit-centric outlook. Teen parents participating in STS discuss and learn about effective methods of contraception, the benefits of LARCs, and the importance of father involvement in decision making about birth spacing and developing strong parenting skills; they also develop a reproductive life plan that aligns with their education, career, and other personal goals.

Figure II.1. Logic model for HFHF



The short-term goals of HFHF enhanced with STS are to (1) increase the use of a highly effective form of birth control, such as a LARC; (2) increase family functioning through improved parenting skills and father involvement in the home visits, and in decision making around parenting and family planning; and (3) promote positive child health and development outcomes. The enhanced program's long-term goals are to ensure parents are able to meet their child's development and health needs, become self-sufficient, and prevent a subsequent pregnancy within two years.

C. The components and expectations of the Steps to Success curriculum

The STS curriculum is not a stand-alone program. It is intended to be integrated with elements of an evidence-based home visiting program (such as Healthy Families America, the model on which HFHF is based). The purpose of STS is to include extensive training and supervision of the family coaches; structure visits around a parenting curriculum such as Growing Great Kids; provide frequent visits (at least one visit a week) when the child is an infant, and decrease the frequency of visits as the family moves toward self-sufficiency; and offer the program for up to three years after the child's birth.

The content of the STS curriculum is organized into a series of handouts and activities covering three main topics: (1) engaging the mother and the father of the baby (or a significant other), (2) identifying goals and steps to success for the mother and father, and (3) educating parents about contraceptive methods and guiding them in developing a reproductive life plan (Table A.1 in Appendix A). The curriculum defines the purpose and content of each activity and handout, as well as discussion questions, key strategies, and topics that coaches should use to guide each visit. Activities and discussions could last over several visits, and coaches are expected to tailor the content of visits to make them most relevant for each young parent couple. Coaches can revisit activities, questions, or handouts as needed over the course of the program to update previously stated goals or to reinforce key messages.

A strong, trusting relationship between the family coach and parents is critical for high quality delivery of the STS content. Literature suggests that effective home visiting programs for teen mothers often incorporate common elements to develop this relationship and meet targeted outcomes. For example, they rely on creative methods to engage and retain hard-to-reach mothers, use a strengths-based rather than a deficit-based approach to encourage participation, and involve families in setting achievable goals (NHVRC 2017; Goodban 2002; MDRC 2013). STS integrates all of these elements. STS staff are expected to use creative engagement strategies to engage and retain new parents, such as bringing welcome baskets, conducting visits on the phone if needed, or sending individualized cards and handwritten notes of encouragement. The curriculum incorporates and emphasizes a focus on parents' strengths and a positive approach. The program's activities are designed to help parents set achievable goals and connect them to their reproductive life plan, and identify the steps they need to take to meet their goals.

The STS curriculum also expects both the mother and the father of the baby (or a significant partner) to participate actively in the home visits. The program hypothesizes that actively engaging fathers or significant partners in goal setting and decision making will lead to healthier and more informed reproductive choices in the future and will improve child development outcomes. Family coaches receive Maps for Dads, a supplement to the Steps for Success materials designed to be used with the fathers/significant partners in home visits. Maps for Dads consists of interactive content and activities on discussing healthy birth spacing and contraception, co-parenting, and child development. Family coaches can also use activities on co-parenting, child development, and healthy relationships from other relevant parenting curricula for their home visits.

STS relies on a formal and well-defined home visiting structure that has three levels and a system of caseload management in which visits occur more frequently at the beginning of the program, with the objective of fostering a strong bond between staff and the mother, and then slowly decrease in frequency over the course of the two-year engagement (Table A.2 in Appendix A). The visits start with the mother but include the father or significant other as much as possible. Expectant or parenting mothers (and fathers, as often as they are available) receive weekly visits in Level 1, a visit every two weeks in Level 2, and monthly visits in Level 3. In addition to the typical home visiting benchmarks for parenting and child development (such as establishing a medical home or offering a nurturing environment for the child), STS adds specific criteria that mothers must meet to move to from one level to the next. For example, in Level 1, STS expects mothers to begin discussing birth spacing and contraceptive choices. They move to Level 2 once they have a plan and are following through on it. The supervisor decides when the mother is ready to change levels, with input from the family coach on the mother's progress with the program. The fathers who are regular participants in the visits are involved in these assessments as well. Home visitors can carry a caseload of up to 25 clients, depending on the number of teen mothers participating in each level.

D. Steps to Success training

To deliver STS with fidelity, program administrators, supervisors, and family coaches must have completed comprehensive training in a standard evidence-based home visiting intervention such as HFA, and must be familiar with the specific strategies, approaches, and required benchmarks associated with a high quality, evidence-informed home visiting program. Additionally, the STS pre-service training is intended to familiarize family coaches with content and strategies to meet STS's two main goals: (1) preventing additional pregnancies during adolescence and (2) developing a healthy relationship between the mother and father of the child that supports the reproductive plan they had set for their family. Coaches receive a program manual that describes the activities, provides handouts, and offers implementation guidance. They learn the program's approach and requirements as well as specific content on contraceptive methods, reproductive life planning, and father engagement. The STS training consists of small-group discussions, role-play, and activities based on the following key program topics:

- Supporting the mother (and father or significant other, when involved) in identifying achievable, concrete goals
- Building trust with and communication with fathers
- Advantages and disadvantages of different birth control methods, particularly LARCs
- The importance of a positive, strengths-based, and client-driven approach

In Houston, the program developer planned to deliver an initial in-person three-day training to the family coaches and their supervisor, discuss the integration of STS with the supervisor on an ongoing basis, and then periodically return to Houston to deliver “booster” sessions to address issues identified by the supervisor. Although the STS training incorporates discussions on home visiting approaches—such as engagement strategies for teen parents, using open-ended and motivational questions, following a strengths-based approach, and planning visits—effective delivery of STS is based in the assumption that family coaches and supervisors have prior formal training in and experience with delivering a structured home visiting program, including the systematic use of parenting curricula materials such as Growing Great Kids.

III. Design, Data Sources, Outcome Measures, and Analysis Methods

This evaluation examines the impacts and explores the implementation of the Houston Health Department’s HFHF program enhanced with STS. We refer to this intervention as HFHF for the remainder of this report. In the short term (within one year of program enrollment), HFHF aims to increase the use of LARCs, enhance family functioning—which includes improving father involvement—and meet the baby’s development needs. In the long term (by the end of the two-year program), HFHF seeks to delay subsequent pregnancies, increase parents’ self-sufficiency, and ensure positive child development. In this chapter, we describe how we formed the sample of participants in the evaluation of HFHF, identify the sources of outcome and implementation data, describe the outcome measures for the impact analyses, and discuss the analytic methods.

A. Study design: A randomized controlled trial

Enrollment for the evaluation of HFHF began in June 2015. To be eligible for participation, adolescents needed to be ages 14 to 19 and a first-time mother, to be pregnant or parenting a baby under the age of 90 days, to speak English or Spanish, and to not have been enrolled in HFHF in the past six months. Schools, WIC clinics, and other community-based organizations referred potentially eligible youth to HHD. Staff at HHD screened each possible new client for study eligibility—most often over the phone—and then sent the referral to the evaluation team, who conducted a second, in-person eligibility screen.

For eligible clients, the evaluation team obtained consent to participate and then administered the baseline survey and randomly assigned participants to either a treatment group or a control group. The treatment group was assigned to receive HFHF, and the control group was not. The evaluation team used a website they developed to conduct random assignment in two separate blocks of youth: evaluation participants who (1) were pregnant or (2) were parenting (and not pregnant) at the time of random assignment.

Conducting random assignment within blocks in that manner ensures that the treatment and control groups are balanced with respect to pregnancy status. Parenting and newly pregnant adolescents participating in the evaluation had an equal chance of being assigned to the treatment group or the control group. Participants in the treatment and control groups received information on Project Milestone, a referral program for pregnant and parenting teens offered through WIC clinics.

The evaluation team originally planned to enroll 600 adolescents. However, shifting priorities within HHD led to an early end of the enrollment process for the evaluation in October 2016, about 15 months after the start of enrollment. During this time, 248 adolescents enrolled in the study and were randomly assigned to either the treatment group or the control group (Table III.1). More than three-quarters (77 percent) of the mothers enrolled in the evaluation were pregnant at the time of random assignment.

Table III.1. Sample size by strata and treatment status

	Number of participants assigned to HFHF (Treatment group)	Number of participants not assigned to HFHF (Control group)
Pregnant at random assignment	96	96
Parenting but not pregnant at random assignment	30	26
Total	126	122

Source: Baseline survey.

B. Data sources

For the impact study, the evaluation team collected survey data from study participants at two points in time. The first, a baseline survey, was administered upon enrollment in the study, immediately before random assignment. The second, a one-year follow-up survey, was administered about 12 months after enrollment, when it is hypothesized that impacts on short-term outcomes can be achieved.

The implementation study relied on the following qualitative and quantitative data sources: (1) a training observation and discussions with the program’s developer; (2) a site visit, which consisted of key informant interviews, a focus group with HFHF participants, observations of program delivery, and review of select participant case files; (3) individual interviews with HFHF participants; (4) family coach records of each visit; (5) a survey of HFHF family coaches; and (6) HFHF program materials. Appendix B includes more details on the implementation study data sources and methods.

C. Baseline characteristics of the sample

At the start of the evaluation (which coincides with program entry), teen mothers participating in the evaluation were 17 years old, on average. About two-thirds of the sample were Hispanic, and one-third African American. Most of these teen mothers (64 percent) were enrolled in school at the time of the baseline survey, and about 20 percent in the treatment group and 17 percent in the control group already had a high school diploma. Some of the participants (20 percent in the treatment group and 25 percent in the control group) reported ever having repeated a grade, and about half of them (50 percent in the treatment group and 53 percent in the control group) reported having been suspended or expelled from school (see Table C.1 in Appendix C).

Teen mothers in the sample reported having been exposed to information related to parenting, child health care, relationships, and birth control methods upon program entry. Primarily, the teen mothers indicated they had been exposed to information on methods of birth control (45 percent in the treatment group and 64 percent in the control group) and child health care (39 percent in the treatment group and 44 percent in the control group) in the 12 months before program entry. A smaller proportion (7 percent in the treatment group and 51 percent in the control group) of the sample reported exposure to information on relationships. The teen mothers

also had fairly little knowledge about methods of birth control: Only about half of them (51 percent in the treatment group and 47 percent in the control group) were able to respond to questions about condoms correctly; slightly less than 4 in 10 mothers had accurate knowledge of birth control pills (35 percent in the treatment group and 38 percent in the control group); and less than one-quarter could correctly answer questions about intrauterine devices (IUDs) or other methods of birth control (including LARCs). Less than 1 percent of the teen mothers in the sample indicated they used a LARC method of birth control the first time they had sexual intercourse, and more than half of the mothers (55 percent in the treatment group and 59 percent in the control group) reported not using any method of birth control the first time they had intercourse.

We found some statistically significant differences in baseline characteristics between the treatment group and the control group. Teen mothers in the treatment group were less likely to have ever been exposed to information on relationships, education services, and methods of birth control. We conducted an F-test of the hypothesis that all characteristics reported in jointly do not predict treatment status. The test rejected the hypothesis with a *p*-value of less than 0.001. For that reason, we include regression controls in our impact analyses to account for the possible influence of baseline characteristics.

D. Outcome measures for the impact study

The impact study aimed to provide a comprehensive assessment of HFHF one year after enrollment in the program. To achieve that, we assessed impacts on a range of outcomes that align with two stages of the logic model: program components and short-term outcomes (see Figure II.1). Because outcome measures are constructed based on data from the follow-up survey that was administered about one year after enrollment in the evaluation, our impact analysis focused on exposure to program components and short-term outcomes that are hypothesized to be attainable within one year of program delivery. We did not evaluate the effects of the program on outcomes that are expected to be achievable or measurable only after two years in the program, such as a repeat birth. Therefore, even though the program's long-term goals include a reduction in repeat births within a two-year period, we did not assess the impact on that outcome. Additionally, because 77 percent (Table III.1) of the sample members were pregnant at the time of study enrollment, we would not expect the program to have a short-term effect on a subsequent pregnancy or birth 12 months later.

We selected 10 outcome measures in two domains that are related to the expected program components: six measures of exposure to information on program content and four measures of knowledge of contraception methods.

The six measures of exposure to information that we selected reflect the specific, expected content of the program, including whether the respondent ever attended an individual or group class or session on relationships, parenting, child health care, education, career, or birth control.

HFHF's home visits include discussions with clients and their partners that seek to improve their knowledge of contraception methods and access, focusing on LARC use in particular, with the ultimate goal of delaying a subsequent pregnancy. We measured knowledge of different types of contraception methods using four measures: (1) knowledge of condoms, (2) knowledge of birth control pills, (3) knowledge of intrauterine devices, and (4) knowledge of other hormonal and LARC methods.

The enhancement of the original HFHF program with the STS curriculum content was primarily intended to address HHD's concerns over rapid repeat births among its clients. Within one year of program provision, the enhanced HFHF sought to support clients in reducing sexual risk behaviors that could result in rapid repeat births. Specifically, the HFHF program supported clients in making effective birth control decisions with their partners, particularly by providing education on LARC effectiveness and availability. To measure exposure to this program component, we selected two measures in the domain of use of contraception to reduce sexual risk behaviors: LARC use and unprotected sexual intercourse.

The outcomes that the HFHF program is expected to affect in the short term are related to the program's content that is consistent with a more traditional home visiting program, such as enhanced family functioning through improved parenting skills, the mother's relationship with the father of the baby, and the mother's increased capacity for self-sufficiency. Therefore, we selected five measures in this domain: one on the mother's relationship with the child, one on the father's relationship with the child; two on the parents' co-parenting relationship; and one on the mother's capacity for self-sufficiency as evidenced by her attitudes and beliefs toward goal setting, problem solving, and future orientation.

Finally, because the HFHF program has a focus on supporting the mother to make healthy decisions related to child health and development, we selected two measures in the domain of health and development: the number of well-child visits and whether the teen mother has secured health insurance for the baby.

E. Analysis methods

Estimating impacts. We estimated the impacts of the HFHF program on each of the outcome measures described earlier as the regression-adjusted difference in means between the outcomes of the members of the treatment group and the outcomes of the members of the control group. We used a linear regression approach to account for baseline differences between the treatment and control groups and to increase the precision of the estimated treatment effects. All impact analyses control for race; age at enrollment in the evaluation; highest grade completed; an indicator for enrollment in school at random assignment; all available baseline measures of exposure to information, knowledge of contraception methods, and short-term outcomes; and an indicator for pregnancy status at random assignment to account for the stratified random assignment.

To test the robustness of these results, we re-ran all our program impact analyses without controls for baseline covariates. We also estimated the impact of actually receiving the HFHF intervention using a two-stage least squares framework. In this approach, we used treatment status as an instrument for the likelihood that an individual attended at least one HFHF visit.

We used two approaches to interpret the evaluation results. First, we report the statistical significance of impact estimates. We report statistical significance because it is familiar to many readers. However, statistical significance is often misinterpreted (Wasserstein and Lazar 2016; Greenland et al. 2016). In addition to reporting the statistical significance of our impact estimates, we also report the probability that the program truly had a favorable (or unfavorable) impact given our estimates and prior evidence on the distribution of effects of home visiting programs. This probability is called a Bayesian posterior probability. In our discussion of the study's findings, we draw attention to results with probabilities greater than 70 percent. The prior evidence we used was a selection of moderate or high quality studies from the Home Visiting Evidence of Effectiveness (HomVEE) review—a large, rigorous, systematic review of interventions serving a disadvantaged population of new parents. The prior evidence shows that the effects of home visiting programs tend to be small; we estimate that about 90 percent of effects are smaller in magnitude than 0.17 standard deviations.² The resulting Bayesian posteriors are less sensitive than p -values to testing multiple outcomes within a single domain. We also make a multiple comparison adjustment to our p -values following Hothorn et al. (2008). More information is found in Appendix D.

Implementation study. For the implementation study, we examined program delivery and the characteristics of HFHF participants using quantitative and qualitative data on service receipt, staff surveys and interviews, observations of home visits and a training, data extracted from case files, and interviews and a focus group with HFHF participants. We conducted qualitative analysis of the training observation, key informant interviews, interviews and focus groups with youth, and home visits observation data using an iterative process based on thematic analysis and triangulation of data sources. The analyses of data from the staff survey of family coaches involved tabulating descriptive frequencies. Appendix B includes more detailed information on the analysis methods we used for the implementation study.

² Drawing on our meta-analysis of the HomVEE database, we use a prior distribution that is normal with a mean effect size 0.01 and a standard deviation of 0.10. See Deke and Finucane (2019) for more information on The BASIE (BAYesian Interpretation of Estimates) Framework.

IV. Findings

The HFHF program—enhanced with STS—is intended to support pregnant and parenting adolescents to improve their parenting skills, prevent child abuse, and reduce rapid repeat pregnancies. In this chapter, we present our impact estimates of the effect of the enhanced HFHF program on outcomes related to these objectives across five domains encompassing exposure to program components and short-term outcomes: (1) exposure to information on program content, (2) knowledge of contraception methods, (3) use of contraception to reduce sexual risk behaviors, (4) family functioning and parenting skills, and (5) child health and development. We also present our calculations of the likelihood that the program had favorable or unfavorable effects on the outcomes of interest, based on the estimated impacts.

As described in Chapter III, we focused on assessing the impacts of HFHF on exposure to program components and short-term outcomes that are expected to be achievable within one year of participation in the program. We did not examine program impact on outcomes that are expected to be attainable or measurable only after two years, as is the case with repeat births.

A. Perspectives on program implementation

It took HHD staff nearly a year after study enrollment began to put systems and staff in place to deliver the program as intended. When the study began, the three existing family coaches, who had between 3 and 10 years' experience conducting home visits with teen parents, initially struggled to understand and integrate the STS content because they did not have the expected training from HFA, or any other evidence-based home visiting program, and did not receive strong internal supervision.³

By fall 2015, approximately four months after study activities began, HHD hired two additional family coaches to join the existing three coaches to meet the growing demand of cases. These two new coaches were familiar with working with teen mothers but had no formal home visiting experience or training. All five coaches struggled to connect with young mothers randomized to HFHF after random assignment; only 60 percent of the young mothers randomized to HFHF had more than five visits within their first year of enrollment. Using service log data that HHD provided after each home visit, we identified 50 teen mothers who received any programming for the 12 months following their enrollment into the study and randomization to HFHF. Among these teen mothers, the service log data demonstrate that they received, on average, 14 visits in their first year after enrollment and that, on average, 3 of these visits included the father of the baby or the mother's significant other. By comparison, mothers in San Angelo, Texas—where

³ The HFHF model was based on HFA; however, the Houston Health Department was not an affiliated site. Only one of the numerous coaches and administrators had attended HFA training before the program began, but that coach was not operating as the recruitment and outreach specialist and was not seeing cases. A small number of staff attended HFA training during the first year of the study, but doing so took time away from seeing the sample of teen mothers.

the program was implemented and evaluated under the supervision of the developer—received 20 visits on average in their first year (Kisker et al. 2016).

In response, the developer offered additional trainings and supervision to support staff in delivering an evidence-based home visiting program with STS content. Despite early challenges, staff were able to provide content on contraception, birth spacing, parenting, and child development to most HFHF young mothers and were able to involve the fathers. For example, among the 111 teen mothers who received at least one visit over the course of the study, coaches discussed contraceptive choices with more than three-quarters of the teen mothers at least once and did so in nearly half of all visits recorded in the service log. Staff reports of birth control and LARC uptake among their clients, although declining in the beginning, showed a marked improvement. According to service log data, the family coaches tracked declines in their clients’ (the teen mothers’) use of birth control and LARCs during their early months of visits. The home visitor reported rate of postnatal mothers using any form of birth control climbed to 82 percent in the final service log received, with nearly 50 percent reporting using a LARC at that time.

The staff also developed supportive relationships with their clients. Youth reported that the staff were their primary source of information about effective methods of birth control, sometimes supplementing and correcting information they received from the internet, family, and friends. Youth engagement and retention also improved over time, and participating young mothers described a strong relationship with staff who were like a surrogate family member or a close friend.

B. Impacts of HFHF

HFHF had a significant and positive effect on teen mothers’ exposure to information on parenting and methods of birth control (Table IV.1); 66 percent of HFHF mothers reported having received information on parenting, compared to 45 percent in the control group. Using Bayesian posterior probabilities, we calculate an 89 percent probability that this estimate reflects a favorable impact of HFHF. One year of access to HFHF also appears to have increased the proportion of teen mothers reporting exposure to information on methods of birth control: About 83 percent of the HFHF mothers reported receiving information on methods of birth control compared to 67 percent of the control group, and we calculate an 86 percent probability that this is favorable to HFHF. We find no other significant impacts on measures of program components.

Table IV.1. Impacts on program components

Program component	Treatment mean	Control mean	Impact	p-value	Adjusted p-value	Sample size	Probability the impact is favorable to HFHF	Probability the impact is unfavorable to HFHF
In the past 12 months, exposed to information on								
Relationships	18	21	-3	0.68	1.00	221	47%	53%
Parenting	66	45	21**	0.01	0.03	220	89%	11%

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Program component	Treatment mean	Control mean	Impact	p-value	Adjusted p-value	Sample size	Probability the impact is favorable to HFHF	Probability the impact is unfavorable to HFHF
Child health care	57	53	4	0.61	0.99	221	62%	38%
Education related services	29	29	1	0.93	1.00	220	55%	45%
Career Counseling or job training	19	22	-3	0.62	0.99	220	46%	54%
Methods of birth control	83	67	15*	0.02	0.06	217	86%	14%
Percent correct on assessments of knowledge of contraception								
Condoms	59	61	-2	0.47	0.87	220	31%	69%
Birth control pills	46	55	-9	0.05	0.10	220	11%	89%
IUDs	35	35	0	0.90	1.00	220	56%	44%
Other methods	37	37	0	0.92	1.00	220	56%	44%

Source: Baseline survey and 12 month follow-up survey.

Note: Treatment and control group means are regression adjusted. Impacts on binary outcomes are estimated using the linear probability model, with standard errors adjusted to account for heteroskedasticity. All regressions include an indicator for parental status at baseline, indicators for race and ethnicity, educational enrollment, age at random assignment, and all available baseline measures of outcome variables. All p-values are based on a two-sided test, and adjusted p-values control for the familywise error rate using the method in Hothorn et al., 2008. Sample sizes differ across outcomes due to missing outcome data.

Probabilities greater than or equal to 70 percent are shown in bold. Values less than 70, but displayed as 70 percent due to rounding, are not bold.

- * Significantly different from zero at the 0.10 level after adjusting for multiple comparisons, two-tailed test.
- ** Significantly different from zero at the 0.05 level after adjusting for multiple comparisons, two-tailed test.
- *** Significantly different from zero at the 0.01 level after adjusting for multiple comparisons, two-tailed test.

Although not significant, one year of access to HFHF also appears to have decreased HFHF mothers' knowledge about birth control pills, relative to the control group (89 percent probability of being unfavorable to HFHF).⁴ Although both the treatment and control groups were more knowledgeable about birth control pills one year after random assignment relative to baseline, the control group showed a greater improvement in knowledge of birth control pills. On average, the treatment group correctly answered about 46 percent of questions about birth control pills, compared to about 55 percent correctly answered by control group members.

HFHF showed an 11 percentage point increase in LARC use among the treatment group—39 percent of the treatment group reported using a LARC, compared to 28 percent of the control group—but the difference was not statistically significant (Table IV.2). We calculate a 77 percent probability that this difference reflects a true effect of HFHF. The program did not otherwise have an impact on engaging in unprotected sex, nor any other short-term outcomes.

⁴ The probability of an unfavorable effect is one minus the probability of a favorable effect.

Table IV.2. Impacts on short-term outcomes

Short-term outcome	Treatment mean	Control mean	Impact	p-value	Adjusted p-value	Sample size	Probability the impact is favorable to HFHF	Probability the impact is unfavorable to HFHF
Contraception use in previous 12 months								
Use of a LARC	39	28	11	0.13	0.17	219	77%	23%
Unprotected sex	24	27	-3	0.65	0.84	218	39%	61%
Respondent intends to wait two or more years before having next child	90	93	-3	0.48	b	216	45%	55%
Frequency of parental engagement in last month—Scale from 0 (never) to 3 (every or almost every day)								
Mother's engagement with child	2.48	2.47	0.01	0.91	1.00	217	56%	44%
Father's engagement with child	1.48	1.54	-0.07	0.70	0.99	211	45%	55%
Quality of co-parenting relationship								
Scale from 1 to 5 with higher values representing stronger co-parenting	3.72	3.82	-0.09	0.48	0.90	216	37%	63%
Father pays half or more of child care costs	67	70	-3	0.67	0.99	216	46%	54%
Capacity for self-sufficiency								
Scale from 1 to 4 with higher values representing greater self sufficiency	2.15	2.13	0.02	0.73	1.00	221	61%	39%
Child health and development								
Number of well visits	6.21	6.64	-0.43	0.44	0.62	200	35%	65%
Has health insurance for child	96	93	3	0.39	0.56	216	65%	35%

Source: Baseline survey and 12 month follow-up survey.

Note: Treatment and control group means are regression adjusted. Impacts on binary outcomes are estimated using the linear probability model, with standard errors adjusted to account for heteroskedasticity. All regressions include an indicator for parental status at baseline, indicators for race and ethnicity, educational enrollment, age at random assignment, and all available baseline measures of outcome variables. All p-values are based on a two-sided test, and adjusted p-values control for the familywise error rate using the method in Hothorn et al., 2008. Sample sizes differ across outcomes due to missing outcome data.

Probabilities greater than or equal to 70 percent are shown in bold. Values less than 70, but displayed as 70 percent due to rounding, are not bold.

To test the robustness of these results, we re-ran all our program impact analyses without controls for baseline covariates. We also estimated the impact of actually receiving the HFHF intervention using a two-stage least squares framework. In this approach, we used treatment status as an instrument for the likelihood that an individual attended at least one HFHF visit. Neither approach, whose results are shown in Appendix D, yielded qualitatively different outcomes from the main analysis.

V. Conclusion

Programs designed to support pregnant and parenting teens, including efforts to prevent rapid repeat pregnancies, are drawing increased interest as evidence of their effectiveness accumulates (Rotz et al. 2016; Covington et al. 2017; Harding et al. 2020). Examining effectiveness and implementation in multiple settings and contexts is an important step in understanding the parameters for successful replication.

Steps to Success (STS) is a two-year curriculum first developed and evaluated in San Angelo, Texas. It engages teen mothers and their partners in discussions about optimal birth spacing, provides important information about effective forms of contraception (particularly LARCs), and encourages fathers to be involved in decision making about parenting and reproductive planning. The curriculum was designed to be integrated into an evidence-based home visiting program to support parenting and child development.

The original implementation of STS in San Angelo, Texas, overseen by its developer, was delivered with high quality and fidelity to the program model. The strong implementation was supported by a substantial emphasis on selecting and training staff, including an intensive pre-training schedule followed by ongoing supervision and support, as well as a carefully constructed case management system (Kisker et al. 2016). In 2015, HHD integrated STS into its local home visiting program, Healthy Families Healthy Futures, and agreed to an evaluation of its effectiveness and implementation. In Houston, where the program was being replicated for the first time, launching and integrating STS with existing services was more challenging than the developer and administrators expected. It took almost a year for staff to put the systems into place to deliver the program as intended. The findings on the impacts and implementation of the HFHF program enhanced with STS could support stronger replication of STS and other similar programs.

The impact analysis results suggest that HFHF very likely increased teen mothers' exposure to information on parenting and methods of birth control, while decreasing their knowledge of birth control pills relative to what it would have been in the absence of the program. Although HFHF intended to improve teen mothers' knowledge about contraception, the program's focus on LARC use might have come at the expense of providing information about birth control pills. The proportion of the treatment group reporting LARC use was 11 percentage points higher than in the control group, and we calculate a 77 percent probability that HFHF truly had a favorable effect (although this difference was not statistically significant). We find no other statistically significant impacts.

These results are primarily favorable and consistent with the program content, goals, and recent evidence on STS (Rotz and Wood 2018). In a prior study on STS conducted at the site of the developer, after one year in the program, study participants were more likely than mothers enrolled in the traditional home visiting program to report using LARCs, and there was also some evidence that the program reduced the prevalence of unprotected sex. In our study, smaller-

than-anticipated sample sizes due to HHD's earlier-than-anticipated withdrawal from the study increased the chances for random error to affect the ability to detect statistically significant differences on many of our measures, such as LARC use.

Our results are encouraging considering the challenges staff experienced integrating STS into their existing home visiting program over the first year. In many ways, the challenges and successes that HHD experienced rolling out HFHF with STS were not atypical of a first-year replication of an intensive program in any setting, let alone a large, bureaucratic city agency (Bumbarger and Perkins 2008). The similarities of the impacts to the results of the developer's optimal implementation of the program (Rotz and Wood 2018) suggest that HFHF program impacts could have been even stronger if implementation had been more successful within the first year.

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Appendix A: Content of the Steps to Success Curriculum and Criteria for Level Transition

Table A.1. Content of Steps to Success

Topic	Purpose	Handouts and activities
Training	Guides or resources for family coach	<ul style="list-style-type: none"> • Your 1st home visit with a new family guide • Primary needs of men and women • How to get men to...talk • Family coach guide to contraceptive counseling • How do you get men to act • Adopting new behaviors • Working with dad common pitfalls guide
Engage the mother and father of the baby	To learn about and assess the parents' current situation and backgrounds including their childhood experiences, family functioning, romantic relationships, and their expectations for their child's birth (pre-natal youth) or parenting experience (post-natal birth). This module helps coaches to establish a positive, supportive, and trusting relationship with youth. Coaches also provide education on the benefits of father involvement during this module.	<ul style="list-style-type: none"> • Getting to know you assessment questions • How children benefit from father involvement handout • Father influence on a child's literacy/school readiness handout • Consequences of father absence handout • Involving dads prenatally handout • Fathers play a unique and irreplaceable role in the lives of their children handout
Identify goals and steps to success	To identify clients' goals and the skills they'll need to reach those goals. For example, completing their education or taking responsibility for their actions. Youth reflect on what actions they're already taking to be successful and those they need to work on. Coaches also use this information to discuss what a second birth would mean to the family and how that would affect goal attainment.	<ul style="list-style-type: none"> • What success means to me activity • The secrets to success activity and coach's guide • What are the secrets to success handout • Secrets to success rating scale activity

Topic	Purpose	Handouts and activities
Educate participants about contraceptive methods and guide them to develop a reproductive life plan	To have clients understand the importance of birth spacing and its impact on improved child and parental outcomes. Coaches also discuss available birth control options and their effectiveness. Finally they assist participants to decide which option would be best for them. Youth complete a written birth plan to encourage them to commit to a birth planning option that suits them best and is a tool for achieving success.	<ul style="list-style-type: none"> • Success takes birth planning guide • Benefits of healthy birth spacing handout • How can healthy birth spacing be accomplished guide • How to take charge handout • What are LARCs? Handout • Contraceptives- a quick look handout • Contraceptive choices parent supplement • Paraguard- 100% hormone free handout • “1970 called and wants its birth control back” handout • Side effects- how concerned should you be handout • After How to Take Charge comes Dad’s Role in Family Planning • After Contraceptive Choices comes Emergency Contraception • Setting up a birth plan activity • Here’s our birth plan handout

Table A.2. Criteria for level transition in Steps to Success

Transition	Criteria
Level 1 to 2	<ul style="list-style-type: none"> • Parent(s) have maintained a stable home environment for 30 days or responded appropriately to crises with or without help of the family coach • Parent(s) have discussed healthy birth spacing and made an informed choice for reproductive planning • Parent(s) have kept home visits appointments or called ahead to reschedule at least 75% of the time • Parent(s) can identify at least one positive support system or person other than the coach. • Parent(s) demonstrate responsive, nurturing care practices with the child • Parent(s) show interest in child development • Parent(s) provide adequate stimulation for the child • Child is provided a safe home environment, including nutrition and attention to medical/health needs • Child is current on immunizations and well-care check-ups • Child has a medical home
Level 2 to 3	<ul style="list-style-type: none"> • All of the criteria for level one, plus: • Parent(s) have maintained a stable home environment for 30 days or responded to crises appropriately without help of the family coach • Parent(s) regularly utilize at least one positive support person other than coach • Parent(s) demonstrate effective problem-solving skills in most situations • Parent(s) have achieved fertility goals or is taking action to achieve those goals • Parent(s) have achieved or are achieving stated educational or employment goals • Custodial parent is free of substance abuse challenges • Parent(s) demonstrate positive parent-child interaction skills • Child is current on immunizations and well-care check-ups

Appendix B: Data Sources and Methods in the Implementation Study

A. Implementation data sources

The study of HFHF implementation examined program delivery from July 2015 through October 2016. The implementation study relied on the following qualitative and quantitative data sources:

1. A training observation and discussions with the program's developer.
2. A site visit, which consisted of key informant interviews, a focus group with HFHF participants, observations of program delivery, and review of select participant case files.
3. Individual interviews with HFHF participants.
4. Family coach records of each visit.
5. Survey of HFHF family coaches.
6. HFHF program materials.

Training observation

In October 2015, a study team member attended and observed the three-day STS training conducted by the developer. Following the training, the study team had ongoing telephone discussions with the developer to understand the intended program model, and to gather information on additional training plans, and her perspective on staff supervision and support.

Site visit

Two researchers visited Houston in September 2016, to collect in-depth data on:

- The intended program design for HFHF with Steps to Success.
- HFHF with Steps to Success as implemented May 2015 to September 2016.
- Staff and participant experience and perceptions of HFHF with Steps to Success.
- Lessons learned from program implementation.

During the site visit, Mathematica staff conducted several types of data collection:

Key informant interviews: Site visitors conducted in-person discussions with HHD administrators (2), and HFHF family coaches and the outreach specialist (5). They also conducted a focus group with HFHF participants (3). Discussions focused on staff roles and backgrounds, the development and refinement of the HFHF with Steps to Success model, staff training and support, needs and motivations of teen mothers and their relationship with their family coach, program implementation, and lessons learned.

Observations: Site visitors observed program delivery by accompanying family coaches on four home visits to deepen the site visitors' understanding of the program and how it is delivered.

Observations were chosen based on the convenience of staff and site visitors. Staff documented content and quality of interactions between the family coach and the teen mothers using a structured observation protocol.

Case file reviews: To provide the study team with deeper insights into participant and staff experiences with the program, site visitors requested and reviewed a small number (19) of typical cases, reflecting on specific needs and challenges. For each family coach, site visitors randomly selected three to four files of participants who had been enrolled in the program for 2 months or more. The reviews were designed to offer site visitors a better understanding of the population being served, their backgrounds and experiences, types of assistance they required, and how the program aimed to address their needs. These reviews, along with the semi-structured interviews, observations, and site visit, formed the basis for the vignettes in the implementation reports.

Interviews with youth

To learn about the teen mothers' experience with HFHF and their perceptions of the program, Mathematica engaged their subcontractor, Decision Information Resources (DIR) in Houston, TX, to conduct individual interviews with 29 participants in HFHF in February and March 2017. Mothers were selected to ensure variation across respondents by varying their time in the program, and assignment to family coach, but also based on convenience to accommodate schedules of mothers. Discussions with the teen mothers occurred in-person and focused on their:

- Relationship with their family coach.
- Motivations behind the decision to participate the program.
- Opinions about the program's content and activities.
- Perspectives on the aspects of the program that they liked or would change.
- Participation in similar programs.

HFHF family coach records

Healthy Families Healthy Futures family coaches recorded data for each visit they completed on forms that were entered into a database that was sent to the study team at the end of every month. The record included: family coach name, date of visit, visit length, mother's name, prenatal/postnatal status, people present at the visit, content discussed or services provided during the visit, mother's contraception status, and contraception type. These data were used throughout program implementation to monitor the percentage of sample members who ever had a home visit, and the content covered, services provided, and program retention for those who had received home visits. For the full implementation study, the study team also used these data to examine the content discussed in the visits, the total and average number of visits completed across all mothers enrolled July 2015 through October 2016, and the extent to which the father participated in the visits. As noted in the report, study data collection ended before the end of the program for most participants. The study does not have a record of visits conducted after October 2016, so dosage could not be calculated for all participants.

Survey of HFHF family coaches

Mathematica staff administered a 30 minute survey in pencil and paper format in September 2016. Four of five family coaches and the outreach specialist completed the survey. A fifth family coach was no longer working at HHD. The survey collected data on staff qualifications, caseloads, staff perceptions of the program, training, organizational and community support, and the program's fit for youth needs.

HFHF program materials

Mathematica staff reviewed numerous documents and materials provided by HHD and the program developer in order to describe the program model and its delivery in Houston. Examples of these include:

- Steps to Success curriculum and training materials.
- The Healthy Families America – approved Growing Great Kids curriculum.
- HHD training requirements.

B. Analysis approach

Qualitative analysis of the training observation and discussions with the developer, key informant interviews, interviews and focus group with youth, and observation data involved an iterative process using thematic analysis and triangulation of data sources (Patton 2002; Ritchie and Spencer 2002). Trained staff used a qualitative analysis software package, Atlas.ti (Scientific Software Development 1997), to facilitate organizing and synthesizing the qualitative data. First, we developed a coding scheme for the study, organized according to key research questions. Within each question, we defined codes for key themes and subtopics. Then, we applied the codes to passages in the interview, observation, and focus group notes. To ensure accurate and consistent coding, two research assistant/programmers independently coded site visit data and a research analyst and researcher (both members of the site visit team) reviewed the coded documents and reconciled any differences in coding. To address the research questions, we used the software to retrieve relevant passages and then examined the patterns of responses across respondents and identified themes emerging from the responses.

To analyze the staff survey of family coaches, the study team tabulated descriptive frequencies in Excel for reporting.

The study team also analyzed data from the family coach records to report findings on:

- **Frequency of topics discussed:** Family coaches recorded topics discussed during each visit with the participant. We calculated the percentage of home visits during which each topic was discussed for all sample members with at least one home visit.
- **Uptake of birth control:** Family coaches recorded the mother's contraception status (started, continued, changed, stopped) and contraception type, if applicable, for each visit. We used these fields to calculate the percentage of participants on any birth control each month as well as the percent on a LARC. We limited this calculation to include only postnatal mothers with a visit that month.
- **Average number of visits and involvement of each parent in visits:** Family coaches recorded whether the mother, father or a significant other was present for the visit. We calculated the total and average number of visits, as well as who was at each visit. The sample was limited to those who were randomly assigned to the program between June 2015 and October 2015, in order to focus on participants who were in the program for at least one year (through the end of data collection in October 2016).

Appendix C: Baseline Equivalence

Table C.1. Characteristics of the sample at program entry (percent, unless otherwise noted)

Characteristic	Treatment mean	Control mean	Difference	Effect size difference	p-value	Sample size
Age at random assignment/ baseline (years)	17.40	17.34	0.06	0.04	0.743	247
Race and ethnicity					0.260^a	
Hispanic	65.07	61.49	3.58	0.07		248
Black non-Hispanic	27.30	35.51	-8.20	-0.18		242
Other race, non-Hispanic	4.96	2.48	2.48	0.13		242
Enrolled in school at random assignment	63.76	64.41	-0.65	-0.01	0.916	245
Highest grade completed					0.342^a	
8th grade or below	13.60	19.01	-5.41	-0.15		246
9th grade	26.34	17.41	8.93	0.22		246
10th grade	18.39	20.67	-2.27	-0.06		246
11th grade	21.66	26.38	-4.72	-0.11		246
12th grade	20.00	16.53	3.47	0.09		246
Ever repeated a grade	20.15	25.01	-4.87	-0.12	0.367	244
Ever suspended or expelled	50.00	53.28	-3.29	-0.07	0.607	248
In previous 12 months, exposed to information about						
Relationships	6.50	15.71	-9.21**	-0.29	0.022	244
Parenting	32.20	35.30	-3.10	-0.07	0.608	246
Child health care	38.88	44.41	-5.53	-0.11	0.376	245
Education related services	28.08	39.32	-11.25*	-0.24	0.063	244
Career counseling or job training	11.30	15.69	-4.40	-0.13	0.316	245
Methods of birth control	44.87	64.31	-19.43***	-0.39	0.001	248
Percent correct on assessments of knowledge of					0.257	248
Condoms	35.21	37.98	-2.78	-0.10	0.452	248
Birth control pills	20.69	21.74	-1.05	-0.04	0.726	248

Appendix C: Baseline Equivalence

Characteristic	Treatment mean	Control mean	Difference	Effect size difference	p-value	Sample size
IUDs	24.10	23.31	0.78	0.03	0.791	248
Other methods	50.78	47.39	3.38	0.14	0.257	248
Use of a LARC first time having sexual intercourse	0.85	0.87	-0.02	0.00	0.988	233
Unprotected sex first time having sexual intercourse	55.44	58.52	-3.08	-0.06	0.626	244
Would be upset if pregnant again in next two years	3.98	9.07	-5.08	-0.21	0.108	246

Source: Baseline survey.

Note: Sample sizes differ across characteristics because of missing data. Sample means are regression adjusted, and differences are estimated using a regression of the baseline characteristic on the treatment indicator and random assignment strata indicator variables, with standard errors adjusted to account for heteroskedasticity. Effect sizes are calculated using Hedges' g statistic. An F-test of the null hypothesis that all baseline characteristics jointly predict treatment status has a p -value of 0.004.

^a Baseline differences of these mutually exclusive variables were assessed using an F-test to determine whether baseline characteristics jointly predict treatment status in a regression that also controlled for stratum. Reported p -values are from this test.

* Significantly different from zero at the .10 level, two-tailed test.

** Significantly different from zero at the .05 level, two-tailed test.

*** Significantly different from zero at the .01 level, two-tailed test.

Appendix D: Impact study analysis methods and results of sensitivity tests

We estimated the impact of HFHF on each outcome measure using the following equation:

$$(1) \quad y_i = \alpha + \tau * T_i + \beta * X_i + \varepsilon_i$$

where y_i is the outcome for individual i , T_i is an indicator equal to one for teen mothers assigned to the treatment group and zero for those assigned to the control group, X_i is a vector of individual-level covariates, and ε_i is an individual-level error term. To account for baseline differences between the treatment and control groups, and to increase the precision of estimated treatment effects, all main analyses control for race; age at sampling; highest grade completed; an indicator for enrollment in school at random assignment; and all available baseline measures of exposure to information, knowledge of birth control methods, and short-term outcomes. The vector X_i also includes an indicator for pregnancy status at random assignment to account for the stratified random assignment. The estimated parameter τ is the average treatment effect of assignment to HFHF. For each outcome, inference is based on standard errors made robust to heteroskedasticity (White 1980).

The chance of observing a false positive increases with the number of outcomes examined. To account for this, within each outcome domain described above, we adjusted the p -values of every test in order to control the familywise error rate at 5%. The statistical procedure we used to adjust p -values is based on the multivariate t -distribution and takes into account correlations among test statistics (Hothorn, Bretz, & Westfall 2008) that we expect, given the likely correlation of our outcome measures within each domain.

Rather than excluding teen mothers with missing baseline data, our main analysis uses a dummy variable adjustment to address missing baseline data (Puma, Olsen, Bell, & Price 2009). Specifically, we impute missing data to a constant and include an indicator variable for each baseline variable that has any missing data. This indicator variable is equal to one for teen mothers whose baseline data were missing before imputation and zero for those whose baseline data were not missing before imputation. Young mothers are only excluded from each main analysis for which they are missing the outcome; we include all teen mothers in the treatment group regardless of their level of participation in the program.

To test the robustness of these results, we re-ran all our program impact analyses without controls for baseline covariates. We also estimated the impact of actually receiving the HFHF intervention using a two-stage least squares framework. In this approach, we used treatment status as an instrument for the likelihood that an individual attended at least one HFHF visit.

Because of the widespread misinterpretation of p -values and statistical significance (Wasserstein & Lazar 2016; Greenland et al. 2016; Wasserstein, Schirm, & Lazar 2019; Amrhein, Greenland, & McShane 2019), we also report a Bayesian posterior probability—the probability that the true

effect of HFHF on each outcome was favorable or unfavorable (meaning, an improvement or decrease in outcomes greater than zero), given our findings. To calculate this probability, we use a standard textbook (for example, Gelman et al. 2013) formula based on Bayes rule (Bayes 1763/1958) to combine two sources of information: (1) the standard error of our impact estimate and (2) how common it is for generally similar interventions to have effects (Bayesian statisticians call this the *prior distribution*).⁵ Both sources of information can help us assess the likelihood that our impact estimate represents an effect of HFHF. All else equal, a smaller standard error implies that the impact estimate is more likely to be close to the true effect. Meanwhile, impact estimates from our study that are similar to the prior evidence are judged more likely to be correct. Bayes rule allows us to combine these two sources into an overall assessment of the likely effect of HFHF.

To develop a prior distribution, we conducted a meta-analysis of all findings on similar outcomes from studies rated moderate or high quality from the Home Visiting Evidence of Effectiveness (HomVEE) review. We chose HomVEE because it is a large, rigorous, systematic review of interventions serving a disadvantaged population of new parents and because HomVEE study descriptions provide enough information to support the analysis.⁶ Our meta-analysis revealed the following information about the prior distribution: slightly more than half of intervention effects are favorable, but large effects are unusual (fewer than 20% of effects are larger than 0.10 standard deviation).⁷ We use a textbook formula (for example, Gelman et al. 2013) to calculate the probability of a favorable effect given our impact estimates and the prior distribution, under the assumption that both our impact estimate and the prior distribution are Gaussian (normal).

We examined the robustness of our results to two alternative analytical approaches. First, we re-estimated our results without controlling for sample members' baseline characteristics. Besides treatment status, in this regression we controlled only for the stratum within which individuals were randomized. Second, we estimated a "treatment on the treated" (TOT) impact. While our main results estimate the impact of being offered HFHF services, the TOT shows the impact of attending at least one HFHF visit. Since, conditional on treatment status, attendance may be correlated with important unobserved variables, we estimated the TOT in a two-stage least squares framework, using treatment group status as an instrument for HFHF attendance. In

⁵ Some Bayesian statisticians define the prior distribution in terms of beliefs (de Finetti 1974; Kaplan 2019). We define the prior in terms of evidence (Gelman 2015; Deke & Finucane 2019).

⁶ A meta-analysis of prior evidence requires both impact estimates and some measure of the precision of those estimates (sample size, standard errors, or *p*-values). HomVEE reports impact estimates and *p*-values.

⁷ Our meta-analysis yielded a prior distribution that is Gaussian (normal) with a mean effect size of 0.01 and a standard deviation of 0.10. The meta-analysis included two statistical adjustments to calculate the mean and standard deviation of prior effects. First, we gave greater weight to more precise estimates, a standard practice in meta-analysis (Cooper, Hedges, & Valentine 2009). Second, to adjust for potential bias due to researchers conducting many analyses but only reporting the most favorable (a phenomenon sometimes called the file drawer problem), we ran a meta-regression of effect size estimates on the standard error of those estimates. This adjustment is motivated by the idea that for any given study, the effect estimate observed in the literature is the largest of all effect estimates calculated by the author (with the rest unseen in a file drawer). In other words, it is a maximum order statistic, which is well approximated by a linear function of the standard error (Royston 1982). The constant term from this meta-regression is our estimate of the mean of the prior distribution.

addition to the control group (none of whom received any HFHF services), fifteen treatment group members (twelve percent) never attended an HFHF visit. The F-statistic of the first stage regression indicates a high correlation between treatment status and participation, with a value over 500. The results from these robustness tests were consistent with the results from our main analysis.

Table D.1. Impacts on program components, excluding controls for baseline characteristics but including controls for randomization strata (percent, unless otherwise noted)

Program component	Treatment mean	Control mean	Impact	p-value	Adjusted p-value	Sample size
In the past 12 months, exposed to information on						
Relationships	20	19	2	0.74	1.00	221
Parenting	65	46	19**	0.01	0.03	220
Child health care	54	56	-2	0.80	1.00	221
Education related services	28	31	-3	0.64	1.00	220
Career counseling or job training	17	24	-7	0.21	0.73	220
Methods of birth control	80	70	10	0.09	0.42	217
Percent correct on assessments of knowledge of contraception						
Condoms	60	60	-1	0.83	1.00	220
Birth control pills	48	53	-5	0.18	0.50	220
IUDs	37	33	3	0.36	0.79	220
Other methods	37	37	0	0.94	1.00	220

Source: Baseline survey and 12 month follow-up survey.

Note: Treatment and control group means are regression adjusted. Impacts on binary outcomes are estimated using the linear probability model, with standard errors adjusted to account for heteroskedasticity. Regressions control only for treatment status and randomization stratum. All p-values are based on a two-sided test, and adjusted p-values control for the familywise error rate using the method in Hothorn et al., 2008. Sample sizes differ across outcomes due to missing outcome data.

* Significantly different from zero at the 0.10 level after adjusting for multiple comparisons, two-tailed test.

** Significantly different from zero at the 0.05 level after adjusting for multiple comparisons, two-tailed test.

*** Significantly different from zero at the 0.01 level after adjusting for multiple comparisons, two-tailed test.

Table D.2. Two-stage least squares impacts of program participation on program components (“Treatment on the Treated”), instrumenting for participation using treatment status and controlling for baseline characteristics (percent, unless otherwise noted)

Program component	Treatment mean	Control mean	Impact	p-value	Adjusted p-value	Sample size
In the past 12 months, exposed to information on						
Relationships	18	21	-3	0.68	1.00	221
Parenting	68	45	24**	0.01	0.04	220
Child health care	57	53	5	0.61	1.00	221
Education related services	29	29	1	0.93	1.00	220
Career counseling or job training	19	22	-4	0.62	0.98	220
Methods of birth control	85	67	17	0.02	0.11	217
Percent correct on assessments of knowledge of contraception						
Condoms	59	61	-3	0.47	0.92	220
Birth control pills	45	55	-10	0.05	0.14	220
IUDs	35	35	1	0.90	1.00	220
Other methods	37	37	0	0.92	1.00	220

Source: Baseline survey and 12 month follow-up survey.

Note: Treatment and control group means are regression adjusted. Impacts on binary outcomes are estimated using the linear probability model, with standard errors adjusted to account for heteroskedasticity. Regressions control for all baseline characteristics and stratum in addition to treatment status. All p-values are based on a two-sided test, and adjusted p-values control for the familywise error rate using the method in Hothorn et al., 2008. Sample sizes differ across outcomes due to missing outcome data.

* Significantly different from zero at the 0.10 level after adjusting for multiple comparisons, two-tailed test.

** Significantly different from zero at the 0.05 level after adjusting for multiple comparisons, two-tailed test.

*** Significantly different from zero at the 0.01 level after adjusting for multiple comparisons, two-tailed test.

Table D.3. Impacts on short-term outcomes, excluding controls for baseline characteristics but including controls for randomization strata (percent, unless otherwise noted)

Short-term outcome	Treatment mean	Control mean	Impact	p-value	Adjusted p-value	Sample size
Contraception use in previous 12 months						
Use of a LARC	38	29	10	0.14	0.25	219
Unprotected sex	25	26	-1	0.81	0.96	218
Respondent intends to wait two or more years before having next child.	89	94	-5	0.16	b	216
Frequency of parental engagement in last month—Scale from 0 (never) to 3 (every or almost every day)						
Mother’s engagement with child	2.48	2.48	0.00	0.99	1.00	217
Father’s engagement with child	1.48	1.54	-0.07	0.65	0.99	211
Quality of co-parenting relationship						
Scale from 1 to 5 with higher values representing stronger co-parenting	3.74	3.80	-0.06	0.62	0.98	216
Father pays half or more of child care costs	67	70	-2	0.72	1.00	216
Capacity for self-sufficiency						
Scale from 1 to 4 with higher values representing greater self sufficiency	2.15	2.13	0.01	0.69	0.99	221
Child health and development						
Number of well visits	6.34	6.51	-0.17	0.73	0.93	200
Has health insurance for child	95	94	0	0.90	0.99	216

Source: Baseline survey and 12 month follow-up survey.

Note: Treatment and control group means are regression adjusted. Impacts on binary outcomes are estimated using the linear probability model, with standard errors adjusted to account for heteroskedasticity. Regressions control only for treatment status and randomization stratum. All p-values are based on a two-sided test, and adjusted p-values control for the familywise error rate using the method in Hothorn et al., 2008. Sample sizes differ across outcomes due to missing outcome data.

* Significantly different from zero at the 0.10 level after adjusting for multiple comparisons, two-tailed test.

** Significantly different from zero at the 0.05 level after adjusting for multiple comparisons, two-tailed test.

*** Significantly different from zero at the 0.01 level after adjusting for multiple comparisons, two-tailed test.

Table D.4. Two-stage least squares impacts of program participation on short-term outcomes (“Treatment on the Treated”), instrumenting for participation using treatment status and controlling for baseline characteristics (percent, unless otherwise noted)

Program component	Treatment mean	Control mean	Impact	p-value	Adjusted p-value	Sample size
Contraception use in previous 12 months						
Use of a LARC	40	28	13	0.13	0.24	219
Unprotected sex	23	27	-4	0.65	0.84	218
Respondent intends to wait two or more years before having next child.	90	93	-4	0.48	b	216
Frequency of parental engagement in last month—Scale from 0 (never) to 3 (every or almost every day)						
Mother’s engagement with child	2.48	2.47	0.01	0.91	1.00	217
Father’s engagement with child	1.47	1.54	-0.08	0.70	0.99	211
Quality of co-parenting relationship						
Scale from 1 to 5 with higher values representing stronger co-parenting	3.71	3.82	-0.10	0.48	0.88	216
Father pays half or more of child care costs	67	70	-3	0.67	0.99	216
Capacity for self-sufficiency						
Scale from 1 to 4 with higher values representing greater self sufficiency	2.15	2.13	0.02	0.73	1.00	221
Child health and development						
Number of well visits	6.15	6.64	-0.49	0.44	0.75	200
Has health insurance for child	96	93	3	0.39	0.90	216

Source: Baseline survey and 12 month follow-up survey.

Note: Treatment and control group means are regression adjusted. Impacts on binary outcomes are estimated using the linear probability model, with standard errors adjusted to account for heteroskedasticity. Regressions control for all baseline characteristics and stratum in addition to treatment status. All p-values are based on a two-sided test, and adjusted p-values control for the familywise error rate using the method in Hothorn et al., 2008. Sample sizes differ across outcomes due to missing outcome data.

* Significantly different from zero at the 0.10 level after adjusting for multiple comparisons, two-tailed test.

** Significantly different from zero at the 0.05 level after adjusting for multiple comparisons, two-tailed test.

*** Significantly different from zero at the 0.01 level after adjusting for multiple comparisons, two-tailed test.

