

Home Visiting for Adolescent Mothers: Effects on Parenting, Maternal Life Course, and Primary Care Linkage

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ABSTRACT

PURPOSE Adolescent mothers are at risk for rapidly becoming pregnant again and for depression, school dropout, and poor parenting. We evaluated the impact of a community-based home-visiting program on these outcomes and on linking the adolescents with primary care.

METHODS Pregnant adolescents aged 12 to 18 years, predominantly with low incomes and of African American race, were recruited from urban prenatal care sites and randomly assigned to home visiting or usual care. Trained home visitors, recruited from local communities, were paired with each adolescent and provided services through the child's second birthday. They delivered a parenting curriculum, encouraged contraceptive use, connected the teen with primary care, and promoted school continuation. Research assistants collected data via structured interviews at baseline and at 1 and 2 years of follow-up using validated instruments to measure parenting (Adult-Adolescent Parenting Inventory) and depression (Center for Epidemiologic Studies Depression). School status and repeat pregnancy were self-reported. We measured program impact over time with intention-to-treat analyses using generalized estimating equations (GEE).

RESULTS Of 122 eligible pregnant adolescents, 84 consented, completed baseline assessments, and were randomized to a home-visited group (n = 44) or a control group (n = 40). Eighty-three percent completed year 1 or year 2 follow-up assessments, or both. With GEE, controlling for baseline differences, follow-up parenting scores for home-visited teens were 5.5 points higher than those for control teens (95% confidence interval, 0.5-10.4 points; *P* = .03) and their adjusted odds of school continuation were 3.5 times greater (95% confidence interval, 1.1-11.8; *P* < .05). The program did not have any impact on repeat pregnancy, depression, or linkage with primary care.

CONCLUSIONS This community-based home-visiting program improved adolescent mothers' parenting attitudes and school continuation, but it did not reduce their odds of repeat pregnancy or depression or achieve coordination with primary care. Coordinated care may require explicit mechanisms to promote communication between the community program and primary care.

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INTRODUCTION

Adolescent mothers experience rapid repeat pregnancy in the short term,¹ depression,² and school dropout,^{3,4} as well as a reduced probability of future economic independence.⁵ Compared with their adult counterparts, teenage mothers may interact with their children less positively and have unrealistic expectations of child behavior that increase the risk of abuse and neglect.^{6,7} Adolescent mothers and children growing up in disadvantaged communities afflicted by drugs, violence, and inadequate supports may be particularly vulnerable.⁸

Family physicians provide most of the adolescent medical care in the United States,⁹ but the typical office may find it challenging to address the multifaceted needs of pregnant and parenting teenagers. Primary care clinicians may be better positioned to address these issues if they work in concert with community-based programs.¹⁰

Home visiting is a community-based strategy for delivering services that aims to improve outcomes for high-risk families through education and support.¹¹ It can function as a mechanism for integrating health and other services.¹² For adolescents who are hard to engage, at high risk, and living under adverse conditions, home visiting may be particularly beneficial.^{13,14}

Studies of home visiting have raised questions about its practical importance and cost-effectiveness.^{14,15} A recent meta-analysis of 60 programs found wide variation in the effect sizes for outcomes, many of which were quite small.¹⁵ These variations in impact may be due to differences in the target population studied, program goals, design and implementation, outcomes measured, and variables that are difficult to quantify, such as the "fit" between staff and program participants.¹⁵

Although teenagers might be a group for whom home visiting may be effective,¹⁴ whether and to what extent these programs succeed in coordination with primary care have not been well studied. Such linkages may play a role in outcomes that are influenced by primary care, such as depression and repeat pregnancy.¹⁶⁻¹⁸

In 2000, we received funding to implement a community-based home-visiting program for pregnant and parenting teenagers. We evaluated the program experimentally to determine its impact on parenting attitudes and beliefs, repeat pregnancy, maternal depression, and school continuation. We also examined the program's success in linking adolescents with primary care. We hypothesized that having a usual source of care would be associated with reduced rates of repeat pregnancy and maternal depression.

METHODS

Participant Population

Between February 2001 and January 2003, pregnant adolescents aged 12 to 18 years whose pregnancies were of least 24 weeks' gestation were recruited from 3 urban, university-affiliated prenatal care sites in Baltimore, Md. Two sites were family medicine sites, and 1 was an obstetrician-gynecologist site. Adolescents attending these clinics were predominantly African American and economically disadvantaged. This study was approved by the Institutional Review Board of the University of Maryland School of Medicine.

Design

Program staff identified eligible adolescents from computer scheduling databases and approached them during a prenatal care visit and explained to them the program and study. After informed consent was obtained from adolescents and their parents or guardians, adolescents completed baseline structured interviews administered by research staff and were randomly assigned to a home-visited group or a usual care control group.

Home-Visiting Program

In the home-visited group, adolescent mothers received home visitation, mentoring, and case management from 1 of 3 African American women who were recruited from communities served by the program. Home visitors were required to have a high school degree and experience related to health care, child development, or social work. They were selected for their empathetic qualities, ability to relate to teens and families, communication skills, and knowledge of the community.

Home visitation started in the third trimester and was planned to occur biweekly for the first year of the child's life and then monthly until the child's second birthday. Each home visitor was assigned a caseload of up to 15 adolescents visited biweekly and up to 10 adolescents visited monthly. They received 2 days of initial training in the use of the curriculum, followed by ongoing training in depression, contraception, substance use, and domestic violence.

We defined a home visit as an in-person contact between the home visitor and adolescent. Two thirds of contacts occurred in adolescents' homes, whereas the remainder occurred elsewhere in the community, often because of safety concerns related to drug trafficking in the home.

Home visitors were to deliver a parenting curriculum and an adolescent curriculum. The curricula were grounded in social cognitive theory and were developed by a child development psychologist and an anthropologist specifically for urban, African American adolescent mothers.^{19,20} The parenting curriculum sessions aimed to improve teens' understanding of child development, teach and model good parenting attitudes and skills, and promote appropriate health care use. If the adolescent mother gave consent, the home visitor attempted to engage the baby's father along with the mother in parenting sessions. The adolescent curriculum sessions provided skills-based, interactive instruction on safer sexual practices, prevention of repeat pregnancy, goal setting geared toward school completion, and training geared toward improving communication and negotiation with partners.

Additionally, home visitors sought to identify depression, partner violence, and school dropout. Adolescents were asked about psychosocial stressors and distress. Their mental health was discussed in biweekly multidisciplinary staff meetings. If depression was identified as a potential concern, the teen was referred to the program's social worker for further evaluation and counseling, and to primary care and mental health services. Home visitors conducted ongoing assessment of the teen's school status and actively worked to promote school continuation or reengagement (eg, meeting with school officials, parents).

Finally, home visitors sought to connect adolescents with primary care for management of their contraceptive needs. Adolescents selected their primary care site, which was often different from their prenatal site, based on insurance requirements, location, and preference.

Home visitors completed standardized forms to measure how actual service delivery conformed to program standards (eg, completion of curriculum sessions, linkages).

Baseline and Follow-up Data Collection

Research staff blinded to the adolescents' group assignment conducted structured baseline interviews. The evaluation was separate from program activities; thus, individual-level data collected from research interviews (eg, standardized depression assessments) were not shared with program staff.

Outcome data were collected when the child turned 1 and 2 years old. We used instruments with established psychometric properties to measure parenting attitudes and beliefs, and depression. Contraceptive behaviors, sexual relationships, repeat pregnancies, school status, and relationship with the baby's father were measured at each follow-up assessment. At the year 2 follow-up interview, we asked adolescents whether they had a "regular personal doctor."²¹ Those responding "yes" were considered to be linked to primary care.

Measures

Parenting attitudes and beliefs were measured with Bavolek's Adult-Adolescent Parenting Inventory (AAPPI),²² which was designed to identify negative parenting attitudes and child-rearing practices associated with a high risk of adverse outcomes for the child. To assess condom and contraceptive use, adolescents were asked how often during the past 12 months they used condoms. Response choices were "never," "sometimes," "most times," and "always." They were also presented with a list of possible contraceptive methods and asked whether they had used the method. We grouped condom use into "always" vs "not always" and contraceptives into hormonal types (eg, medroxyprogesterone

acetate) vs nonhormonal types (eg, spermicide). Repeat pregnancy and birth were assessed by self-report.

Depressive symptoms were measured using the Center for Epidemiologic Studies Depression (CES-D) scale,²³ which contains 20 questions asking about symptoms experienced in the past week. Adolescents having a score of 21 points or higher were defined as having moderate to severe depressive symptoms.²⁴ For school status, we used the adolescents' self-reports of whether they were in school, were not in school, or had graduated by the year 2 follow-up interview, and whether they returned to school if, at baseline, they had dropped out.

We assessed maternal demographics and covariates that have been shown to be associated with parenting outcomes, repeat pregnancy, and depression.^{5,6,25,26} These variables included history of sexual abuse, exposure to domestic violence, and substance use.

Analyses

We used the intention-to-treat approach to analyze the effectiveness of the program.²⁷ Regardless of the adolescents' level of program participation (including no home visits and early dropout), we measured outcomes according to their originally assigned group. This method helps maintain the benefits of randomization and minimizes bias when participant attrition is related to outcomes of interest.

We used the χ^2 Fisher exact test and Student *t* test to test for differences between the home-visited and control groups in baseline and follow-up measures. We controlled for baseline differences in the follow-up analyses. We checked for differential attrition both within and between the groups. There was no difference between groups in attrition, but we did observe greater loss to follow-up among adolescents reporting greater domestic violence ($P < .05$) and a trend toward greater attrition for those who were depressed at baseline ($P = .09$). We controlled for these associations in analyses.

Generalized estimating equations (GEE)²⁸ were used to examine the impact of the home-visiting program on changes in adolescent mothers' parenting attitudes and beliefs, contraceptive behaviors, repeat pregnancy, depressive symptoms, school continuation, and linkage to primary care, adjusting for baseline differences. We used GEE because it produces a summary estimate of the group effect averaged over the year 1 and year 2 follow-up assessments, taking into account the correlation of the repeated measurements. We examined using random effects modeling to adjust for within-person and home visitor-level correlations, but the findings were unchanged.

Studies of home visiting demonstrate that participants often have high rates of attrition and receive fewer services than specified by the program's protocol.^{11,29}

Consequently, we assessed adolescents' total number of completed curriculum sessions and then determined whether they had a high level of exposure ($\geq 75\%$ of planned sessions) vs a low level of exposure ($< 75\%$ of planned sessions). We repeated the GEE analyses comparing parenting scores of home-visited vs control adolescents, including exposure level in the model and controlling for significant baseline differences.

Finally, we examined whether program participants were more likely to report having a regular personal doctor and whether this variable was associated with contraceptive, repeat pregnancy, and depression outcomes.

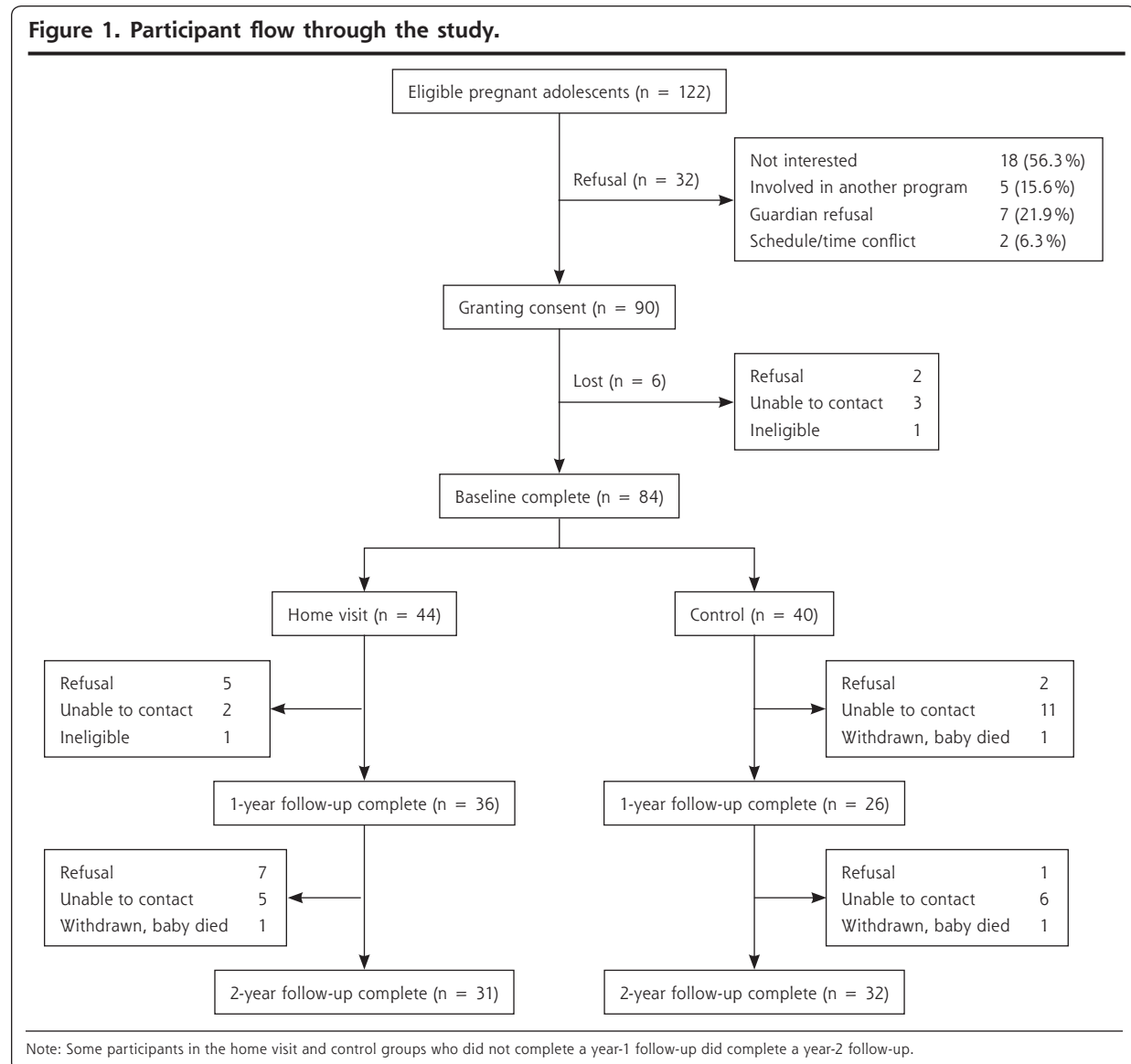
We defined statistical significance as $P < .05$ and a statistical trend as $.05 < P < .10$. Our sample size of 40 per group yielded a power of 0.80 to test for an effect size of

0.40 for continuous outcomes. Missing values accounted for less than 6% of all tested independent variables. Descriptive statistics and GEE models were computed with Stata 8.0 (Stata Corp, College Station, Tex).

RESULTS

We identified 122 eligible pregnant adolescents (Figure 1). Of these, 32 (26%) declined to give informed consent and another 6 (5%) did not complete a baseline assessment. Eighty-four teens were randomized to receive home visits ($n = 44$) and usual care as a control ($n = 40$). Among those randomized, follow-up assessments were completed at 1 year by 62 teens (74%) and at 2 years by 63 teens (75%). Seventy (83%) completed either assessment, and 56 (67%) completed both assessments.

Figure 1. Participant flow through the study.



Baseline Characteristics

The home-visited and control groups were comparable on most measures at baseline, except that AAPI parenting scores were significantly higher in the home-visited group (Table 1). The population was predominantly African American, had low socioeconomic status, and experienced challenges and stressors including sexual abuse (10%), physical fighting (31%), depressive symptoms (35%), and school dropout (30%).

Outcomes

The program had a positive impact on adolescent mothers' parenting attitudes and beliefs. Compared

with their control counterparts, home-visited adolescents had significantly improved changes over time in total AAPI scores and 2 of the subscales (Table 2).

Among the home-visited group, adolescents received fewer curriculum sessions than intended; 39% in this group completed fewer than 75% of planned sessions. Home-visited teens who completed 75% or more of the parenting curriculum scored 8.3 points higher than control teens on the AAPI ($P < .005$) (Table 3). On average, high-exposure recipients were older (16.8 vs 15.8 years, $P < .05$), but exposure level was not related to depression, domestic violence, or relationship with the baby's father.

We observed a trend toward greater consistent con-

dom use among home-visited adolescents, but no impact on use of hormonal contraception, repeat pregnancy or birth, or depressive symptoms (Table 4). Thirty percent of teens had dropped out of school at baseline. Significantly more home-visited teens than control teens returned to school and graduated by 2 years postpartum (71% vs 44%, $P < .05$).

At the year 2 follow-up interview, 61% of home-visited adolescents vs 44% of control adolescents reported having a regular personal doctor ($P = .25$) (Table 5). Teens who reported having a personal doctor were younger and more likely to be depressed at the year 2 follow-up interview. Controlling for age, baseline depressive symptoms, and domestic violence, having a personal doctor was associated with depressive symptoms at the 2-year assessment (adjusted odds ratio = 3.9; 95% confidence interval, 0.9-17.9; $P = .08$) and continuous insurance (adjusted odds ratio = 4.5; 95% confidence interval, 1.0-20.9; $P = .06$), but not with program participation.

Table 1. Baseline Characteristics of Adolescents in the Third Trimester of Pregnancy, Overall and by Study Group

Characteristic	Overall (N = 84)	Group		P Value
		Home Visit (n = 44)	Control (n = 40)	
Demographics				
Age, mean (SD), y	16.9 (1.4)	16.4 (1.4)	16.6 (1.4)	.40
African American, %	91	86	94	.27
Medicaid insurance, %	77	77	78	.59
Received TANF in past month, %	27	26	27	.57
Lives with mother, %	65	59	72	.26
Continuous health insurance for past 12 months, %	64	60	68	.34
Dropped out of school, %	30	23	37	.16
Pregnancy and parenting history				
Age at first pregnancy, mean (SD), y	15.6 (1.4)	15.4 (1.3)	15.8 (1.5)	.27
Prior birth, %	13	14	13	1.00
Abuse and violence exposure				
Beaten or physically harmed by parent, %	18	21	15	.51
Victim of sexual abuse, %	10	9	10	.89
In a physical fight in past 12 months, %	31	30	33	.36
Household violence: total CTS score, mean (SD)*	26.5 (19.9)	25.1 (18.0)	28.0 (21.9)	.52
Mental health				
Depressive symptoms (CES-D score >21), %	34.5	34.1	35.0	1.0
Substance use				
Used tobacco in past 30 days, %	10	11	8	.72 [†]
Used alcohol in past 30 days, %	5	5	5	1.0 [†]
Used marijuana in past 30 days, %	5	7	3	.62 [†]
Parenting attitudes and beliefs				
Total AAPI score, [‡] mean (SD)	111.3 (14.5)	114.4 (13.8)	108.0 (14.5)	.04
Characteristics of baby's father				
Age, mean (SD), y	19.7 (3.6)	19.7 (4.1)	19.6 (3.1)	1.00
In jail, %	14	14	14	1.00
Married, living together, going with baby's mother, %	63	64	63	.94

TANF = Temporary Assistance to Needy Families; CTS = Conflict Tactics Scale; AAPI = Adult-Adolescent Parenting Inventory; CES-D = Center for Epidemiologic Studies Depression.

* Higher scores indicate greater household violence.

† Higher scores indicate better parenting.

‡ By the Fisher exact test.

DISCUSSION

Our paraprofessional home-visiting program significantly improved adolescent mothers' parenting attitudes and beliefs

Table 2. Program Impact on Parenting Attitudes and Beliefs

Parenting Measure	Group	Mean Score (SD)* by Year of Follow-up		Difference in Score Change† Home Visit vs Control		
		Year 1 (n = 62)	Year 2 (n = 63)	β‡	95% CI	P Value
Total AAPI score, mean (SD)	Home visit	119.6 (14.6)	122.0 (17.2)	5.5	0.5 to 10.4	.03
	Control	110.1 (13.7)	111.8 (14.7)			
AAPI subscale scores, mean (SD)						
	Appropriate expectations	24.4 (2.8)	24.9 (3.3)	1.1	0.1 to 2.1	.02
Empathy	Home visit	29.2 (4.3)	30.9 (4.2)	1.7	0.3 to 3.4	<.05
	Control	27.0 (4.3)	27.5 (4.8)			
Avoidance of physical punishment	Home visit	37.3 (5.2)	36.8 (6.9)	1.8	-0.4 to 4.0	.10
	Control	34.7 (6.1)	34.2 (5.7)			
Avoidance of role reversal	Home visit	28.6 (6.5)	29.4 (7.7)	1.3	-1.1 to 3.7	.28
	Control	25.4 (5.4)	26.7 (6.4)			

AAPI = Adult-Adolescent Parenting Inventory; CI = confidence interval.

* Higher scores indicate better parenting.

† A greater mean difference indicates greater benefit of the home-visiting program relative to the control condition.

‡ Determined by generalized estimating equation (GEE) linear regression analysis with change in parenting score from baseline to follow-up as the outcome, adjusting for age, baseline parenting score, and baseline depressive symptoms.

Table 3. Effect of Level of Exposure to the Parenting Curriculum on Adolescent Mothers' Parenting Attitudes and Beliefs

Parenting Measure	Level of Exposure to Parenting Curriculum					
	Low Exposure (<75% of Planned Sessions)			High Exposure (≥75% of Planned Sessions)		
	β*	95% CI	P Value	β*	95% CI	P Value
Total AAPI score	0.2	-7.0 to 7.3	.97	8.3	3.2 to 13.3	<.005
AAPI subscale scores						
Inappropriate expectations	0.3	-1.3 to 1.9	.08	1.5	0.4 to 2.5	.01
Empathy	1.4	-0.7 to 3.5	.19	2.6	0.9 to 4.3	<.005
Avoidance of physical punishment	0.04	-3.2 to 3.3	.98	2.6	0.2 to 5.0	.03
Avoidance of role reversal	-0.9	-4.9 to 3.0	.63	2.1	-0.1 to 4.4	.06

AAPI = Adult-Adolescent Parenting Inventory; CI = confidence interval.

* β = the mean difference in score between intervention home-visited adolescents (with high or low exposure to the curriculum) and control adolescents, using the generalized estimating equation (GEE), and adjusting for age, baseline AAPI scores, baseline depressive symptoms, and household violence.

have been due to our sample's younger mean age and our use of a previously evaluated parenting curriculum that was culturally and age appropriate.²⁵ We furthermore emphasized staff training and monitoring to ensure that staff acquired and used skills to teach, promote, and model positive parenting faithfully.²⁰

Similar to programs that specifically target teenage mothers,¹⁵ our program significantly influenced school reentry and graduation. This effect may have been due to the home visitors' consistent

and increased school continuation relative to usual care; however, the program was not effective in reducing the odds of repeat pregnancy or maternal depressive symptoms. We aimed to link teens with primary care and did observe a nonsignificant trend toward this outcome.

In contrast to findings from a meta-analysis of home-visiting programs that found small changes in parenting,¹⁵ our findings found medium to large effect sizes on parenting outcomes.³⁰ Specifically, among home-visited teens overall, the standardized effect size for improved parenting attitudes was 0.49 and was even higher, 0.72, among adolescents who had a high level of exposure to the curriculum. These effect sizes are larger than that reported by Olds et al (effect size, 0.38)³¹ and may

messages and case management activities delivered in the context of their ongoing relationship with the teen. Disruptions in these relationships were rare; during the program's 4-year lifetime, only 1 of the 3 home visitors left the program. Such continuity may enhance a trusting relationship and increase the impact of messages.³²

On the other hand, this program did not improve use of hormonal contraception or reduce repeat pregnancy. Prior studies of home visitation have found a similar lack of impact on prevention of additional pregnancies.^{16,31} A possible explanation derives from research showing that knowledge of and access to contraceptive services alone do not reduce repeat pregnancy.^{33,34} Motivation to avoid pregnancy is influenced by many factors, including

Table 4. Program Impact on Contraceptive and Pregnancy Outcomes, Mental Health, School Completion, and Linkage With Primary Care

Measure	Group	Year of Follow-up		Program Impact at 2 Years		
		Year 1 n (%)	Year 2 n (%)	AOR*	95% CI	P Value
Contraceptive use and pregnancy outcomes						
Used condoms "always" in past 12 months	Home visit	18/36 (50)	17/31 (55)	3.6	0.9-14.4	.07
	Control	9/26 (35)	12/32 (38)			
Used hormonal contraception in past 12 months	Home visit	18/36 (50)	18/31 (58)	0.7	0.2-1.9	.46
	Control	15/26 (58)	21/32 (66)			
Repeat pregnancy	Home visit	7/36 (19)	14/31 (45)	1.2	0.4-3.5	.69
	Control	5/26 (19)	12/32 (38)			
Repeat birth	Home visit	3/36 (8)	4/31 (13)	0.6	0.2-2.6	.54
	Control	2/26 (8)	6/32 (19)			
Maternal mental health						
Depressive symptoms (CES-D score \geq 21)	Home visit	8/36 (22)	11/31(36)	2.1	0.6-7.1	.24
	Control	6/26 (23)	8/32 (25)			
School status						
In school or graduated at year 2 [†]	Home visit	–	22/31 (71)	3.5	1.1-11.8	<.05
	Control	–	14/32 (44)			
Linkage with primary care						
Has a regular personal doctor at year 2	Home visit	–	19/31 (61)	1.9	0.7-5.6	.23
	Control	–	15/32 (47)			

AOR = adjusted odds ratio; CI = confidence interval; CES-D = Center for Epidemiologic Studies Depression.

* Adjusted for baseline depressive symptoms and baseline household violence.

† Excludes the 14 adolescents who had graduated at baseline.

Table 5. Selected Characteristics of Adolescent Mothers With and Without a Regular Personal Doctor

Characteristic	Adolescent Has a Regular Personal Doctor		P Value
	Yes (n = 34)	No (n = 29)	
Demographics			
Age at baseline, mean (SD), y	16.2 (1.5)	16.9 (1.4)	.04
Lives with mother at year 2, %	62	46	.23
Household conflict at year 2: CTS score, mean (SD)	17.4 (14.5)	23.6 (14.5)	.13
Continuous health insurance from baseline to year 2, %	42	26	.19
Contraceptive use and pregnancy outcomes			
Used condoms "always" in past 12 months at year 2, %	56	35	.09
Used hormonal contraception in past 12 months at year 2, %	62	62	.98
Repeat pregnancy by year 2, %	47	35	.48
Repeat birth by year 2, %	18	14	.68
Maternal mental health			
Depressive symptoms (CES-D score $>$ 21) at baseline,* %	38	21	.13
Depressive symptoms (CES-D score $>$ 21) at year 2, [†] %	41	17	<.05
Group			
Home visit	61	39	.25
Control	47	53	

CTS = Conflict Tactics Scale; CES-D = Center for Epidemiologic Studies Depression.

* n = 19.

† n = 19.

partner preferences for having more children.³⁵⁻³⁷ Although our program did provide adolescents with contraceptive information and counseling, and taught them about safer sexual practices and negotiation skills, it lacked an explicit mechanism to address motivation as the key to postponing childbearing.^{35,38,39} Additionally, the program lacked specified methods to share information between the home visitors and the primary care physician. Studies suggest that defined communication protocols may facilitate a more seamless and integrated care process.⁴⁰

Despite the program's focus on assessing adolescents for depression at baseline, providing therapy to those with depression, and recommending further treatment in primary care and mental health settings, the program did not

have any impact on adolescent mothers' depressive symptoms. One possible explanation is that the program did not train the home visitors to use a standardized depression screening tool for ongoing assessment. Consequently, the program may have failed to identify adolescent mothers with incident depression between delivery and 2 years.² Beyond this factor, merely identifying depression without giving adolescents specific evidence-based treatment does not improve outcomes.⁴¹ Even if depressed teens were referred to their primary care doctor, the program lacked a well-developed system to coordinate information between the home visitor and the teen's physician. Consequently, when the teen visited the physician, the physician may have failed to recognize her depression.^{42,43} Barriers in access to care are also likely to have played a part. During their pregnancy, more than 75% of the teenagers were covered by insurance (predominantly Medicaid), but fewer than 35% reported continuous insurance coverage during the 2-year study period. Although speculative, our experience suggests that complicated welfare reform policies may contribute to loss of coverage after delivery.⁴⁴

Multiple studies have shown that using care managers to complement the primary care physicians' role in the treatment of depression improves outcomes and is cost-effective.⁴⁵⁻⁴⁷ It is possible that appropriately trained home visitors could serve such a role. Although our program aimed to coordinate care, our lack of adequate explicit mechanisms to communicate with the primary care clinician was a missed opportunity for bidirectional flow of information that might reinforce each setting's messages.⁴⁸

This study raises questions about how to integrate community-based and primary care services for vulnerable teenage mothers. Studies have found that even within a single system of clinicians, communication is difficult⁴⁹ and may be impractical, time-consuming, and economically unproductive for many clinicians.⁵⁰ We believe that future trials should explore innovative methods for communicating important information (eg, the presence of depressive symptoms) between primary care clinicians and community programs. Successful linkages that promote and reinforce positive behavior change could prove more fruitful.

A major limitation of this study is its small sample size; however, our high follow-up rate and intention-to-treat analysis strengthen our findings of a positive program impact on parenting attitudes and school continuation for this group. Second, although we used a randomized design, our study groups were not balanced at baseline on our main parenting measure, the AAPI score. It is also possible that our parenting outcome findings might have been different had we measured parenting through direct observation rather than self-report. Finally, we did not assess the content of primary care

received by these teens. Consequently, we are unable to determine whether primary care clinicians provided appropriate contraceptive services or recognized and treated depression in these adolescent mothers.

In recent years, federal dollars have been drastically reduced for programs that support services for vulnerable pregnant and parenting teenagers in favor of ineffective programs that support "abstinence only until marriage."^{51,52} This trial reinforces prior studies showing the effectiveness of home visitation in improving important outcomes for economically disadvantaged adolescent mothers, and may be helpful in formulating evidence-based policy. It is possible that other important outcomes, such as repeat pregnancy and depression, could be altered with greater coordination of care. Community-based home-visiting programs and primary care practices may achieve greater benefits if they work together to develop and test explicit mechanisms and implementation systems that coordinate care for high-risk adolescents.

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