

A Primary Care Intervention to Prevent Repeat Pregnancy Among Teen Mothers



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Introduction: The purpose of this study is to determine the effectiveness of a patient-centered medical home intervention for teen parent families in reducing rates of unintended repeat pregnancy in the first 2 years postpartum.

Methods: A prospective quasi-experimental evaluation was conducted with 98 African American, low-income, teen mother (aged <20 years) participants who received either the intervention or standard pediatric primary care. All participants completed structured interviews at baseline (child aged 2 months) and at follow-ups 12 and 24 months later. Data were collected from 2011 to 2015. Participants reported number of pregnancies, contraception used at last intercourse, depressive symptoms, and romantic status of the relationship with the baby's father. Analyses were conducted from 2015 to 2017.

Results: Logistic regression showed that mothers in the intervention group were half as likely as mothers who received standard pediatric primary care to have a repeat pregnancy within 2 years (OR=0.55, $p=0.16$). The main effect of the intervention on lower rates of repeat pregnancy was mediated by higher rates of contraceptive use. Depression was associated with higher odds of repeat pregnancy, but did not appear to mediate the intervention effect.

Conclusions: This comprehensive and integrated model of care for teen parents may be an effective method to prevent rapid repeat pregnancies in this vulnerable population.

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INTRODUCTION

Despite recent declines, the teenage birth rate in the U.S. remains higher than in other industrialized countries.^{1,2} Teen childbearing has been associated with adverse outcomes for both teen mothers and their children, including birth complications,^{3,4} limited educational attainment,⁵ and depression among mothers,⁶ plus developmental, academic, and behavioral problems among their children.^{7,8} Rates of repeat births to teenage mothers range from 35% to 42% within 24 months of a prior birth,^{9,10} with higher rates among African American teens.¹¹ African American teen mothers and their children face greater health risks,^{12,13} and teens who have a second or higher-order birth experience additional adverse consequences, including lower

educational attainment, less economic self-sufficiency, and increased health problems relative to peers who have one birth during adolescence,^{3,14} perpetuating cycles of socioeconomic disadvantage and health disparities.

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Support for teen parents and their children, including unintended pregnancy prevention, is an important public health goal, but no specific intervention has yet emerged as a standard of care.¹⁵ Most teen pregnancy prevention programs are curriculum-based, delivered in school or in after-school programs or community-based organizations.¹⁶ Such programs have an important role in the prevention repertoire, but they are less likely to reach teen parents who are disconnected from school or community services, and are less likely to address family and community factors that may influence teens' sexual decision making.

The patient-centered medical home model^{17–19} may provide a different opportunity for preventing unintended repeat teen pregnancy and improving care for teen parent families. Some early studies have demonstrated benefits of the patient-centered medical home model in cost savings and appropriate utilization of services.^{17,18,20} Particularly in under-resourced communities, the integration of multidisciplinary services into the patient-centered medical home has enhanced providers' abilities to address patients' needs.^{21,22}

Teen-Tot programs, a model of intervention in which a medical provider cares for teen parents and their children in a single setting, in a single visit, is an early exemplar of the patient-centered medical home. Because a provider cares for both parent and child, the provider has increased contact with the teen parents, simplifying access to contraceptives and putting their use into an overall context of family health. To date, a small number of studies evaluating early iterations of the Teen-Tot model have found low rates of rapid repeat pregnancies among participants.^{23,24} However, these studies have significant methodologic flaws, including lack of comparison groups, which preclude any meaningful conclusions about the model's effectiveness.^{23–25}

The current study is a rigorous evaluation of a patient-centered medical home intervention applied to secondary teen pregnancy prevention. The Generations program expands upon previous iterations of the Teen-Tot model. In addition to integrating primary care for teen parents and their children with the same provider during the same visit, the program integrates intensive social work and mental health services into the primary care setting. This study examines two research questions: (1) are teen mothers participating in the Generations program less likely than teen mothers who receive standard pediatric primary care to have a repeat pregnancy by the time their children are aged 2 years? and (2) is a decreased likelihood of repeat pregnancy for teen mothers in the Generations program mediated by increased contraceptive use?

METHODS

This study used a quasi-experimental prospective treatment-comparison design to compare teen mothers enrolled in the Generations program with those receiving standard pediatric primary care based on a medical home model. This design is more feasible than randomization at the individual level because providers cannot alter their behavior based on group status within a clinic site, and intervention and comparison sites were very comparable in the demographics of patients served and types of services offered.

Study Sample

Participants were recruited from three intervention sites and three comparison sites, all of which were community-based primary healthcare clinics serving primarily urban, low-income, African American families. The intervention sites were all hospital-based outpatient pediatric clinics, and the comparison sites included one hospital-based outpatient pediatric clinic and two federally qualified health centers. Patients were eligible for enrollment into the study if: (1) the mother was aged ≤ 19 years, (2) the child was aged < 6 months, (3) the family was newly seeking care from one of the study sites, and (4) the mother had physical custody of her child. The baseline sample was enrolled over 2 years (2011–2013) and consisted of 150 teen mother–child dyads (85 intervention, 65 comparison), which was 83% of the eligible mothers invited to participate. The 24-month follow-up sample consisted of 110 teen mothers, a retention rate of 73%, particularly high compared with other longitudinal research with similar populations.^{26,27} There were no significant differences in attrition between the intervention (24%) and comparison (31%) groups, and the sample retained at 24-month follow-up (83%) did not significantly differ from those lost to follow-up (75%) in baseline use of any form of contraception. For these analyses, the sample was restricted to participants who completed both 12- and 24-month follow-up surveys ($n=98$). In this sample, 100% of the participants are African American. At baseline, 78% lived with their own mothers, 18% were working for pay, 80% were in school or had graduated from high school, and 69% received Medicaid. Analyses were conducted from 2015 to 2017.

Measures

After obtaining informed consent/assent from the teen mother, and her guardian for mothers aged < 18 years, research assistants administered study measures during home-based interviews. All study procedures and measures were approved and monitored by the IRB of Children's National Health System.

There are three primary components of the Generations intervention: The first component is Family Centered Primary Care. Teen parents and their children are seen by the same medical provider, during the same visit, which typically includes standard well-child care for children, and reproductive health services for parents. Scheduling of visits outside of standard preventive healthcare exam schedules for both parent and child is based on the healthcare needs of the family. Medical visits also include healthcare maintenance, acute concerns, contraception, and mental health/psychopharmacologic management, as needed. Fathers are encouraged to attend visits. The frequent, non-threatening, non-stigmatizing encounters of pediatric visits allow medical providers to develop strong and lasting relationships with young parents,

address pregnancy intentions frequently and actively, facilitate continuity of care, and address a wide range of the families' needs.

The second component is Comprehensive Social Work Services. Each teen parent family is assigned a social worker who supports the family by meeting with them during every visit and between visits as needed. The social worker begins with a family-based assessment of capacities and needs that dictates the frequency of ongoing contact. The social worker assists the teen parents in accessing needed community-based services, and teaches and empowers them to access resources themselves. Additional social work services may include ongoing case management, home visitation, and phone/text messaging contact as needed. The social worker also addresses family planning and sexual behavior with the teen parents, attending to issues such as ambivalence about becoming pregnant or negotiating condom use with a new partner.

The third component is Mental Health Screening and Treatment. On an annual basis, every parent in the program is given a brief battery of mental health screens to assess mood disorders, interpersonal violence, trauma history, and substance use. Regular developmental and behavioral assessments are administered to the children of the teen parents. When a mental health need, in either a parent or a child, is identified through screening or clinician judgment, the mental health provider, a licensed clinical psychologist, sees the parent or family for an initial consultation during a medical visit. Mental health services may include consultation during clinic appointments, crisis management, parent-child psychotherapy, co-parenting support, and individual psychotherapy outside of the medical visits. In contrast to a more limited traditional model of mental health care, the Generations mental health provider is available during medical visits, and is integrated into the patient-centered medical home team. She is in regular contact with the medical and social work staff, and has the flexibility to work with parents more episodically, as their needs compel them to seek services.

The outcome variable, rapid repeat pregnancy, was measured by calculating the difference between the number of lifetime pregnancies reported at 24-month follow-up and baseline. If the difference was >0 then repeat pregnancy=1.

Contraceptive use was the primary mediator of interest and was measured at the 12-month follow-up interview. Participants were asked, *The last time you had sexual intercourse, what method did you or your partner use to prevent pregnancy?* They could choose multiple methods from the following list: *none, birth control pills, condoms, Depo-Provera, birth control patch, rhythm method, withdrawal, intrauterine device (IUD), diaphragm, or other.* Responses were recoded as hormonal if the participant reported using only any of the following: birth control pills; Depo-Provera; birth control patch; IUD, including the non-hormonal IUD; or other (open-ended responses indicated all other responses were Nexplanon implants). Responses were recoded as barrier if the participant reported using only condoms or diaphragm. If the participant indicated using one of the hormonal methods and one of the barrier methods, the response was recoded as hormonal and barrier. Participants were also asked, *During the past 3 months, with how many people did you have sexual intercourse?* If they answered 0, then their contraceptive use was recoded as abstinence.

An ongoing romantic relationship with the father of the baby (FOB), and clinically significant symptoms of depression have

both been shown in previous research with this sample and others to be associated with rapid repeat pregnancies or decreased contraceptive use in teen mothers.^{28,29} They were therefore included in the final predictive model. Romantic involvement with the FOB was determined by asking the mother, *Are you and your baby's father currently together as a couple?* The 20-item, self-report Center for Epidemiologic Studies–Depression scale³⁰ was used to assess depressive symptoms in the past week. Respondents reported the frequency of each symptom on a 4-point scale (Cronbach's $\alpha=0.84$), with higher scores indicating more depressive symptoms. Scores ≥ 16 meet the clinical cut off for depression.

Statistical Analysis

An intent-to-treat approach was used, comparing participants enrolled in the Generations program, regardless of level of intervention engagement, to those enrolled in the comparison group. First, the intervention and comparison groups were described and compared on select demographics and variables used in analyses with chi-square and ANOVA tests (Table 1). Potential confounders other than relationship with the FOB and depressive symptoms were explored but were not significantly associated with repeat pregnancy and thus not retained in analyses. Next, chi-square tests were conducted to test bivariate associations between predictors X repeat pregnancy (Table 2), to establish the first and second criteria for mediation. Finally, an adjusted logistic regression model was conducted (Table 3), with multiple steps, predicting repeat pregnancy from: (1) group status (main effect), (2) contraceptive use (primary mediator), and (3) romantic status with the FOB and depressive symptoms. The chi-square tests and logistic regression tested Baron and Kenny's criteria for establishing mediation.³¹ Finally, another step with interaction terms was added to the logistic regression model to explore whether the effect of the intervention or contraceptive use was moderated by the other predictors. All analyses were conducted using SPSS, version 23.0 for Macintosh, and statistical significance was set at $p<0.10$ to ensure that important relationships were not overlooked given the small sample size.

RESULTS

At the 24-month follow-up, children in this study were on average aged 27 months, and teen mothers were aged $\cong 19$ years. Table 1 shows the rate of repeat pregnancy in this total sample was 37%, and lower in the Generations group (31%) than the comparison group (45%). At baseline and 12 months after enrollment, the largest proportion of participants reported using hormonal and barrier methods of contraception, yet a sizable portion (16%) used none. Establishing the second mediation criterion, after involvement in the intervention (but not before), Generations participants were more likely to use all forms of contraception, although they were less likely to have been abstinent over the prior 3 months ($p=0.10$). Generations participants were also significantly less likely to be romantically involved with the FOB, at both baseline and 12-month follow-up. There was no significant difference between groups in rates of depression,

Table 1. Descriptive Statistics for Intervention and Comparison Groups

Variable	Total (n=98)	Generations (n=58)	Comparisons (n=40)	χ^2/F	p-value
Child characteristics					
Age at 24-month follow-up, years, mean (SD)	27.19 (1.95)	27.34 (1.81)	26.97 (2.15)	0.72	0.40
Female gender, % (n)	49 (48)	45 (26)	55 (22)	0.98	0.32
Maternal characteristics					
Age at 24-month follow-up, years, mean (SD)	19.57 (1.43)	19.46 (1.53)	19.74 (1.29)	0.74	0.40
Contraception used at baseline, % (n)				1.83	0.77
None	14 (13)	11 (6)	18 (7)		
Hormonal	11 (11)	11 (6)	11 (4)		
Barrier	18 (17)	21 (12)	13 (5)		
Hormonal + barrier	32 (30)	32 (18)	32 (12)		
Abstinent	26 (25)	26 (15)	26 (10)		
Contraception used at 12 months, % (n)				8.20	0.09
None	16 (16)	9 (5)	28 (11)		
Hormonal	15 (15)	17 (10)	13 (5)		
Barrier	15 (15)	19 (11)	10 (4)		
Hormonal + barrier	44 (43)	48 (28)	38 (15)		
Abstinent	9 (10)	9 (5)	13 (5)		
Romantically involved with FOB at baseline, % (n)	60 (59)	52 (30)	73 (29)	—	—
Romantically involved with FOB at 12-month follow-up, % (n)	43 (41)	30 (17)	62 (24)	9.52	0.002
Above cut off for depression at baseline, % (n)	34 (33)	40 (23)	25 (10)	—	—
Above cut off for depression at 12-month follow-up, % (n)	41 (40)	36 (21)	48 (19)	1.25	0.26
Repeat pregnancy at 24 months, % (n)	37 (36)	31 (18)	45 (18)	1.99	0.16

Note: Boldface indicates statistical significance ($p < 0.05$).

FOB, father of baby.

but notably 40% of the total sample met the criteria for clinical levels of depressive symptoms when their child was aged 2 years.

The first step of the logistic regression model (first mediation criterion) showed that the odds of repeat

pregnancy in the Generations group was almost half that of the comparison group (OR=0.55), although this effect was not statistically significant ($p=0.16$). The second step of the model established the third and fourth mediation criteria: the odds of repeat pregnancy were significantly

Table 2. Bivariate Associations With Repeat Pregnancy at 24-Month Follow-up

Variable	Repeat pregnancy, % (n)	None, % (n)	χ^2	p-value
Contraception used at 12 months			23.32	<0.001
None (n=16)	88 (14)	13 (2)		
Hormonal (n=15)	33 (5)	67 (10)		
Barrier (n=15)	27 (4)	73 (11)		
Hormonal + barrier (n=43)	21 (9)	79 (34)		
Abstinent (n=9)	44 (4)	56 (5)		
Romantic relationship status with FOB at 12 months			2.25	0.13
Romantically involved (n=41)	44 (18)	56 (23)		
Not together as a couple (n=55)	29 (16)	71 (39)		
Depression at 12 months			1.99	0.16
Above clinical cut-off (n=40)	45 (18)	55 (22)		
Below clinical cut-off (n=58)	31 (18)	69 (40)		

Note: Boldface indicates statistical significance ($p < 0.05$).

FOB, father of baby.

Table 3. Multivariate Logistic Regression Predicting Repeat Pregnancy at 24-Month Follow-up (n=96)

Variable	Step 1	Step 2	Step 3
Generations, OR (95% CI)	0.55 (0.24, 1.29)	1.02 (0.36, 2.86)	1.17 (0.39, 3.52)
Contraception at 12 months, OR (95% CI)			
None	—	ref	ref
Hormonal	—	0.06 (0.01, 0.39)	0.04 (0.004, 0.27)
Barrier	—	0.04 (0.01, 0.29)	0.04 (0.004, 0.29)
Hormonal + barrier	—	0.04 (0.01, 0.20)	0.03 (0.01, 0.17)
Abstinent	—	0.11 (0.02, 0.83)	0.06 (0.01, 0.52)
Romantically involved, OR (95% CI)	—	—	1.15 (0.40, 3.32)
Depression above clinical cut off, OR (95% CI)	—	—	3.19 (1.07, 9.55)
Pseudo R ²	0.02	0.23	0.27

lower for participants using any method of contraception compared with those who did not, and the absolute value of the OR for Generations was reduced to essentially zero (OR=1.02). This indicates that the main effect of Generations on reduced rates of repeat pregnancy was mediated by increased use of contraception in the intervention group. In the third step of the logistic regression, clinical levels of depressive symptoms were significantly associated with higher odds of repeat pregnancy (third mediation criterion), whereas there was no significant main effect of being in a romantic relationship with the FOB. An alternative order of entry (not shown) was used to determine if depression, entered in the second step, mediated the main effect of Generations. It did not, as the OR was only reduced from 0.55 to 0.69. Also, in iterative versions of a fourth step in the model (results not shown, available upon request), interaction terms between group status X contraceptive use/romantic relationship with the FOB/depression showed no evidence of moderating the Generations main effect, nor did romantic status with the FOB or depression moderate the contraceptive use main effect.

DISCUSSION

The effect of the Generations program on the reduction of rapid repeat pregnancy was not statistically significant, but a reduction from 45% to 31% is clearly sizable and clinically important. The size of the *p*-value is likely due to the study's small sample size and, as many have argued recently, is not a good indicator of meaningful effects in intervention studies with small samples.^{32,33} A recent editorial in the *American Journal of Public Health* regarding the evidence base for adolescent pregnancy programs asserts that the size of the *p*-value does not necessarily indicate the meaningfulness of the effect, and that it is more useful to examine the direction and magnitude of RRs to understand program impact.³⁴ In the

current study, the OR of 0.55 indicates that mothers in the Generations group were about half as likely as mothers in the comparison group to have a rapid repeat pregnancy, a clinically meaningful difference. Further, findings indicate that mothers in the Generations program had higher rates of contraceptive use 12 months after program entry, the mechanism that decreased their likelihood of having a repeat pregnancy by 24 months.

This study also found that depression increased the likelihood of repeat pregnancy. There were notably fewer depressed participants in the Generations group (36%) versus the comparison group (48%) at the 12-month follow-up, but depression did not mediate the effect of Generations on repeat pregnancy. This group difference in rates of depression may be because of the provision of mental health services within the Generations program.

Limitations

Although this study moves the evidence base on teen pregnancy prevention programs forward, it still has a number of limitations. First, it included a homogenous sample and thus may not be generalizable to other socio-demographic groups. However, because African Americans are disproportionately affected by teen parenthood, and they face greater risks compared with other racial groups of teen mothers,^{13,14} they are an important group in which to study preventive interventions. Second, contraceptive use in this study was only measured as snapshots at three time points, when it is actually a construct that can vary considerably over time. Future research should consider time sampling methods to capture individual patterns of contraceptive use. Third, this study did not measure pregnancy intentions, so the authors were not able to assess their relationship to contraceptive behavior. Finally, the small sample size of this study constrained the statistical power so that several sizable and clinically meaningful differences did not reach

conventional statistical significance. However, the size of these differences demonstrates the promise of this intervention and future replication with larger samples is warranted.

CONCLUSIONS

This preliminary study shows that a patient-centered medical home model of expanded care coordination and integrated services improves prevention of rapid repeat teen pregnancy compared with standard pediatric care. This finding adds support to the growing interest within pediatrics in integrating social work and mental health services into the primary care setting as a means of increasing access to needed services for families.^{35,36}

At a time when healthcare delivery models are evolving towards outcomes-based measures with social and cost implications, these findings are even more relevant. Given what is known about the increased risks for poverty and health concerns among teens who have rapid repeat pregnancies, and the costs associated with teen pregnancies,³⁷ preventing these pregnancies may have a significant impact on health and social determinants of health in a vulnerable population, contribute to a reduction in health disparities, and reduce economic costs associated with these outcomes.

In contrast to the majority of evidence-based teen pregnancy prevention programs, which are manualized and curriculum-based, the Generations program is a relationship-based intervention that permits substantial flexibility for providers to tailor services to best meet the needs of each family. These findings support the expansion of future efforts in pregnancy prevention programming to include such individualized and relationship-based interventions. The infrastructure to implement the Generations model already exists in many primary care settings, although additional investment in, and reallocation of, social work and mental health resources may be needed for full implementation. This study lends support to the value of such allocations in order to improve outcomes with both health and cost implications, and meaningfully alter family trajectories by assisting young women in their choices about family formation.

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Dr. Amy Lewin served as the principal investigator of the study and was responsible for all aspects of study design, data collection, data analysis, and manuscript development and writing. Dr. Stephanie Mitchell led data analysis and also contributed to study conceptualization and to manuscript writing. Drs. Deirdre Quinn and Towanda Street were responsible for data collection and also contributed to manuscript writing. Drs. Kristine Schmitz and Lee Beers contributed to study conceptualization and implementation, and to manuscript writing and editing.

Some of the contents of this article have been presented at professional meetings, but have not been published elsewhere or posted online.

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