ARTICLE

Prime Time

Sexual Health Outcomes at 24 Months for a Clinic-Linked Intervention to Prevent Pregnancy Risk Behaviors

Renee E. Sieving, RN, PhD, FSAHM; Annie-Laurie McRee, DrPH; Barbara J. McMorris, PhD; Kara J. Beckman, MA; Sandra L. Pettingell, PhD; Linda H. Bearinger, RN, PhD, FAAN, FSAHM; Ann W. Garwick, RN, PhD, FAAN; Jennifer A. Oliphant, EdD; Shari Plowman, MPH; Michael D. Resnick, PhD, FSAHM; Molly Secor-Turner, RN, PhD

Importance: Preventing early pregnancy among vulnerable adolescents requires innovative and sustained approaches. Prime Time, a youth development intervention, aims to reduce pregnancy risk among adolescent girls seeking clinic services who are at high risk for pregnancy.

Objective: To evaluate sexual risk behaviors and related outcomes with a 24-month postbaseline survey, 6 months after the conclusion of the Prime Time intervention.

Design: Randomized controlled trial.

Setting: Community and school-based primary care clinics.

Participants: Of 253 sexually active 13- to 17-year-old girls meeting specified risk criteria, 236 (93.3%) completed the 24-month follow-up survey.

Intervention: Offered during an 18-month period, Prime Time includes case management and youth leadership programs.

Main Outcome Measures: Self-reported consistency of condom, hormonal, and dual-method contraceptive use with most recent male sex partner and number of male sex partners in the past 6 months.

Results: At 24-month follow-up, the intervention group reported significantly more consistent use of condoms, hormonal contraception, and dual-method contraception than the control group. Intervention participants also reported improvements in family connectedness and self-efficacy to refuse unwanted sex, and reductions in the perceived importance of having sex. No between-group differences were found in the number of recent male sex partners.

Conclusions and Relevance: This study contributes to what has been a dearth of evidence regarding youth development interventions offered through clinic settings, where access to high-risk adolescents is plentiful but few efforts have emphasized a dual approach of strengthening sexual and nonsexual protective factors while addressing risk. Findings suggest that health services grounded in a youth development framework can lead to long-term reductions in sexual risk among vulnerable youth.

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Author Affiliations: School of Nursing (Drs Sieving, McMorris, Pettingell, Bearinger, and Garwick) and Healthy Youth Development Prevention Research Center, Division of Adolescent Health and Medicine, Department of Pediatrics, Medical School, University of Minnesota, Minneapolis (Drs Sieving, McRee, McMorris, Pettingell, Bearinger, Oliphant, and Resnick and Mss Beckman and Plowman); and Department of Nursing, North Dakota State University, Fargo (Dr Secor-Turner).

Despite reaching historic lows, the United States continues to have the highest rates of teen pregnancy and childbearing among industrialized nations.[1] Each year, more than 750 000 young women aged 15 to 19 years become pregnant, resulting in more than 400 000 births.[2] Pregnancy rates are disproportionately high among adolescents of color, with non-Hispanic black and Hispanic teenagers experiencing twice the rate of pregnancy as their non-Hispanic white counterparts.[2]

Teen pregnancy and childbearing are associated with adverse outcomes for teenage mothers and their children, including lower educational attainment for teenage parents, lower overall well-being for their children, and increased poverty for young families.[3] As overall birth rates decline, evidence indicates growing disadvantage among teenagers who give birth.[4] Teen childbearing also results in substantial economic costs to society, with an estimated cost of $10.9 billion to US taxpayers in 2008 alone.[5]

Among teenagers at high risk for pregnancy, interventions that are multifaceted and sustained over time are needed to positively affect risk behaviors linked to early pregnancy.[6,7] Promising ap-

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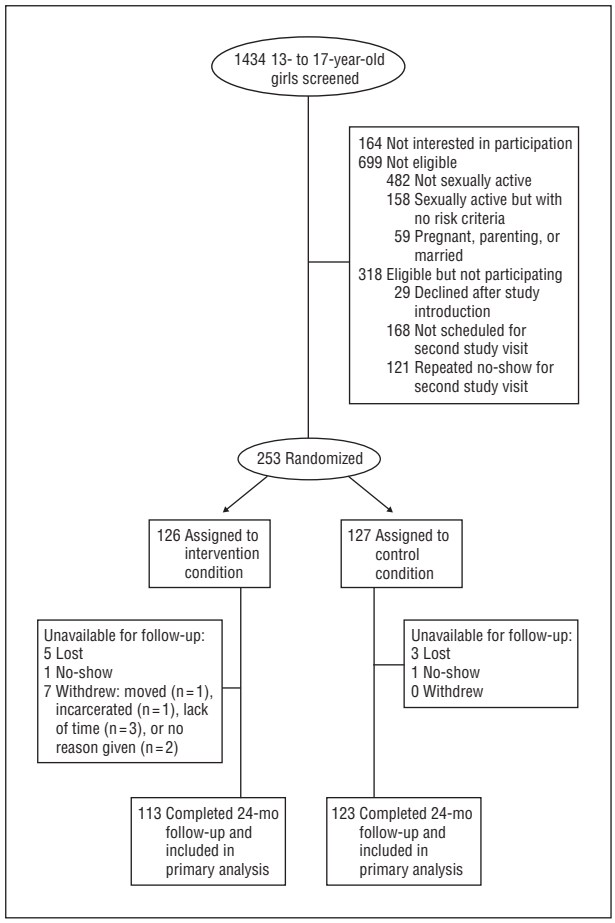

Figure. Flowchart showing randomization of Prime Time study participants. Among patients unavailable for follow-up, "lost" indicates those who could not be located; and "no-show," those who were contacted and scheduled for a follow-up survey but did not complete the survey.

proaches are grounded in a youth development framework. Such interventions build on young people's strengths, incorporating both prevention and promotion strategies and enhancing protective factors such as sex refusal skills and family and school connectedness.[8,9] By emphasizing protective factors and resources rather than focusing exclusively on risks, youth development approaches may be particularly appealing to communities that have experienced profound social and health disparities.[10]

According to a recent National Research Council and Institute of Medicine report,[11] incorporating youth development approaches is fundamental to improving preventive and promotive health services for adolescents, especially for those most vulnerable to negative health outcomes, including early pregnancy. To date, limited evidence exists regarding outcomes of health services grounded in a youth development framework, especially from studies using rigorous evaluation designs.[11]

Prime Time is a multicomponent youth development intervention for girls at high risk for pregnancy. Designed for primary care clinics, this 18-month intervention aims to reduce precursors of teen pregnancy, including sexual risk behaviors, violence involvement, and school disconnection. A Prime Time randomized trial involved clinics in Minneapolis and St Paul, Minnesota. We have previously demonstrated intervention effects on sexual risk behaviors at a 12-month (post baseline) interim point.[12] At the end of the 18-month intervention, we found higher levels of enrollment in postsecondary education and lower levels of relational aggression among the intervention group,[13] as well as lower levels of violence victimization among intervention participants with strong family connections.[14] In this article, we examine sexual health outcomes of Prime Time—namely, patterns of contraceptive use, number of sex partners, and related psychosocial attributes—6 months after the conclusion of the intervention. Given the earlier effects on sexual risk behaviors and psychosocial attributes already noted, we hypothesized that the intervention would have enduring effects on these outcomes at this follow-up point.

METHODS

PARTICIPANTS

Our sample consisted of sexually active girls aged 13 to 17 years who met at least 1 of the following risk criteria: (1) clinic visit involving negative pregnancy test,[15] (2) clinic visit involving treatment for sexually transmitted infection,[16] (3) young age (13 or 14 years),[6] (4) aggressive and violent behaviors,[6,17] (5) sexual risk behaviors,[6] and (6) behaviors indicating school disconnection.[6] Recent sexual activity and risk criteria 3 through 6 were assessed with a self-report screening tool.[18] Girls who did not understand consent materials, were married or pregnant, or had given birth were not eligible. University and participating clinics' institutional review boards approved the study.

From April 19, 2007, through October 22, 2008, trained study staff screened 1434 girls at 4 community and school-based primary care clinics (**Figure**). Of these, 571 sexually active girls who met at least 1 risk criterion were invited to participate. Enrollment involved 2 clinic visits to minimize attrition,[19] which is problematic in high-risk, highly mobile youth populations.[20] At the first visit, research staff identified study-eligible girls and invited them to return for a second visit within 2 weeks. At the second visit, girls signed an informed consent statement, provided baseline data, and were then randomized into study conditions. In total, 253 girls were enrolled, including 118 from community and 135 from school-based clinics.

Demographic and risk behavior items on the screening tool (completed at the first visit) were used to compare participants (n=253) with eligible nonparticipants (n=318). The 2 groups were similar for multiple indicators.[12] Participants were more likely than eligible nonparticipants to live with only 1 parent (64.5% vs 52.4%) (χ^2_2=19.09 [n=545]; P=.02).

Table 1 provides data on participant demographics and sexual behaviors at baseline. Intervention and control groups were equivalent on these descriptors. Compared with national and statewide samples of sexually active girls of similar ages (eg, Youth Risk Behavior Survey[21] and Minnesota Student Survey[22]), baseline data indicate high rates of sexual risk behaviors in this sample. For example, whereas 47% of sexually active 9th- and 12th-grade girls in Minnesota reported always using condoms,[22] only 31.5% of our sample reported consistent condom use during the past 6 months.

INTERVENTION COMPONENTS

The resilience paradigm,[23] social cognitive theory,[24] and findings from a pilot study[25] guided design of Prime Time. The pri-

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mary focus was on promoting change in selected psychosocial attributes linked to sexual risk behaviors and other behavioral outcomes.[6]

Girls were involved in intervention programming for 18 months. Case managers experienced in working with urban teenagers from diverse cultural backgrounds led all programming. Details regarding case managers' backgrounds, training, and supervision are found elsewhere as are intervention components, which are summarized here.[18,26]

Case Management

The overall goal of Prime Time case management was to establish a trusting relationship in which a teenager and her case manager worked together to address attributes targeted by this intervention. One-on-one visits focused on core topics including healthy relationships, responsible sexual behaviors (eg, contraceptive use), and positive family and school involvement. As a client-centered approach, the capacities, interests, and needs of individual participants determined the topics addressed during a visit. With each girl actively involved in case management, all core topics were addressed during each 6-month interval. Monthly visits occurred for the duration of the 18-month intervention in locations convenient for individual teenagers. Participants received $10 for each visit.

Youth Leadership Groups

Designed to complement one-on-one case management, peer educator and service learning groups provided hands-on skill-building experiences.

Peer Educator Groups: Just In Time. The goal of Just In Time was to provide opportunities for positive peer, school, and community involvement by actively engaging participants as peer educators. Just In Time training used a standard 15-session curriculum addressing interpersonal skills, expectations and skills for healthy relationships; social influences on sexual behaviors; sexual decision making; and contraceptive skills. Weekly homework gave teenagers opportunities to discuss Just In Time topics with adult family members.

Starting with their first training session, girls were instructed to reach and teach others outside their peer educator group. Girls received $5 for each contact, for up to 50 contacts. After completing the Just In Time curriculum, girls engaged in a group teaching practicum. During this 7-session practicum, groups selected a topic, developed a lesson plan, taught a session to another group of youths, adjusted the lesson plan as needed, and taught a second group session.

Service Learning Groups: It's Our Time. These groups focused on expanding girls' social-emotional skills and their real-world experience in youth leadership. It's Our Time groups followed a standard curriculum featuring core service learning elements: preparation, action, reflection, and celebration. An initial unit emphasized building group cohesion and identifying participants' leadership skills. In a second unit, groups explored community needs, assets, and potential service projects. In a third unit, groups implemented their service project during 5 or 6 sessions (eg, domestic violence awareness campaign). Each implementation session included a group reflection regarding the impact of service on recipients and on group members themselves. In a final session, groups celebrated their accomplishments.

Table 1. Baseline Characteristics of Prime Time Participants by Intervention Condition[a]

Baseline Characteristic	Intervention Group	Control Group
Demographic data		
Age, mean (SE), y	15.7 (0.1)	15.5 (0.2)
Age, y		
13	0.8	2.4
14	14.3	22.0
15	28.6	23.7
16	27.0	28.3
17	29.3	23.6
Race or ethnicity[b]		
American Indian/Native American	3.2	2.4
Asian/Asian American/Pacific Islander	10.3	13.4
Black/African/African American	44.4	37.8
Hispanic/Latina	16.7	7.9
White/European American	6.3	15.7
Mixed/multiple	19.1	22.8
No. of parents or guardians in home[c]		
0	4.0	2.4
1	46.4	44.1
2	37.6	45.6
Other arrangements	12.0	7.9
No. of places lived in past 6 mo		
1	57.9	60.6
2	25.4	23.6
≥3	16.7	15.8
Family receipt of public assistance in past 1 y[d]		
No	32.8	31.5
Yes	43.2	51.2
Unsure	24.0	17.3
Currently enrolled in school	93.6	96.0
Ever suspended from school	64.8	74.6
Sexual behaviors		
No. of male sex partners in past 6 mo, mean (SE)	1.5 (0.2)	1.8 (0.1)
No. of male sex partners in past 6 mo		
1	64.8	57.5
2	26.4	24.4
3	2.4	8.7
≥4	6.4	9.4
Condom use in past 6 mo (n = 251)		
Never	14.4	9.5
Half the time or less	32.0	32.5
More than half the time	22.4	26.2
Every time	31.2	31.8
Months of using hormonal contraception in past 6 mo, mean (SE)[e]	2.1 (0.3)	2.1 (0.5)

[a] Data represent percentage of participants unless otherwise noted. The intervention group included 126 participants and the control group, 127, except that for condom use in past 6 mo, the intervention group included 125 participants and the control group, 126.

[b] Mutually exclusive race categories; participants were allowed to select >1 category.

[c] Adults and guardians include biological or adoptive parents, stepparents, foster parents, grandparents, and other guardians.

[d] Public assistance includes welfare payments, aid from the Minnesota Family Investment Program, public assistance, and food stamps.

[e] Hormonal methods include oral contraception, injection, contraceptive patch, and vaginal ring.

EVALUATION

All participants completed an audio computer-assisted self-interview at baseline and 24 months after enrollment. Participants were paid $25 for completing each survey.

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Participants

Of 253 participants who completed baseline surveys, 236 (93.3%) completed a 24-month follow-up survey. Seventeen participants were unavailable for follow-up at the 24-month point, 13 of whom were in the intervention condition. There were no significant differences in baseline measures (age, ethnicity, public assistance, sexual behaviors, and contraceptive use) between girls in the intervention and control groups completing the 24-month survey. An attrition analysis yielded isolated differences in baseline characteristics between girls unavailable for follow-up and those completing the 24-month survey. Compared with girls in the 24-month sample, those unavailable for follow-up reported fewer recent male sex partners in the past 6 months (mean, 1.3 vs 1.7 partners; $P = .04$) and less dual-method contraceptive use with their most recent partner (used dual methods 6% vs 16% of time with this partner; $P = .05$).

Outcome Measures

Two primary behavioral outcomes were the focus of this analysis: contraceptive use consistency with a most recent sex partner and number of male sex partners in the past 6 months. Previous research has established the reliability of these measures among sexually active adolescent girls.[27]

Contraceptive Use Consistency With Most Recent Partner. Participants identified in which of the past 6 months they had had sex and in which of these months they had used a hormonal method (oral contraception, injection, contraceptive patch, or vaginal ring), dual methods (hormonal method plus condoms), or condoms every time or most times they had sex with their most recent male partner. To measure consistency of contraceptive use, we tallied the number of months a participant reported using a hormonal method, dual methods, or condoms every or most times she had sex (count for each type of contraception ranged from 0 to 7 months, including current month).

Number of Male Sex Partners. Participants indicated the number of male partners with whom they had had vaginal sex in the past 6 months.

Psychosocial attributes repeatedly associated with adolescent sexual and contraceptive behaviors and targeted for change in the intervention were also examined. The eTable (http://www.jamapeds.com) describes these variables and their measurement properties.

Data Analysis

We used an intent-to-treat approach in which participants' data were analyzed based on the group to which they were randomized, regardless of their level of participation. Generalized estimating equations were used to evaluate intervention efficacy. This strategy allows for modeling of both normally and nonnormally distributed variables and adjustment of standard errors for correlations between participants enrolled from the same clinic.[28,29] Generalized estimating equation models are population averaged[30]; thus, model estimates are interpreted as applicable to an "average" participant in this population of high-risk adolescents.

Each 24-month outcome was regressed on participation in Prime Time (intervention vs control), controlling for the baseline measure of the outcome, with the exception of attending college or technical school. Models of partner-specific outcomes (eg, self-efficacy to use condoms with partner) included an indicator of whether the most recent partner at 24 months was the same partner reported at baseline. Models for contraceptive use consistency also included an exposure variable (number of months sexually active with most recent partner) to adjust for varying lengths of time at risk. Results are presented as adjusted odds ratios for dichotomous outcomes, adjusted incidence risk ratios for count outcomes, and adjusted mean differences for continuous outcomes. Analyses were conducted with Stata software (version 10).[31]

RESULTS

INTERVENTION PARTICIPATION

Participation in case management and peer educator components was high. Specifically, 88.4% of girls completed at least 4 case management visits; among girls who reached this threshold, the median number of case management visits was 13. Moreover, 66.9% of participants completed at least 4 peer educator sessions; among those who reached this threshold, the median number of peer educator sessions was 18. In contrast, participation in the service learning component was low; only 30.6% of participants completed at least 4 sessions.

INTERVENTION EFFECTS

Table 2 compares intervention and control groups for study outcomes at the 24-month survey, 6 months after the conclusion of the intervention. For sexual behaviors, intervention participants reported significantly more consistent condom use with their most recent partner than controls (adjusted means for intervention vs control, 1.53 vs 0.93 months). Intervention participants also reported significantly more consistent hormonal use (adjusted means, 3.29 vs 2.34 months) and more consistent dual-method use (adjusted means, 0.65 vs 0.42 months). No between-group differences were found in the number of male sex partners in the past 6 months.

For psychosocial attributes, intervention participants reported significantly higher levels of family connectedness than controls. Fewer intervention participants than controls reported that it was important to have sex with their most recent partner in exchange for material things (6.0% vs 11.9%). Intervention participants reported significantly greater self-efficacy to refuse unwanted sex than controls. No between-group differences were found in the remaining psychosocial attributes.

INTERVENTION EFFECTS OVER TIME

Table 3 presents intervention effects at 12-, 18-, and 24-month assessment points to provide a context for sustained effects on sexual health outcomes. Among significant outcomes at 24 months, greater hormonal contraceptive consistency was noted at both prior assessments. Greater consistency in the use of condoms and dual-method contraceptives had been noted at the 12-month assessment,[12] and greater family connectedness at the 18-month assessment.[13] Significant effects on self-efficacy to refuse unwanted sex and the perceived im-

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Table 2. Effects of Prime Time Intervention on Behavioral and Psychosocial Outcomes at 24 Months[a]

Variable	Sample Size	Adjusted % or Mean Score		ARR, AOR, or Mean Difference (95% CI)[b]
		Intervention Group	Control Group	
Sexual Behavior Outcomes				
Consistency of condom use[c,d,e,f]	204	1.53	0.93	ARR, 1.57 (1.28 to 1.94)
Consistency of hormonal contraceptive use[d,e,f,g]	203	3.29	2.34	ARR, 1.30 (1.06 to 1.58)
Consistency of dual-method contraceptive use[d,e,f,g]	203	0.65	0.42	ARR, 1.36 (1.01 to 1.85)
No. of male sex partners in past 6 mo[d,h]	234	1.39	1.34	ARR, 1.06 (0.84 to 1.32)
Psychosocial Outcomes				
Environmental attributes				
Social connectedness				
Family[i]	233	2.21	1.91	0.30 (0.14 to 0.46)
School[i,j]	158	2.20	2.13	0.07 (−0.08 to 0.22)
Attending college or technical school[k,l]	75	61.5%	44.2%	AOR, 2.01 (0.86 to 4.74)
Perceived norms regarding contraception				
Perceived partner desire to use contraception[k,m]	202	41.3%	33.3%	AOR, 1.15 (0.74 to 1.77)
Personal attributes				
Sexual attitudes and beliefs				
Reasons for having sex, material considerations[e,k]	214	6.0%	11.9%	AOR, 0.50 (0.41 to 0.61)
Reasons for having sex, relationship considerations[e]	212	0.65	0.64	0.01 (−0.14 to 0.16)
Desire to use contraception with partner[k,n]	204	51.1%	44.3%	AOR, 1.17 (0.77 to 1.77)
Perceived pregnancy consequences[i]	209	1.80	1.78	0.02 (−0.15 to 0.19)
Behavioral attributes				
Social-emotional skills				
Stress management skills[i]	232	1.84	1.75	0.09 (−0.03 to 0.21)
Interpersonal skills[i]	233	2.16	2.07	0.09 (−0.02 to 0.20)
Sexual self-efficacy and skills				
Sex refusal self-efficacy[i]	224	2.50	2.39	0.11 (0.01 to 0.22)
Condom use self-efficacy[e,i]	207	2.11	2.15	−0.04 (−0.31 to 0.23)
Sexual risk communication with partner[e,o]	211	1.23	1.09	0.14 (−0.10 to 0.38)

Abbreviations: AOR, adjusted odds ratio; ARR, adjusted relative risk.
[a] Unless otherwise indicated, all models controlled for outcome at baseline and adjusted for within-clinic similarities.
[b] Difference between intervention and control groups.
[c] Counts for using a condom every time or most of the time ranged from 0 to 7 mo.
[d] Poisson regression model for count outcome.
[e] Model controlled for having the same sex partner at baseline and 24-mo assessment.
[f] Model adjusted for number of months participant had sex with most recent partner.
[g] Counts ranged from 0 to 7 mo.
[h] Values ranged from 0 to 10 partners in the past 6 mo.
[i] Scores ranged from 0 (low) to 3 (high).
[j] Model excluded participants who had completed high school or General Education Development requirements at 24-mo follow-up.
[k] Logistic regression model for dichotomous outcome.
[l] Model included only participants who had graduated from high school or received General Education Development certification.
[m] Percentage reporting most recent sex partner always wanted to use contraception.
[n] Percentage reporting always wanting to use contraception with most recent sex partner.
[o] Scores ranged from 0 (no communication about sexual risk with most recent sex partner), 1 (communication with partner after having sex), and 2 (communication with partner before having sex).

portance of having sex for material reasons were noted only at the 24-month assessment.

COMMENT

Findings of sustained Prime Time program impact add to a growing evidence base supporting multicomponent youth development approaches for reducing sexual risk among adolescent girls at high risk for pregnancy. This project demonstrated that a large proportion of high-risk adolescent girls seeking clinic services will engage in youth development programming occurring outside the physical space of clinics. Nine in 10 intervention participants (88.4%) were actively involved in case management; two-thirds (66.9%) were actively involved in peer educator groups. This level of involvement yielded sustained improvements in participants' use of condoms and hormonal and dual-method contraceptives. The intervention was also associated with sustained improvements in family connectedness, increases in sex refusal self-efficacy, and reductions in the perceived importance of having sex for material reasons.

Among the sexual behaviors targeted for change, Prime Time was particularly efficacious in improving girls' consistent use of condoms and hormonal contraception. Consistent use of contraceptives was a key topic in both case management and peer educator sessions. Case managers regularly discussed contraceptive use as a responsible sexual behavior and an aspect of healthy sexual relationships. They also supplied girls with condoms and reminded them of clinic appointments for hormonal contraception. In peer educator sessions, girls discussed contraceptive options, communicating with partners about contraception, and contraceptive use as part of healthy

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Table 3. Effects of Prime Time Intervention on Behavioral and Psychosocial Outcomes at 12, 18, and 24 Months After Baseline[a]

Variable	ARR, AOR, or Mean Difference (95% CI)		
	12 mo[b,c]	18 mo[c,d]	24 mo[c]
Sexual Behavior Outcomes			
Consistency of condom use[e,f,g,h]	**ARR, 1.45 (1.26 to 1.67)**	ARR, 1.10 (0.73 to 1.68)	**ARR, 1.57 (1.28 to 1.94)**
Consistency of hormonal contraceptive use[e,f,g,i]	**ARR, 1.46 (1.13 to 1.89)**	**ARR, 1.36 (1.02 to 1.83)**	**ARR, 1.30 (1.06 to 1.58)**
Consistency of dual-method contraceptive use[e,f,g,i]	**ARR, 1.58 (1.03 to 2.43)**	ARR, 1.08 (0.78 to 1.50)	**ARR, 1.36 (1.01 to 1.85)**
No. of male sex partners in past 6 mo[e,j]	ARR, 1.08 (0.89 to 1.31)	ARR, 0.97 (0.77 to 1.22)	ARR, 1.06 (0.84 to 1.32)
Psychosocial Outcomes			
Environmental attributes			
Social connectedness			
Family[k]	0.12 (−0.01 to 0.26)	**0.18 (0.07 to 0.28)**	**0.30 (0.14 to 0.46)**
School[k,l]	0.16 (−0.01 to 0.33)	−0.02 (−0.15 to 0.12)	0.07 (−0.08 to 0.22)
Attending college or technical school[m,n]	AOR, 1.58 (0.76 to 3.28)	**AOR, 2.25 (1.30 to 3.93)**	AOR, 2.01 (0.86 to 4.74)
Perceived norms regarding contraception			
Perceived partner desire to use contraception[m]	AOR, 1.50 (0.88 to 2.56)	AOR, 1.12 (0.64 to 1.97)	AOR, 1.15 (0.74 to 1.77)
Personal attributes			
Sexual attitudes and beliefs			
Reasons for having sex, material considerations[f,m]	AOR, 0.88 (0.72 to 1.07)	AOR, 0.76 (0.33 to 1.75)	**AOR, 0.50 (0.41 to 0.61)**
Reasons for having sex, relationship considerations[f,k]	−0.01 (−0.23 to 0.21)	0.04 (−0.11 to 0.19)	0.01 (−0.14 to 0.16)
Desire to use contraception with partner[m]	AOR, 1.62 (0.81 to 3.27)	AOR, 1.18 (0.96 to 1.46)	AOR, 1.17 (0.77 to 1.77)
Perceived pregnancy consequences[k]	0.04 (−0.07 to 0.15)	0.08 (−0.13 to 0.29)	0.02 (−0.15 to 0.19)
Behavioral attributes			
Social-emotional skills			
Stress management skills[k]	**0.11 (0.05 to 0.23)**	0.05 (−0.09 to 0.20)	0.09 (−0.03 to 0.21)
Interpersonal skills[k]	0.01 (−0.01 to 0.04)	−0.08 (−0.21 to 0.05)	0.09 (−0.02 to 0.20)
Sexual self-efficacy and skills			
Sex refusal self-efficacy[k]	0.15 (−0.04 to 0.33)	0.03 (−0.18 to 0.24)	**0.11 (0.01 to 0.22)**
Condom use self-efficacy[f,k]	0.09 (−0.20 to 0.39)	**0.13 (0.02 to 0.24)**	−0.04 (−0.31 to 0.23)
Sexual risk communication with partner[f,o]	0.01 (−0.13 to 0.15)	0.17 (0.00 to 0.38)	0.14 (−0.10 to 0.38)

Abbreviations: AOR, adjusted odds ratio; ARR, adjusted relative risk.

[a] Unless otherwise indicated, all models controlled for outcome at baseline and adjusted for within-clinic similarities. ARR, AOR, and mean differences noted in bold indicate differences between intervention and control groups that were significant at $P < .05$.

[b] All 12-mo outcomes, except attending college or technical school and reasons for having sex (material and relationship considerations) have been reported elsewhere.[12]

[c] Difference between intervention and control groups.

[d] The 18-mo outcomes for family connectedness, school connectedness, stress management skills, and attending college or technical school have been reported elsewhere.[13]

[e] Poisson regression model for count outcome.

[f] Model controlled for having the same sex partner at baseline and 24-mo assessment.

[g] Model adjusted for number of months participant had sex with most recent partner.

[h] Counts for using a condom every time or most of the time ranged from 0 to 7 mo.

[i] Counts ranged from 0 to 7 mo.

[j] Values ranged from 0 to 10 partners in the past 6 mo.

[k] Scores ranged from 0 (low) to 3 (high).

[l] Model excluded participants who had completed high school or General Education Development requirements at 24-mo follow-up point.

[m] Logistic regression model for dichotomous outcome.

[n] Model included only participants who had graduated from high school or received General Education Development certification.

[o] Scores ranged from 0 (no communication about sexual risk with most recent sex partner), 1 (communication with partner after having sex), and 2 (communication with partner before having sex).

sexual relationships. In turn, improvements in hormonal use were first noted at a 12-month interim assessment and sustained over time. Similarly, improvements in condom use were first seen at the interim and again 6 months after the conclusion of the intervention. Prior research[32,33] indicates that improvements in contraceptive use are a driving force behind recent declines in teen pregnancy and childbearing. Thus, efforts such as Prime Time that promote consistent contraceptive use among sexually active teenagers via repeated messages from adults and peers may be a key to further reducing teen pregnancy rates.

In contrast to improvements in the consistent use of contraception, Prime Time had limited effects on reducing girls' number of sexual partners. Having multiple sex partners was not normative in this sample: 64.8% of participants reported 1 and 19.4% reported 2 sex partners in the 6 months before study enrollment. Thus, there was less room for reducing sexual risk by decreasing numbers of sex partners than by improving contraceptive consistency.

Of psychosocial attributes targeted for change, Prime Time seems to have shifted girls' sexual beliefs and increased their self-efficacy to refuse unwanted sex. Reductions in perceived importance of having sex for material reasons along with improvements in self-confidence to refuse unwanted sex may be indicators of establishing clear sexual relationship boundaries within the intervention group. Prime Time also may have augmented girls' connections to family; intervention effects

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on family connectedness were sustained, having previously been noted at the conclusion of the 18-month intervention.[13] A substantial number of Prime Time participants lived in disadvantaged social contexts (eg, residential mobility, family poverty), which may pose particular barriers to development of supportive family bonds. Expanding opportunities that foster positive family communication and connectedness may be critical to sustaining healthy sexual behaviors, including contraceptive use, especially for youth from disadvantaged contexts.[7,34,35]

This study has several methodological limitations. First, data were collected using self-report surveys that are subject to response bias. Using self-reports is standard practice for intervention studies addressing sexual risk behaviors[36]; prior research supports the reliability of adolescents' reports of sexual and contraceptive behaviors,[27,37] particularly with audio computer-assisted self-interview methods.[38] Still, including biological measures, such as urine pregnancy tests, would have enhanced this study.[39] Second, our study lacks measures assessing relational elements of the intervention. Thus, we are unable to assess the extent to which intervention effects were mediated through ongoing, individualized attention from a supportive adult professional. Third, findings may not be generalizable to high-risk adolescent girls who do not access clinic services. These limitations are balanced by methodological strengths. First, because participants were similar to eligible nonparticipants on a range of indicators, findings may be generalizable to a population of high-risk adolescent girls seeking clinic services. Second, minimal loss to follow-up at the 24-month survey along with only isolated differences between girls in the 24-month sample and those unavailable for follow-up increase our confidence in the validity of findings.[40]

This study contributes to what has been a dearth of evidence about long-term effects of preventive services for youth with complex, multisystem needs.[11,36] Vulnerable youth comprise a critical subset of the adolescent population that typically does not receive comprehensive health services,[41] thereby contributing to enduring disparities in pregnancy and birth rates. Although innovative multifaceted models of preventive services for this population exist,[11] evidence regarding outcomes, costs, and downstream benefits of such approaches is limited. In this era of health care reform, evidence about efficacy and the costs and benefits of preventive services are critical to guiding changes in the organization, staffing, and delivery of health services for vulnerable youth.

Together with previous findings demonstrating reductions in sexual risk behaviors, relational aggression, and violence victimization among Prime Time participants,[12-14,26] results from this study suggest that involvement in a youth development intervention that combines individualized case management and youth leadership components holds great promise for preventing multiple risk behaviors among youth most vulnerable to poor health outcomes, including early pregnancy. Furthermore, long-term increases in family connectedness as well as the beliefs and self-efficacy necessary to set healthy sexual boundaries suggest that interventions such as Prime Time may foster social and intrapersonal attributes needed to sustain healthy behaviors.

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Correspondence: Renee E. Sieving, RN, PhD, FSAHM, University of Minnesota School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard St SE, Minneapolis, MN 55455 (sievi001@umn.edu).
Author Contributions: Dr Sieving had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Sieving, Beckman, Bearinger, Oliphant, Plowman, and Resnick. *Acquisition of data:* Sieving, Beckman, Plowman, and Secor-Turner. *Analysis and interpretation of data:* Sieving, McRee, McMorris, Beckman, Pettingell, Bearinger, Garwick, Oliphant, Plowman, and Secor-Turner. *Drafting of the manuscript:* Sieving, McRee, Bearinger, Oliphant, and Secor-Turner. *Critical revision of the manuscript for important intellectual content:* Sieving, McRee, McMorris, Beckman, Pettingell, Garwick, Oliphant, Plowman, Resnick, and Secor-Turner. *Statistical analysis:* McRee, McMorris, and Pettingell. *Obtained funding:* Sieving, Bearinger, Oliphant, and Resnick. *Administrative, technical, and material support:* Sieving, Beckman, Oliphant, Plowman, and Resnick. *Study supervision:* Sieving.
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