HHS Public Access

Author manuscript

J Adolesc Health. Author manuscript; available in PMC 2019 September 17.

Published in final edited form as:

J Adolesc Health. 2014 October ; 55(4): 528–534. doi:10.1016/j.jadohealth.2014.04.005.

The Project Connect Health Systems Intervention: Linking Sexually Experienced Youth to Sexual and Reproductive Health Care

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Abstract

Purpose: To evaluate a health systems intervention to increase adolescents' receipt of high-quality sexual and reproductive health care services.

Methods: Quasi experimental design. Twelve high schools in a large public school district were matched into pairs. Within each pair, schools were assigned to condition so that no control school shared a geographic border with an intervention school. Five yearly surveys (T1, T2, …, T5) were administered from 2005 to 2009 (N = 29,823) to students in randomly selected classes in grades 9–12. Community-based providers of high-quality sexual and reproductive health care services were listed on a referral guide for use by school nurses to connect adolescents to care.

Results: Statistically significant effects were found for intervention school females on three outcomes, relative to controls. Relative to T1, receipt of birth control in the past year was greater at T4 (adjusted odds ratio [AOR] = 1.85; 95% confidence interval [Cl], 1.09–3.15) and T5 (AOR = 2.22; 95% CI, 1.32–3.74). Increases in sexually transmitted disease testing and/or treatment in the past year were greater in T1–T3 (AOR = 1.78; 95% CI, 1.05–3.02), T1–T4 (AOR = 1.73; 95% CI, 1.01–2.97), T1–T5 (AOR = 1.97; 95% CI, 1.17–3.31), and T2–T5 (AOR = 1.76; 95% CI, 1.06–

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2.91). Increases in ever receiving an HIV test were greater in T1–T4 (AOR = 2.14; 95% CI, 1.08–4.26). Among males, no intervention effects were found.

Conclusions: A school-based structural intervention can improve female adolescents' receipt of services.

Keywords

Adolescent; STD; HIV; Reproductive health; Adolescent health services

Most adolescents initiate sexual behavior during the high school years; by the end of 12th grade, 63% have had sexual intercourse [1]. Young people aged 15–24 years account for nearly half of all newly diagnosed sexually transmitted infections [2], with the highest reported rates of chlamydia and gonorrhea infection of any age group [3]. In addition, approximately 750,000 students aged 15–19 years become pregnant each year [4]. To prevent these outcomes, sexually experienced adolescents require sexual and reproductive health care (SRH) that includes preventive counseling, risk assessment, provision of contraceptives, and sexually transmitted disease (STD) testing and treatment. Current STD treatment guidelines recommend yearly chlamydia and gonorrhea screening for all sexually active females aged ≤25 years [5]. Data from the National Survey of Family Growth indicate that 73% of sexually active females aged 16–25 years reported visiting a medical provider for reproductive health services in the past year; however, only 42% reported they had been tested for an STD [6].

Connecting sexually experienced adolescents to high-quality SRH can be challenging. High-quality health care is health care that follows accepted guidelines [7] for providing comprehensive health care to adolescents, including assessing risk behavior, such as sexual activity; screening sexually active adolescent females for STDs; and offering preventive counseling. A recent review of barriers to care seeking among adolescents indicated that confidentiality concerns, stigma, insufficient knowledge about available services, poor accessibility, and adolescents' perceptions about providers' attitudes were significant in preventing them from seeking care [8]. Chacko et al. [9] found that young women cite systemic factors related to clinic visits (e.g., having to wait for test results) and logistics (e.g., work and/or school schedules, transportation) as primary barriers to seeking screening for chlamydia and gonorrhea. Currently, few evidence-based interventions exist to improve adolescent utilization of SRH. Although a number of studies have demonstrated the effectiveness of strategies to improve care within clinical settings [10–12], connecting adolescents to these services presents a significant challenge.

Environmental, policy, or systems interventions seek to change the physical, social, or regulatory context to improve health behavior. Changing the context to make healthy choices easier represents one of the more effective approaches to achieving population-level health change [13]. Examples of contextual interventions include designing communities to promote physical activity, enacting policies that encourage people not to drive, and passing smoke-free air laws. Such changes are often more cost effective and sustainable than traditional behavioral interventions, which seek to change individual behavior.

Contextual changes implemented in places where adolescents gather and where there is a reasonable likelihood of reaching most adolescents are best situated to improve adolescent utilization of SRH services. Schools, therefore, provide an advantageous setting for health change interventions targeting adolescents. School-based STD screening programs have been implemented in a number of localities with some success [14,15], and there is evidence that access to confidential health care has been improved through school-based health centers (SBHCs) [16]. Although these programs have positively impacted sexual and reproductive health among adolescents at a population level in schools, they may not present viable options for many jurisdictions [17], because of resource constraints or lack of community support.

Our goal was to explore an alternative means to increase adolescents' receipt of SRH at a population level and to develop and evaluate a low-cost sustainable intervention that would connect adolescents to existing sources of high-quality care in their communities through systems changes within their schools. Specifically, we identified community-based providers of developmentally appropriate adolescent SRH and created referral systems within high schools to connect adolescents to those services using existing school personnel (e.g., school nurses). We anticipated that receipt of contraception and STD and HIV testing would increase among sexually experienced students in intervention schools over time, relative to students in control schools.

Methods

Overview of the study

Project Connect was an adolescent pregnancy and STD prevention study conducted in a public school district in Los Angeles County, California. To identify areas with the greatest pregnancy and STD prevention needs, rates of chlamydia among 15–19 year olds and births among females were mapped by high school attendance areas.[1] Twelve high schools in areas with chlamydia rates among males and females, and birth rates among females, exceeding Healthy People 2010 [18] goals participated. Schools were matched into six pairs on criteria including local adolescent chlamydia and birth rates, school size and demographics, availability of a SBHC, and geographic distance between schools. To reduce the likelihood of contamination, schools from each pair were purposively assigned to either the intervention or control condition, so that no control school shared a geographic border with an intervention school. Study materials and protocols were approved by the school district and collaborators' institutional review boards.

The intervention

Our goal was to develop and evaluate a low-cost sustainable intervention with sufficient reach to increase receipt of SRH services among sexually experienced adolescents. Because our population was school based, our first objective was to design an intervention that would impact the entire sexually experienced population in the intervention schools. Second, we opted for an approach that would connect students to existing community-based sources of

[1]The geographic boundaries that define which high school a student attends, according to his or her home address.

SRH rather than delivering those services in schools. Third, we designed the intervention to support environmental and systems changes within the school without trying to modify provider behavior. Fourth, although we documented the criteria that have come to define the "teen friendliness" of services in the literature (e.g., confidential services, low or no cost services, walk-in appointments), we included a wide variety of clinics in the guide in case other factors (e.g., location) were more important. Furthermore, because formative interviews with school staff suggested that school nurses interacted frequently with the sexually experienced students, and so would be a primary link between students and outside sources of care, we chose to focus on nurses as our primary touchpoints for making referrals. The resulting multicomponent, synergistic, health systems intervention included a referral guide (in both large poster-size format and tear-off sheets that could be given to students) of community-based health care settings, identified because they demonstrated provision of high-quality SRH; in-service education on state laws and district policy for school personnel; linkage meetings between school and district nursing personnel and health care providers in the community; and mobile testing events arranged at schools without an SBHC. There was no direct intervention with adolescents. Table 1 provides a snapshot of intervention activities and the timing of their implementation in schools across study years.

To pinpoint sources of high-quality SRH in communities surrounding our intervention schools, we used Los Angeles County Department of Public Health chlamydia surveillance data to create a list of providers who had reported a minimum of 10 cases of chlamydia among 15–19 year olds in the study high school attendance areas in the prior year. These data served as a surrogate marker to define providers who (1) saw sufficient numbers of adolescents to be trusted sources of care; (2) tested adolescents for chlamydia; and (3) reported results to the health department according to guidelines. We then sent questionnaires to each provider office or clinic to assess SRH practices. Based on a set of criteria (e.g., always question adolescents about sexual activity, offer chlamydia screening to all sexually active females, offer reproductive health counseling to all adolescents), a group of providers with appropriate adolescent health care practices was selected for inclusion in the provider guide. Half of the high schools had an on-site SBHC, which were operated by health care institutions. These were balanced across condition and were included in the provider guide.

Project staff then visited provider sites to identify potential difficulties in accessing services, such as missing or concealed signage, overcrowded waiting areas, and other access barriers, resulting in a small number of clinics being eliminated from consideration from the guide. Providers were asked their permission to be listed on a guide to be given to local high schools for the purpose of referring students in need of SRH. Poster and tear-off sheet versions of the guides were created, detailing information about the providers and their services including contact information and location, hours, distance from the school, bus routes, services provided, gender of patients served, and cost (all free through MediCal, California's Medical Assistance Program, or FamilyPACT, California's Office of Family Planning's Family Planning Access, Care, and Treatment Program).

Both versions of the guide were distributed in schools to nurses and other staff as recommended by the nurse (e.g., counseling staff, physical education teachers, health

teachers). Before receiving the guide, school nurses and other staff participated in a 1-hour in-service training on the use of the guide, which included a discussion of relevant policies, such as the confidential release of students for sexual health care during the school day, and a discussion of barriers to use of the guide.

Student recruitment and data collection

Classrooms were randomly selected from the set of required classes (e.g., health, history) at each grade level (9–12), and all students attending the selected classes were invited to participate in a confidential survey. We did not exclude students previously surveyed, so students could be selected in multiple years (15.4% of the sample provided more than one survey). Study information and consent forms were distributed 2 weeks before data collection. Students aged ≥18 years were able to consent for themselves. Younger students were required to obtain signed parental consent to participate and also themselves signed assent forms. Of the 68,022 students enrolled in selected classes, 56% (n = 37,795) returned parental consent forms, of which 94% (n = 35,468) received their parents' consent for their participation. Among students with parental consent, <3% refused to participate and another 12% were absent on the day of the survey. Overall, 84% of consented students (n = 29,823) completed the survey and comprised the study sample.[2] Participants completed the 30-minute survey during a single class period. Data were collected in the spring semester for 5 consecutive years, 2005–2009.

Measures

The survey included demographics, service utilization variables, sexual behavior, and other potential covariates. The study questionnaires (English and Spanish versions) were pilot tested with approximately 1,000 students. Certified translators associated with the school district translated the questionnaire into Spanish; bilingual project staff back translated into English to assure consistency. Four hundred twenty-five students (1.4%) completed the questionnaire in Spanish.

Outcome variables.—To measure STD testing, respondents were asked in a single question if they had seen a doctor or nurse in the past year for a test or a treatment for an STD like chlamydia, gonorrhea, herpes, or HIV. With respect to contraceptive services, respondents reported if they had seen a doctor or nurse in the past year for birth control, including condoms and hormonal methods. Respondents also reported whether they had ever been tested for HIV.

Sexual behavior.—Participants were asked if they ever had sexual intercourse (yes or no).

Demographic covariates.—Participants reported their grade, gender, and family structure (two parents vs. all other). Self-identified race and/or ethnicity was assessed with a "mark all that apply" format and then recoded to three nonoverlapping categories: Hispanic and/or Latino, black and/or African-American, or other ethnicity, among which included

[2]Parental consent form return rates increased steadily across 5 years of data collection, from a low of 43% at T1 to a high of 64% at T5, whereas student survey completion rates were similar across years, ranging from 81% at T2 to 87% at T5.

white and/or Caucasian, Asian and/or Pacific Islander, and Native American. Generation of immigration was assessed by asking where respondents and their parents were born. Respondents born in another country were considered first generation; U.S.-born respondents with one or both parents born elsewhere were considered second generation; and U.S. born with U.S.-born parents were considered third-generation immigrants. Language spoken at home was recorded as English only, English and other language, or another language only.

Other covariates.—Additional covariates were selected for inclusion in analyses if they had the potential to confound intervention effects or had been previously found to be associated with our study outcomes. These included having a close friend who had caused or experienced a pregnancy [19]; receipt of other health care (for a regular check-up, illness, injury, or chronic condition) in the past year; visiting the school nurse in the past year; school-level information on the percentage of students participating in the free or reduced lunch program (as a marker for socioeconomic status); and a high school pair variable to control for the matching of intervention and control schools.

Data analysis

Analyses were limited to students who had ever had sexual intercourse (i.e., sexually experienced). Chi-square analyses and *t* tests were used to compare demographic and outcome variables across conditions, in the aggregated sample (across all five time points). A mixed model logistic regression analysis (STATA 12 [StataCorp, College Station, TX] "xtlogit" procedure [20]) was used to test for an intervention effect for the sexually experienced males and females separately. Because students were sampled multiple times by classroom, we considered using a hierarchical linear model that accounted for the clustering of responses within students within classes and within schools for the analysis. Fitting different models with and without the classroom and school random effect did not change significance of the effects or the estimates; hence, we settled on the more parsimonious model with only random effects for the student. For each outcome model, we performed a covariate selection procedure using backward elimination, allowing variables that remained significant at $p = .1$ for a particular outcome to enter the model analyzing that outcome. Tests were performed to assess the significance of the intervention effect between any two time points. For example, to test for an intervention effect on ever tested for HIV from T1 to T2, we compared change in ever HIV tested in intervention versus control participants from T1 to T2, with the resulting *p* value corresponding to the significance of the difference in change in testing between conditions from T1 to T2.

Results

Sample characteristics

Table 2 describes the demographics of the baseline sample, by condition. Both groups were approximately 55% female and 76% Latino, although significantly more intervention than control participants were African–American. There were no statistically significant differences in sexual experience between groups. Overall, 47% were sexually experienced,

the same percentage reported in the 2005 Youth Risk Behavior Survey among all high school students [21].

Intervention effects

The intervention had significant and largely sustained impact on SRH among sexually experienced females. Reports by intervention school females indicating they had seen a doctor or nurse in the past year for birth control remained stable from T1 (26.9%) to T4 (26.5%) and T5 (25.8%), whereas reports among control school females decreased across these same time points (29.1%, 21.2%, and 20.9%, respectively), which resulted in a statistically significant intervention effect (Figure 1).

Among intervention females, the percentage who reported seeing a doctor or nurse for STD test or treatment in the past year increased from T1 (19.2%) to T3 (26.9%), T4 (27.4%), and T5 (29.8%) relative to controls (19.3%, 21.3%, 18.1%, and 20.5%, respectively) and from T2 (26.3%) to T5 (29.8%) as compared with controls (22.7% and 20.5%, respectively), resulting in statistically significant intervention effects (Figure 2).

Reports by intervention school females of ever having been tested for HIV increased from T1 (24.8%) to T4 (33.6%), compared with no change in reports of HIV testing among controls (23.1% and 22.6%, respectively), which resulted in a statistically significant intervention effect (Figure 3).

The intervention had limited impact on the receipt of SRH services by sexually experienced males; there were no statistically significant intervention effects on receipt of birth control in the past year, STD testing or treatment in the past year, or on ever having been tested for HIV (Figures 1, 2, and 3), although increases in reports of STD and HIV testing were statistically significant among both intervention and control males (data not shown).

Discussion

Project Connect was designed to increase receipt of SRH services among adolescents by implementing low-cost sustainable environmental and systems changes to connect sexually experienced high school students to community-based high-quality services. This was accomplished by working with existing school personnel and by identifying providers who were local to participating schools and already providing appropriate services to significant numbers of adolescents. By identifying the school personnel most likely to have contact with at-risk students, linking them to providers and clarifying laws and policies related to referring students for confidential services, the school environment was changed such that sexually experienced female students increased their receipt of sexual and reproductive health services in significant and sustained ways.

This approach was notable in several ways. First, we did not intervene with students themselves at any point over the course of the project, and data collection was conducted among students in a random sample of classrooms in the participating schools. As such, we are not measuring the impact of the intervention among those we know were exposed (e.g., referred by a school nurse to a provider in our guide) but instead on the broader population

of students in the school. Second, although some students were sampled across multiple years, most were measured at a single point in time. Thus, the observed changes in receipt of services are occurring among different students rather than just in one cohort, suggesting a shift in the school environment itself. For example, it was our intention to increase receipt of birth control in our intervention schools, and although that did not happen, we were able to maintain stable levels as compared with control schools in which students reported a decline in such services. There could, of course, have been other factors influencing receipt of contraception differentially in intervention and control schools that were not measured in our study. However, with the added results of increased STD and HIV testing among female intervention school students, it is reasonable to attribute at least some of the difference to the intervention. Third, we do not know whether students were accessing services at the providers included in the guide or elsewhere, as these data were not collected. Although we hoped that students would visit the referred providers, because we knew more about their services, our ultimate goal was to increase access and receipt of services and it appears that the intervention was successful in doing so, for some services. Finally, it is likely that increased access to services may not have happened only through direct referral from school staff but also through word-of-mouth from students' peers who had received referrals.

The presence of an SBHC has been found to be associated with increased receipt of reproductive health care services by female students [22]. In this study, half of the schools had an SBHC and half did not. Schools with SBHCs were evenly distributed across intervention condition, thereby controlling for their potential impact on the measured study outcomes. SBHCs were listed on the referral guides and students were referred to these locations during the course of the study. We did not measure specifically if SBHCs noted an increase in students seeking SRH services; however, we expect this may have occurred. It was not necessary for schools to have an SBHC in order for the Project Connect referral system to be successful, as evidenced by the other half of the schools in our study that had only a school nurse. We do not know, however, how well a referral system would operate in a school with neither an SBHC nor a school nurse.

This study illustrates the feasibility and synergistic effects of collaboration between public health, schools, and clinical care. We used surveillance data from the health department to identify appropriate local providers, targeted key personnel in schools to provide referrals to students, and relied on community providers with a history of providing quality sexual health care. This approach capitalizes on connecting the strength and expertise of each without having to create any new entities or systems in a way that is likely to be sustainable.

Although this intervention strategy was effective for adolescent females, it had no impact on the receipt of services by adolescent males. Statistically significant increases were observed for STD and HIV testing among both intervention and control school males, which could have been the result of intervention contamination, or some other community effort targeting males for testing. Nonetheless, the lack of a demonstrated intervention effect may have been the case for a number of reasons. First, school nurses may have perceived female students as being in greater need of SRH services than male students, leading to more referrals being given to females. Second, because we used chlamydia reports as the basis for our initial provider selection and because chlamydia rates are higher among females, we may have

overselected providers who serve female clients (e.g., prenatal clinics). Third, males may not perceive themselves to be in need of services, so lower receipt of services may be less about access than about perceived need. Males' health care seeking behavior is generally lower than that of females in all areas, including SRH [23,24]. Connecting male adolescents to services is an on-going conundrum. As in the case of a number of interventions that are effective for adolescent females but not males [25], our intervention in its current form does not appear to be the answer to that conundrum and certainly more work is necessary in this area.

There are, of course, a number of weaknesses to this study. Partly because of active parental consent requirements, our response rate is low, although there was little negative consent and the bulk of students who did not participate resulted from unreturned consent forms. However, selection bias could be operating in that it is possible that the students who did not return parental consent forms may be dissimilar (i.e., at higher risk) than the students included in the study. The study was also conducted in a large urban school district with access to a wide variety of SRH providers, and we were able to differentiate between providers who were offering appropriate services to adolescent patients and others who were not. In smaller or rural settings this might not be possible. Finally, although they were not the only ones making referrals in schools, there were school nurses in all our participating schools. Although this presents an opportunity for school nurses to play an important public health role in schools, this may not be feasible for other school systems. Despite these limitations and the need for further study, this intervention represents a low-cost sustainable means to increase utilization of SRH services among adolescent females and assists young women in developing the skill of seeking health care independently.

Acknowledgments

Funding Sources

This research was supported by a cooperative agreement from the Centers for Disease Control and Prevention (U30/CCU922283-01).

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IMPLICATIONS AND CONTRIBUTION

Project Connect offers an effective means of connecting female high school students to sexual and reproductive health care services and may be implemented in schools unable to offer such services.

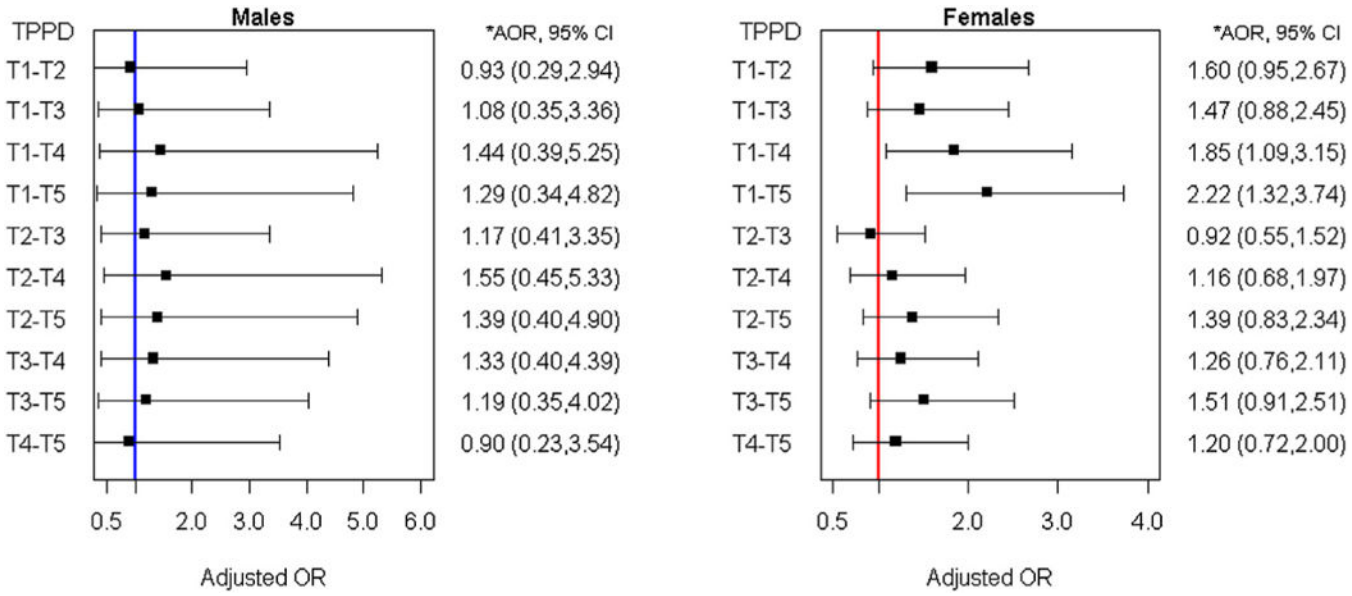

Figure 1.

Adjusted odds ratios (AOR) for change in receipt of birth control in the past year between time points, by gender. Odds ratios for the intervention effect between time points are calculated as the change in intervention minus the change in control. *Adjusted for high school pair, grade, ethnicity, generation of immigration, two parent household, home language, had sibling who was a teen parent, had a friend who experienced a pregnancy, visited school nurse, health care utilization, and school level percentage low SES. CI = confidence interval; SES = socioeconomic status; TPPD = time point paired differences.

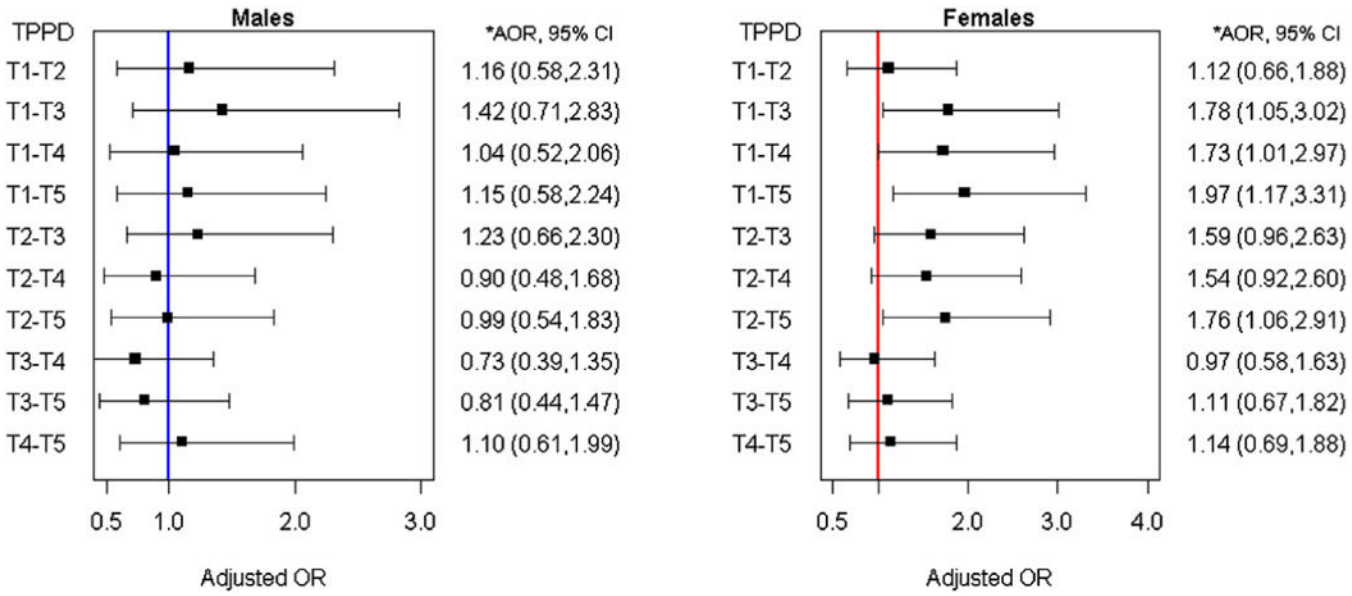

Figure 2.

Adjusted odds ratios (AOR) for change in sexually transmitted disease testing or treatment in the past year between time points, by gender. Odds ratios for the intervention effect between time points are calculated as the change in intervention minus the change in control. *Adjusted for high school pair, grade, ethnicity, generation of immigration, two parent household, home language, had sibling who was a teen parent, had a friend who experienced a pregnancy, visited school nurse, health care utilization, and school level percentage low SES. CI = confidence interval; SES = socioeconomic status; TPPD = time point paired differences.

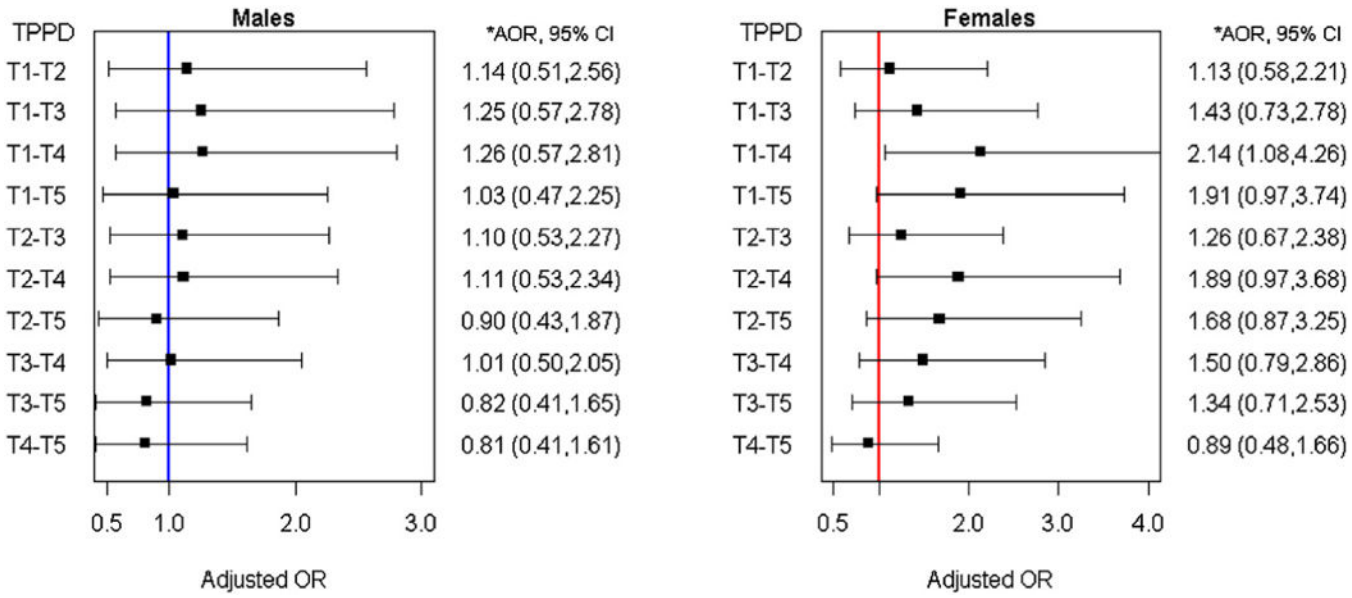

Figure 3.

Adjusted odds ratios (AOR) for change in the percentage ever HIV tested between time points, by gender. Odds ratios for the intervention effect between time points are calculated as the change in intervention minus the change in control. *Adjusted for high school pair, grade, ethnicity, generation of immigration, two parent household, home language, had sibling who was a teen parent, had a friend who experienced a pregnancy, visited school nurse, health care utilization, and school level percentage low SES. CI = confidence interval; SES = socioeconomic status; TPPD = time point paired differences.

Table 1

Provider intervention activities by school and intervention year and semester

Intervention Activity[a]	School[b]	Intervention Year and Semester (Fall "F" or Spring "S" Semester)							
		1		2		3		4	
		2005–06		2006–07		2007–08		2008–09	
		F	S	F	S	F	S	F	S
Held policy meeting	1		■						
	2	■							
	3		■						
	4			■					
	5	■							
	6	■							
Distributed guides	1		■		■		■		■
	2	■			■		■		■
	3		■		■		■		■
	4			■	■		■		■
	5	■			■		■		■
	6	■			■		■		■
Link Over Lunch Meeting	1					■		■	
	2					■		■	
	3					■		■	
	4					■		■	
	5					■		■	
	6					■		■	
Mobile Testing Events[c] (Only offered in schools with no SBHC)	1								
	2								
	3								

Intervention Activity[a]	School[b]	Intervention Year and Semester (Fall "F" or Spring "S" Semester)							
		1		2		3		4	
		2005–06		2006–07		2007–08		2008–09	
		F	S	F	S	F	S	F	S
	4			■	■		■	■	■
	5			■	■		■	■	■
	6			■	■		■		■

SBHC = school-based health center.

[a] Filled blocks indicate intervention occurred during this semester.

[b] Schools 1, 2, and 3 had an SBHC on site, whereas schools 4, 5, and 6 did not.

[c] Project staff coordinated with school nurses to offer free and confidential chlamydia and gonorrhea screening via the Los Angeles County Department of Public Health mobile testing van. Events spanned a 2-hour period after school on a predetermined date, and flyers were posted in and around the school several days in advance. The van parked within a block or two of the school and offered urine-based chlamydia and/or gonorrhea screening to any individual who requested it. All clients were screened for chlamydia and gonorrhea; some requested and received HIV testing in addition. Events typically were scheduled one per semester in the schools without SBHCs throughout the years 2, 3, and 4.

Table 2

Time 1[a] age, gender, ethnicity, grade in school, and sexual activity variables, by condition

Characteristic	Control (N = 2,635)		Intervention (N = 3,295)		*p*
	n	%	n	%	
Gender					
Male	1,159	44.1	1,484	45.1	.45
Female	1,472	55.9	1,808	54.9	
Ethnicity					
Hispanic	1,985	75.8	2,515	76.7	.003
African-American	274	10.5	410	12.5	
Other	361	13.8	354	10.8	
Grade					
9th	622	23.6	809	24.6	<.001
10th	509	19.3	657	19.9	
11th	713	27.1	733	22.2	
12th	791	30.0	1,096	33.3	
Sexually experienced					
Yes	1,118	46.1	1,485	47.8	.2
No	1,309	53.9	1,623	52.2	
Age, mean (standard deviation)	16.3 (1.37)		16.3 (1.42)		.46

[a]Additional differences across condition occurred for ethnicity at T2, T3, and T5; for grade at T2 and T3; no other differences across condition were found at other time points.