Published in final edited form as:

J Adolesc Health. 2013 July ; 53(1): 68–78. doi:10.1016/j.jadohealth.2012.12.012.

Interventions to reduce sexual risk behaviors among youth in alternative schools: A randomized controlled trial

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Abstract

Purpose—This paper presents results from a randomized controlled trial that assessed the short- and longer-term impact of a skills-based HIV/STI/pregnancy prevention curriculum, service learning, and the combination.

Methods—The study featured a four-arm experimental design involving 47 classrooms (765 youth) from continuation high schools. Classrooms were randomly assigned to one of four conditions: (1) HIV/STI/pregnancy prevention curriculum only, (2) service learning only, (3) HIV/STI/pregnancy prevention curriculum plus service learning, or (4) an attention control curriculum. Students completed 3 surveys over 18 months. Multilevel analysis was used to adjust for the correlation among students within the same classroom and school, and the correlation of repeated measurements.

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Conflict of Interest Disclosure

There are no real or perceived conflicts of interest for the paper authors, and the study sponsor did not play a role in the study or submission.

Results—Participants were 53% male (mean age: 16.2 years). The majority of youth reported being Hispanic/Latino or African American (37.9% and 22.3%, respectively). Students in the HIV/STI/pregnancy prevention curriculum condition were less likely to have vaginal intercourse without a condom in the 3 months prior to the survey [odds ratio (OR) = 0.58, $p=.04$]; these effects diminished by final follow up. The program also significantly reduced students' exposure to risky situations. These changes were not significant in the service learning only or combined intervention conditions relative to control.

Conclusion—This study is one of a few controlled studies of HIV/STI and pregnancy prevention programs in continuation settings, and suggests the curriculum was effective in changing selected risk behaviors in the short term.

Keywords

Adolescents; sexual behavior; intervention studies; sexually transmitted infections; HIV/AIDS; health education; urban populations; randomized controlled trial

Introduction

Schools for youth at risk of education failure, often referred to as alternative schools, are an important venue for HIV, other sexually transmitted infections (STI), and pregnancy prevention interventions because youth attending these schools are more likely to engage in sexual risk behaviors, and more likely to have experienced a prior pregnancy or to have had an STI than youth in mainstream settings [1–4]. Behavioral interventions continue to serve as a key vehicle for preventing HIV/STI. Prevention education and service learning programs (i.e., programs that combine meaningful community volunteering with instruction and reflection) have been found to be effective at reducing risk behavior or pregnancy rates with selected populations [5–8]. Almost none of this research has been completed with youth in alternative settings. Further, questions remain about how service learning impacts sexual risk behaviors, though some posit it could be through factors such as increased connections with caring adults, increased confidence in relationships, increases in sense of personal responsibility or increases in sense of future and purpose [5,7,8].

Two published studies tested HIV/STI/pregnancy prevention programs in alternative high school settings. Tortolero and colleagues [9] adapted and evaluated *Safer Choices*, an intervention found effective in reducing sexual risk behaviors among mainstream high school youth [10], for use with youth in alternative high schools. According to the study investigators, the adapted program (*Safer Choices 2*) had no statistically significant effects on reducing levels of unprotected sexual intercourse relative to those in the comparison condition. Coyle et al. [11] examined the impact of a skills-based HIV/STI and pregnancy prevention intervention that included a service learning component on sexual risk outcomes of alternative school youth. The program (*All4You!*) showed modest, short-term effects in reducing unprotected sexual intercourse.

While the *All4You!* study assessed the combined effects of the program's two primary components (skills-based instruction plus service learning), it left unanswered questions about which component contributed to the behavior change. Consequently, we completed a subsequent study (*All4You2!*) to examine the individual and combined effects of HIV/STI/pregnancy prevention and service learning. This paper presents outcome results of the *All4You2!* Study, focusing on the primary study question: Did the HIV/STI and pregnancy prevention curriculum component or the service learning component significantly reduce levels of unprotected sexual activity, and were the effects of the combined intervention greater than the effects of either of the two components alone?

Methods

Procedure

The study procedures were approved by the ETR Institutional Review Board. It was also reviewed annually by an independent Data and Safety Monitoring Board. The intervention was evaluated using a 4-arm experimental design involving 47 classrooms (765 youth) drawn from 11 district-run continuation high schools in northern CA. Students were referred to these schools for a variety of reasons (e.g., deficits in academic performance, discipline issues, and/or chronic absenteeism). Classrooms were randomly assigned using computer-generated random numbers to one of four intervention conditions: (1) HIV/STI and pregnancy prevention curriculum only, (2) service learning only, (3) the HIV/STI and pregnancy prevention curriculum plus service learning, or (4) an attention control condition (nutrition and physical activity curriculum). All students within the classrooms were invited to enroll. Students completed three surveys (baseline plus two follow up surveys at 6 and 18 months following baseline). Baseline data were collected before random assignment by trained research staff in class during school hours at the beginning of each semester. For students still enrolled in school, follow-up surveys were collected during school hours. Those not at school were surveyed by mail or had surveys hand-delivered to them at their homes. Figure 1 shows the number of classes and adolescents randomized to each group, and their flow through the study. The implementation phase extended from 2006–2009, with continuing recruitment and randomization each school semester during that time period.

Participants and Response Rates

Active parental permission and student assent were required. Because the schools in which the study took place enroll and lose students on a regular basis, we adapted criteria from the Alternative School Youth Risk Behavior Survey [1] to establish study eligibility. All students enrolled in the schools at the time of baseline were eligible for study enrollment unless: (a) they were on extended leave (e.g., maternity leave, medical leave); (b) they had been suspended or were incarcerated at the time of baseline; or (c) they had functionally dropped out of school (e.g., had not been seen in weeks, dropped out officially). Of the 899 eligible students, 85% (N=765) were randomized and completed baseline surveys; all participants were contacted for follow up surveys regardless of program exposure. Student retention rates were 80% and 70% at 6 and 18 months, respectively; 86% of the participants completed at least one follow up survey (ranging from 83% to 88% across conditions).

Study Conditions

Each intervention consisted of 32 hours of instruction, taught 2–3 times a week during school hours. The curriculum length was dictated by the combined condition (HIV/STI and pregnancy prevention + service learning). In the HIV/STI pregnancy prevention only and service learning only conditions, youth received lessons in either HIV/STI and pregnancy prevention or service learning plus lessons from the attention control curriculum to equalize the length of each intervention condition, controlling for “Hawthorne effects” (i.e., effects resulting simply from extra group interaction and special attention for those in the combined intervention condition) (12). The program was titled *All4You2!*, *One life, Your life* (hereafter referred to as *All4You2!*) by youth advisors. The lessons were interactive and highly structured to ensure consistency across implementation. All four conditions were taught by trained health educators who had experience working with youth in alternative schools and experience with the content.

HIV/STI and pregnancy prevention condition—This condition was shaped using social cognitive theory [13] and theory of planned behavior [14] to reduce unprotected sexual intercourse (either by increasing condom use or reducing sexual intercourse). It also

addressed theory-based determinants (e.g., perceived self efficacy, attitudes, perceived normative beliefs). Examples of curriculum activities include: examining attitudes and beliefs about having sex and using condoms (e.g., through advice columns and group discussion); and building negotiation skills and skills to use condoms correctly (e.g., through role playing, demonstrations, and guided practice).

Service learning condition—In the service learning condition, supported by social development theory [15], students made 9 visits as a class during the school day (about 1.5 hours each) to volunteer sites that included elementary schools, senior centers, and community-based service organizations (e.g., homeless shelters). They also participated in lessons involving preparation and reflection activities.

During the service visits, students led activities and provided services (e.g., working with clients on craft projects, preparing clothing for distribution). Preparation for service was integrated into curriculum lessons through small-group planning activities, empathy-building exercises, and an activity identifying the potential benefits of helping in the community. Reflection occurred immediately following service (through brief verbal exchanges and individual work sheets) and then again at the next lesson (e.g., through small-group activities). Reflection was shaped by Kolb's learning cycle adapted for service learning practitioners [16].

Combined HIV/STI/pregnancy prevention and service learning condition—This condition involved the combination of the HIV/STI and pregnancy prevention lessons and service learning visits and lessons.

Attention control condition—This condition featured 32 interactive lessons on nutrition and physical education behaviors developed for this study.

Instrument

The student survey assessed demographic characteristics, sexual risk behaviors (vaginal sex), theory-based antecedents, and questions about volunteering modified from the original study [11]. The primary sexual behavior was: *frequency of unprotected sexual intercourse* (vaginal intercourse, no condom) in the previous 3 months. We also assessed secondary behaviors related to: (1) *frequency of unprotected sexual intercourse by partner type* (vaginal intercourse, no condom, in the previous 3 months with *steady* and *non-steady* partners); (2) *sexual partners* (number of sexual partners with whom students had unprotected vaginal intercourse in the previous 3 months); (3) *use of protection at last intercourse* (use of condoms or an effective pregnancy prevention method at last vaginal intercourse); (4) *frequency of sexual intercourse* (number of times had vaginal intercourse in previous 3 months); (5) *sexual initiation* (ever had vaginal intercourse); (6) *HIV/STI testing* (number of times tested for HIV and other STI, lifetime); and (7) *reports of volunteering* (number of times volunteered in the past 6 months). Finally, we assessed a number of constructs stemming from our underlying theories (see Table 1 for scales and their psychometric properties).

Data analysis

Behavioral and psychosocial analyses—Multilevel models were used to adjust for the correlation among students within the same classroom and school, and the correlation of repeated measurements taken on the same student over time. We used linear and logistic multilevel regression models to analyze continuous and dichotomous data, respectively. For analyses of outcomes regarding frequency of vaginal intercourse without a condom and frequency of vaginal intercourse without a condom with steady and non-steady partners, we

dichotomized the variables as follows: students who reported no instances of sex without a condom or who did not have sex in the past 3 months were coded as “0.” Those who reported having sex without using condoms were coded “1.” These dichotomizations reflect the key messages of the program--choose not to have sex or use condoms every time if having sex.

For each outcome a four-level repeated measures multilevel model was used (time, student, classroom and school, respectively). Each model included the following independent variables: intervention group indicator variables; survey time; interaction terms between survey time and the intervention group indicator variables; and outcome-specific covariates. Variables were included as potential covariates for a particular outcome if they were imbalanced across intervention conditions and were related to the outcome at baseline or either follow-up time point ($p \leq 0.15$ for both criteria). A covariate was retained in the model if it remained significant in the final multilevel model ($p \leq 0.05$). Multi-level models included all students with at least two time points, regardless of program exposure. Effect sizes were estimated using Cohen’s d or odds ratios [17–18]. We carried out computations for the multilevel models using MLwiN Software for Multilevel Analysis, Version 2.23 [19].

Attrition analyses—We used multilevel logistic regression models to assess the significance of the relationship between whether a student had at least one follow-up survey or not and intervention group; baseline demographic characteristics; and selected behavioral outcome variables as measured at baseline.

Results

Assessment of Attrition Bias

No statistically significant differences were found in the rates of attrition by treatment group. Further, no statistically significant differences were found between students lost to follow-up and those retained for the demographic and sexual behaviors tested, with three exceptions. Students lost to follow-up were more likely than those retained to report being (1) male ($p < .05$), (2) ever on probation ($p < .05$), and (3) having sexual intercourse without a condom with a higher number of sexual partners in the past 3 months ($p < .05$).

Baseline Compatibility across Conditions

There were no statistically significant differences among the groups in terms of gender, race/ethnicity, and sexual behaviors (ever had sexual intercourse, intercourse past 3 months, and frequency of intercourse without a condom past 3 months). Selected intervention groups differed significantly on age, probation status, suspensions, and language spoken at home (Table 2).

Overall Program Effects: Behavioral Outcomes

Table 3 presents the 6-month and 18-month behavioral outcomes, showing the effects for each intervention condition relative to the attention control.

HIV/STI and pregnancy prevention condition versus attention control—At the 6-month follow up, students in the HIV/STI and pregnancy prevention condition were less likely to have intercourse without a condom in the 3 months prior to the survey ($p = .04$); these effects diminished by the final follow up. Youth in this condition also reported having sexual intercourse fewer times than youth in the control condition at the 6- and 18-month follow ups, though the differences did not reach statistical significance ($p = .09$ and $p = .07$,

respectively). There were no statistically significant differences on any of the remaining behavioral outcomes.

Service learning condition versus attention control—The service learning condition had no statistically significant impact on any of the primary or secondary behavioral outcomes at either time period.

Combined HIV/STI/pregnancy prevention and service learning condition versus attention control—The combination condition had no statistically significant impact on any of the behavioral outcomes at either time period.

Overall Program Effects: Theory-Based Outcomes

Table 4 presents program effects on the theory-based outcomes.

HIV/STI and pregnancy prevention condition versus attention control—At the 6-month follow up, students in the HIV/STI and pregnancy prevention condition reported higher levels of refusal self efficacy than youth in the control group, but these differences were only marginally significant ($p = .06$). At the 18-month follow up youth receiving the HIV/STI and pregnancy prevention intervention were less likely to place themselves in risky situations ($p = .03$) than were youth in the control condition.

Service learning condition versus attention control—Students in the service learning condition reported a lower sense of efficacy to make change in their communities at 6 and 18 months ($p = .003$ and $.05$, respectively) than those in the control condition, and less favorable perceptions of peer condom use ($p = .04$).

Combined HIV/STI/pregnancy prevention and service learning condition versus attention control—Students in the combination condition reported a lower sense of efficacy to make change in their communities than those in the control condition at 6 and 18 months, though the effects at 6 months did not reach statistical significance ($p = .06$ and $.01$, respectively). They also reported lower levels of optimism than youth in the control condition at the 6-month follow up ($p = .01$), which remained marginally significant at the 18-month follow up ($p = .08$).

Comparisons between combination condition and individual component conditions

Comparisons between the combination condition and the individual component conditions yielded several differences reaching statistical significance (data not shown). Specifically, students in the combination condition reported lower levels of optimism at the 6-month follow up ($p = .04$), and lower levels of efficacy to make change in their communities at the 18-month follow up ($p < .05$) than did students in the HIV/STI and pregnancy prevention condition. Similarly, students in the combination condition reported lower levels of efficacy to make community change than students in the service condition at 6- and 18-month follow ups ($p < .01$ for both).

Discussion

The results of this study suggest that the HIV/STI and pregnancy prevention curriculum had short-term effects on reducing unprotected sexual intercourse and limited impact on psychosocial factors. Further, the data suggest that the behavioral effects diminished with time—a pattern found in other HIV/STI prevention studies [20], including the predecessor study [11]. The limited impact on psychosocial variables may be the result of a variety of factors, such as insufficient exposure to the interventions (youth received about two-thirds of

the lessons across conditions on average), measurement issues (e.g., lack of sensitivity), and/or the need to re-examine the theoretical base for this population. Flay et al. [21] argued that the complexity of the processes underlying health risk behaviors involving substance use calls for broadening the theories upon which many prevention curricula are based, and a need for more specificity with respect to what parts of theories are most applicable; this argument may be relevant to HIV/STI/pregnancy prevention programs with youth in alternative school settings.

Contrary to expectations, the service learning and combination conditions yielded no statistically significant behavioral effects relative to the control condition, though several outcomes were in the expected direction (e.g., both conditions showed small reductions in unprotected sexual intercourse). Other studies using service learning have reported positive behavioral effects [7–8, 11, 22]. The lack of statistically significant behavioral findings may be a function of program exposure. It also may reflect the types of service opportunities available for this study, limits on student choice, and the challenges educators faced in finding suitable service sites. By design, students provided service in larger institutions (e.g., senior centers) that could accommodate groups of youth during the school day. The options for this study were more limited (e.g., due to new and more limiting volunteer policies) than in the original *All4You!* study that showed positive behavioral results from the combined intervention. In this study, students volunteered more in senior centers and less with children compared to the first study, and some students expressed difficulty forming connections with seniors (e.g., because they were uncomfortable in the setting or around older people) or seeing the impact of their service, though others articulated a range of positive outcomes from taking part in the service visits (e.g., confidence navigating new experiences, greater respect for elders, greater sense of responsibility). Further, the larger settings in which youth volunteered had restrictions on what students could do while helping, which made it challenging for educators to ensure all students were engaged while at the service sites. In qualitative interviews students expressed a desire for more time to volunteer, and more choice in settings and activities at the sites. We used a group service model for this population based on available resources, the success in the prior study, concerns regarding motivation to attend service without the group structure, and to provide a shared experience for reflection. Future research on service learning as a strategy for reducing sexual risk in this population may benefit from examining the effects of different models of service (e.g., having students work in pairs or small groups versus large group and the influence of different service settings) on such behavior. Finally, contamination across classrooms could have diluted the effect of the service learning component. Our qualitative data from post-program interviews suggest students were aware of the different class foci and some were envious of other classes that got to go on “field trips” (i.e., the service learning visits), but the data do not suggest major contamination at a content level that might influence students’ survey responses.

Despite having a smaller sample size than intended, the statistical power was similar to what was planned due to the gain from inclusion of important covariates and from use of repeated measures models in which up to three observations per student contributed to effect size estimation [23]. We saw ICCs similar to those projected at the study outset (for the main outcome variable the school-level ICC was 0.02 and the class-level was 0). For the primary outcome, the effects for the HIV only condition were equivalent to a Cohen’s *d* [18] of -0.31 (small-medium effect). The effects for the service learning conditions were smaller (-0.14 and -0.23), and, therefore, did not reach statistical significance in this study.

None of the psychosocial outcomes in the two conditions featuring service learning changed significantly in a positive direction. To the contrary, students in the service learning only and combination condition were significantly less likely to report feeling efficacious to

make change in their community compared to those students not taking part in service learning. It is possible students overestimated their efficacy initially because they lacked context [24], and the youth who gained experience through volunteering had an expanded basis on which to make subsequent self efficacy appraisals. It may also reflect students' more limited roles. We also saw lower levels of optimism among youth who took part in the combined intervention condition compared to controls; this is the opposite of what we found in the first study [11]. Other studies examining the effects of service learning on sexual outcomes have reported little or no data on its impact on psychosocial factors [7–8, 22]. We targeted factors that had been shown to be influenced by service learning [25], and were related to sexual risk behaviors [26], hoping to gain more understanding of how service learning influences sexual behavior; we still lack clarity on this issue.

The combined intervention was expected to be more effective than either component alone, which was not supported. This is likely a result of challenges with the service learning component of the intervention and how students experienced it, as the combined intervention was effective in the prior study [11].

Strengths and Limitations

This study is unique in its examination of two prevention education strategies (an HIV/STI and pregnancy prevention curriculum and service learning) alone and in combination with youth in alternative high school settings.

As is standard practice for school-based studies, the outcome data were collected using self-report questionnaires, which are subject to potential response biases. Some evidence supports the general reliability and validity of adolescents' reports of sexual and contraceptive behaviors [27]. The study included youth in continuation schools; the results may not generalize to other settings (e.g., mainstream schools or juvenile justice facilities). Further, the results may not generalize to students lost to follow-up, who were more likely to be male and have higher levels of risk behavior. We did not correct the statistical procedures for multiple testing. We specified hypotheses a priori; however, it is always possible that some of the significant results were due to chance. The overall pattern of results—a pattern that suggests the HIV/STI and pregnancy prevention curriculum condition had modest effects in the expected direction for several key outcomes—supports the existence of a true effect. We also saw selected positive effects for the control condition, further supporting the notion of program effects.

Conclusion

The *All4You2!* HIV/STI and pregnancy prevention curriculum reduced selected sexual risk behaviors and exposure to risk situations among youth in continuation school settings, thereby reducing these youth's risk for HIV, other STI, and unintended pregnancy; however, the effects were moderate and/or short-term. The service learning intervention and the combined intervention yielded trends in the desired direction for some key outcomes, including the primary behavioral outcome, but these effects did not reach statistical significance in this study. Service learning has been shown to be effective with other populations. Thus, the lack of findings for the service learning and combined interventions may have been a result of the challenges faced during implementation rather than the strategy itself. The study results suggest the need for new prevention models and theory-bases for youth in alternative school settings. Models that address a range of issues may be more impactful. Targeted brief interventions (e.g., focusing on specific skills such as using condoms or identifying and handling risky situations) may be promising given the attendance patterns in these schools and the higher rates of sexual behavior. Program boosters (e.g., technology-based applications such as text message campaigns) may also

hold promise. In post-program interviews, some youth noted a desire for more emphasis on building healthy relationships, an approach we are pursuing presently as an avenue for reducing sexual risk behaviors. Finally, more research is needed to identify the most impactful psychosocial mediators of these prevention programs, which could help strengthen future programming by highlighting potential focal points.

Acknowledgments

The study was supported by the National Institute of Child Health and Human Development (HD#041856). The authors gratefully acknowledge the contributions to this research project by the educators, research staff, and tracking staff who helped ensure the project was implemented successfully. Additionally, we express our sincere appreciation to the district representatives, principals, teachers, school staff, and students who participated in the study.

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Implications and Contribution

The HIV/STI/pregnancy prevention curriculum reduced selected sexual risk behaviors and exposure to risk situations among youth in continuation high school settings. This study is one of a few controlled studies of sexual risk reduction programs with youth in alternative schools, providing another program option for this setting.

Figure 1.
Participants' Flow through Trial

Table 1**Scales and Indices with Basic Psychometric Properties**

Construct	Number of Items	Sample Item	Response Format	Alpha^a
<u>Behaviorally-related Scales</u>				
Exposure to Risky Situations	3	In the past month, how often have you laid down on a couch or bed alone with someone you like?	6- point scale (1 = 0 times, 6 = 16 or more times)	0.74
Volunteering/Helping in Community	1	In the past 6 months, how many times have you volunteered in your community?	4- point scale (1 = 0 times, 4 = 5 or more times)	NA
<u>Psychosocial Indices/Scales Knowledge Indices</u>				
Condom Knowledge	4	When using a condom, a person should always leave some room or space at the end of it.	True/false; count of number correct	NA
HIV Knowledge	2	All STDs, except for HIV/ AIDS, can be cured with antibiotics. (reverse coded)	True/false; count of number correct	NA
<u>Perceived Self-efficacy</u>				
To get and use condoms	4	If you were going to have sex, could you insist on using a condom if your partner did not want to use one?	4- point scale (1 = I am sure I could not, 4 = I am sure I could)	0.80
To refrain from having sex	3	Could you keep from having sex if you had strong sexual feelings for someone?	4- point scale (1 = I am sure I could not, 4 = I am sure I could)	0.81
<u>Skills</u>				
Refusal Strategies (Skills)	5	In the past month, how many times have you suggested doing something else to keep from having sex or unprotected sex?	4- point scale (1 = 0 times, 4 = 5 or more times) ^a	0.80
<u>Attitudes and Beliefs</u>				
General attitudes toward condoms	15	Asking my partner to use condoms would be like saying "I don't trust you."	5- point scale (1 = strongly disagree, 5 = strongly agree)	0.80
General attitudes toward birth control	3	Getting female methods of birth control is a hassle. (reverse coded)	5- point scale (1 = strongly disagree, 5 = strongly agree)	0.74
Beliefs about not having sexual intercourse	5	I believe it is OK for people my age NOT to have sex.	5- point scale (1 = strongly disagree, 5 = strongly agree)	0.63
<u>Normative Beliefs</u>				
Perception of peer beliefs about not having sex	4	Most of my friends think it is OK for people my age NOT to have sex.	5- point scale (1 = strongly disagree, 5 = strongly agree)	0.75
Perception of peer beliefs about using condoms	3	Most of my friends think people my age should always use condoms when having sex.	5- point scale (1 = strongly disagree, 5 = strongly agree)	0.46

Construct	Number of Items	Sample Item	Response Format	Alpha ^a
Perceptions of number of peers who use condoms	1	Most of my friends use condoms if they are having sex.	5- point scale (1 = strongly disagree, 5 = strongly agree)	NA
Communication				
Communication Skills	5	I am good at saying what I think.	4- point scale (1 = strongly disagree, 4 = strongly agree)	0.65

^aCronbach's Alpha based on students' baseline responses.

Table 2

Selected Baseline Characteristics by Treatment Condition

	HIV/STI & Pregnancy Prevention Curriculum (N=212)	Service Learning (N=184)	Combined HIV/STI/Preg & Service Learning (N=149)	Attention Control (N=217)
Gender				
•Male	119 (56.1 %)	94 (51.1%)	85 (57.0%)	109 (50.2%)
•Female	94 (43.9%)	90 (48.9%)	64 (43.0%)	108 (49.8%)
Age (Yrs)¹				
•Mean (at baseline survey)	16.40	16.10	16.07	16.16
Race/Ethnicity				
•Black or African American	57 (26.9%)	38 (20.7%)	34 (23.1%)	40 (18.6%)
•Hispanic or Latino/Latina	87 (41.0%)	67 (36.4%)	52 (35.4%)	81 (37.7%)
•White or Caucasian	30 (14.2%)	41 (22.3%)	29 (19.7%)	40 (18.6%)
•Multiple races	26 (12.3%)	28 (14.7%)	23 (15.6%)	41 (19.1%)
•Other (American Indian, Asian, Pacific Islander)	12 (5.7%)	11 (2.1%)	9 (6.1%)	13 (6.0%)
•Unknown	0 (0.0%)	0 (0.0%)	2 (1.3%)	2 (.9%)
Current or Past Probation²				
•No current or previous probation	172 (81.9%)	125 (68.7%)	98 (66.7%)	162 (75.3%)
•Current or previous probation	38 (18.1%)	57 (31.3%)	49 (33.3%)	53 (24.7%)
Suspension in the past year³				
•Mean times (SD)	2.47 (.17)	2.37(.18)	3.11(.26)	2.56 (.18)
Language at Home⁴				
Only English	114 (53.8%)	101 (54.9%)	79 (53.0%)	115 (53.2%)
Mostly English	17 (8.0%)	18 (9.8%)	24 (16.1%)	21 (9.7%)
Half English/half other language	52 (24.5%)	27 (14.7%)	27 (18.1%)	53 (24.5%)
Mostly other language	25 (11.8%)	27 (14.5%)	12 (8.1%)	18 (8.3%)
Only other language	4 (1.9%)	11 (6.0%)	7 (4.6%)	9 (4.2%)
Ever Had Sexual Intercourse				
•Yes	149 (70.3%)	124 (67.4%)	108 (72.5%)	148 (68.2%)
•No	62 (29.2%)	60 (32.6%)	41 (27.5%)	68 (31.3%)
•Unreported	1(.5%)	0 (0.0%)	0 (0.0%)	1 (0.5%)
Had Sexual Intercourse in Previous 3 Months (among those who have ever had sex)				
•Yes	120 (80.5%)	91 (73.4%)	91 (84.3%)	124 (83.8%)
•No	29 (19.5%)	33 (26.6%)	17 (15.7%)	23 (15.5%)
•Unreported	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.7%)
Frequency of vaginal intercourse w/o a condom in previous 3 months (0 vs.1+ times)⁵				
•None	147 (69.3%)	118 (64.1%)	100 (67.1%)	132 (60.8%)

	HIV/STI & Pregnancy Prevention Curriculum (N=212)	Service Learning (N=184)	Combined HIV/STI/Preg & Service Learning (N=149)	Attention Control (N=217)
•One or more	54 (25.5%)	59 (32.1%)	43 (26.9%)	67 (30.9%)
•Unreported	11 (5.2%)	7 (3.8%)	6 (4.0%)	18 (8.3%)

¹ $p < .001$ for overall ANOVA. Independent t-tests show statistically significant differences between the HIV only and each of the other three conditions— HIV+Service ($p < .001$), Service only ($p < .001$), and Control ($p < .001$).

² $p = .003$ for overall ANOVA. Independent t-tests show statistically significant difference between Combination and HIV/STI and pregnancy prevention ($p < .001$).

³ On an 11-point scale ranging from 0–10+ times. $p = .01$ for overall ANOVA. Independent t-tests show statistically significant differences between the Combination and each of the other three conditions—HIV/STI and pregnancy prevention ($p < .001$), Service learning ($p < .001$), and Attention control ($p = .004$).

⁴ $p = .04$ for overall ANOVA. Independent t-tests show a statistically significant difference between Combination and Service learning ($p = .01$).

⁵ Students who did not have sex were coded as having sex without a condom 0 times.

Table 3
Primary and Secondary Behavioral Outcomes: Results by Condition Relative to Control Condition

Outcome Variables	n ^a	Cov. in model ^b	HIV/STI & Pregnancy Prevention Curriculum Compared to Attention Control			Service Learning Compared to Attention Control			Combined HIV/STI/Pregnancy Prevention & Service Learning Compared to Attention Control		
			Group Estimate (SE)	p Value	Estimated Effect Sizes	Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size
Primary Outcome—Frequency of Unprotected Sexual Intercourse											
Frequency of vaginal intercourse w/o a condom in previous 3 months (0 vs. 1+ times) ^d	741	A, P									
•6 month follow-up			-0.55(0.27)	0.04	OR = 0.58	-0.25(0.28)	0.37	OR = 0.78	-0.41(0.30)	0.17	OR = 0.66
•18 month follow up			-0.19(0.34)	0.57	OR = 0.83	-0.22(0.35)	0.53	OR = 0.80	-0.45(0.39)	0.24	OR = 0.64
Secondary Outcomes—Frequency of Unprotected Sexual Intercourse by Partner Type											
Frequency of vaginal intercourse w/o a condom in previous 3 months— <i>steady partners</i> (0 vs. 1+)	738	A, P									
•6 month follow-up			-0.39(0.28)	0.17	OR = 0.68	-0.23(0.29)	0.43	OR = 0.79	-0.30(0.31)	0.33	OR = 0.74
•18 month follow up			-0.12(0.35)	0.72	OR = 0.89	-0.03(0.36)	0.93	OR = 0.97	-0.40(0.40)	0.32	OR = 0.67
Frequency of vaginal intercourse w/o a condom in previous 3 months— <i>non-steady partners</i> (0 vs. 1+) ^e											
•6 month follow-up	-	-	-	-	-	-	-	-	-	-	-
•18 month follow up	-	-	-	-	-	-	-	-	-	-	-
Sexual Partners											
Number of partners w/o a condom previous 3 months (0, 1, 2, 3+ partners)	746	A, L, P									
•6 month follow-up			-0.07(0.05)	0.22	-0.06	-0.01(0.06)	0.93	0.00	-0.04(0.06)	0.53	-0.03
•18 month follow up			-0.09(0.07)	0.23	-0.06	0.01(0.08)	0.93	0.00	-0.05(0.09)	0.60	-0.06
Use of Protection at Last Intercourse											
Condom use at last intercourse (among those who have had sex in the past 3 months) (Y/N)											
•6 month follow-up	339	S	0.60(0.39)	0.13	OR = 1.83	0.20(0.41)	0.63	OR = 1.22	0.60(0.42)	0.15	OR = 1.83
•18 month follow up	337	None	0.18(0.35)	0.61	OR = 1.20	-0.36(0.37)	0.33	OR = 0.70	-0.01(0.4)	0.97	OR = 0.99

Outcome Variables	n ^a	Cov. in model ^b	HIV/STI & Pregnancy Prevention Curriculum Compared to Attention Control			Service Learning Compared to Attention Control			Combined HIV/STI/Pregnancy Prevention & Service Learning Compared to Attention Control		
			Group Estimate (SE)	p Value	Estimated Effect Size ^c	Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size
Used effective method to prevent pregnancy at last intercourse (among those who have had sex in the past 3 months) ^f (Y/N)											
•6 month follow-up	339	S, L	0.13(0.42)	0.76	OR = 1.14	0.40(0.45)	0.38	OR = 1.49	0.12(0.45)	0.79	OR = 1.13
•18 month follow up	337	None	0.24(0.44)	0.59	OR = 1.26	-0.09(0.45)	0.85	OR = 0.92	0.10(0.50)	0.84	OR = 1.11
Frequency of Sexual Intercourse											
Frequency of vaginal intercourse previous 3 months (0–99+)	739	A									
•6 month follow-up				0.09	-0.08		0.16	-0.07		0.78	-0.01
•18 month follow up			-2.44(1.43)	0.07	-0.09	-2.15(1.99)	0.28	-0.05	0.75(2.19)	0.73	0.02
Sexual Initiation											
Initiation of vaginal intercourse (among sexually inexperienced at baseline)(Y/N)	230	A									
•6 month follow-up			-1.20(0.91)	0.19	OR = 0.30	-0.84(0.90)	0.35	OR = 0.43	0.87(0.78)	0.27	OR = 2.38
•18 month follow up			-0.70(0.70)	0.32	OR = 0.50	-0.34(0.70)	0.63	OR = 0.72	1.18(0.80)	0.14	OR = 3.24
HIV/STI Testing											
Times tested for HIV (among sexually experienced at baseline) (0–4+ times)	522	A, L, P									
•6 month follow-up			0.14(0.14)	0.33	0.06	0.15(0.15)	0.33	0.06	0.14(0.15)	0.36	0.05
•18 month follow up			-0.17(0.17)	0.32	-0.06	-0.04(0.18)	0.82	-0.01	0.04(0.20)	0.82	0.01
Times tested for STI (among sexually experienced at baseline) (0–4+ times)	523	A, L, P									
•6 month follow-up			0.03(0.17)	0.84	0.01	0.16(0.18)	0.37	0.05	0.03(0.19)	0.87	0.01
•18 month follow up			-0.06(0.20)	0.75	-0.02	0.14(0.21)	0.51	0.04	-0.03(0.23)	0.91	-0.01
Reports of Volunteering											
Volunteered/helped in community past 6 months (0–5+times)	756	L									
•6 month follow-up			-0.12(0.08)	0.13	-0.07	-0.09(0.09)	0.31	-0.05	-0.09(0.09)	0.31	-0.05
•18 month follow up			-0.14(0.10)	0.19	-0.06	-0.12(0.11)	0.28	-0.05	-0.20(0.12)	0.09	-0.08

^a n represents the number of individuals included in the analyses. The tests of significance are based on the number of observations rather than number of individuals. Each individual had two or three observations.

^c Estimated effect sizes were calculated using Cohen's D for variable analyzed as continuous outcomes using linear multilevel regression models and odds ratios for dichotomous outcomes.

^d Students who did not have sex were coded as having sex without a condom 0 times.

^e Estimates not available – model would not converge.

^f Effective methods to prevent pregnancy included birth control pills, condoms, Depo-Provera, the patch, and vaginal ring.

Table 4

Psychosocial Outcomes: Results by Condition Relative to Control Condition

Outcome	n ^a	Cov. in model ^b	HIV/STI & Pregnancy Prevention Curriculum Compared to Attention Control			Service Learning Compared to Attention Control			Combined HIV/STI/Pregnancy Prevention & Service Learning Compared to Attention Control		
			Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size
Knowledge											
Condom knowledge											
•6 month follow up	570	A	0.01(0.02)	0.56	0.04	0.01(0.03)	0.69	0.02	0.02(0.03)	0.36	0.06
•18 month follow up			0.02(0.03)	0.51	0.04	0.02(0.03)	0.52	0.04	0.02(0.03)	0.54	0.04
HIV knowledge	515	L									
•6 month follow up			0.04(0.04)	0.35	0.06	0.00(0.04)	0.92	0.01	0.02(0.04)	0.69	0.03
•18 month follow up			-0.03(0.05)	0.55	-0.04	-0.03(0.05)	0.58	-0.04	-0.03(0.05)	0.50	-0.05
Perceived Self-efficacy											
To get and use condoms	745	P									
•6 month follow up			-0.04(0.05)	0.37	-0.04	-0.05(0.05)	0.35	-0.04	-0.04(0.05)	0.48	-0.03
•18 month follow up			0.01(0.06)	0.86	0.01	-0.11(0.07)	0.09	-0.08	-0.11(0.07)	0.12	-0.07
To refrain from having sex	748	P									
•6 month follow up			0.13(0.07)	0.06	0.09	0.06(0.07)	0.44	0.04	0.02(0.08)	0.82	0.01
•18 month follow up			0.04(0.09)	0.64	0.02	-0.04(0.09)	0.70	-0.02	-0.11(0.1)	0.27	-0.05
Skills											
Refusal strategies	688	L									
•6 month follow up			0.03(0.07)	0.68	0.02	0.03(0.07)	0.66	0.02	0.06(0.07)	0.38	0.05
•18 month follow up			-0.01(0.08)	0.93	0	0.02(0.09)	0.84	0.01	-0.14(0.09)	0.13	-0.08
Exposure to risky situations	745	A, L, P, S									
•6 month follow-up			-0.17(0.12)	0.16	-0.06	0.03(0.13)	0.79	0.01	-0.06(0.13)	0.64	-0.02
•18 month follow up			-0.31(0.15)	0.03	-0.10	-0.07(0.16)	0.68	-0.02	-0.03(0.17)	0.88	-0.01
Attitudes and Beliefs											
General attitudes toward condoms	744	A, L, S									
•6 month follow up			-0.03(0.05)	0.62	-0.02	0.01(0.05)	0.82	0.01	0.06(0.06)	0.30	0.05

Outcome	n ^a	Cov. in model ^b	HIV/STI & Pregnancy Prevention Compared to Attention Control			Service Learning Compared to Attention Control			Combined HIV/STI/Pregnancy Prevention & Service Learning Compared to Attention Control		
			Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size
•18 month follow up	749	A, L	0.02(0.06)	0.75	0.01	0.03(0.06)	0.61	0.02	0.04(0.07)	0.58	0.03
General attitudes toward birth control											
•6 month follow up			-0.02(0.06)	0.73	-0.02	-0.02(0.07)	0.74	-0.02	-0.02(0.07)	0.81	-0.01
•18 month follow up			-0.02(0.09)	0.83	-0.01	-0.13(0.09)	0.16	-0.07	-0.08(0.1)	0.41	-0.04
Beliefs about not having sex	744	S, P									
•6 month follow up			0.09(0.06)	0.17	0.06	0.05(0.07)	0.49	0.03	0.06(0.07)	0.41	0.04
•18 month follow up			0.03(0.08)	0.75	0.02	-0.01(0.08)	0.87	-0.01	0.04(0.09)	0.66	0.02
Perception of peer beliefs about not having sex	757	A									
•6 month follow-up			-0.07(0.28)	0.80	-0.01	0(0.08)	0.96	0	0.05(0.09)	0.59	0.03
•18 month follow up			0.04(0.10)	0.65	0.02	-0.1(0.1)	0.34	-0.04	0.00(0.11)	0.99	0
Perception of peer beliefs about using condoms	758	None									
•6 month follow up			0.03(0.07)	0.69	0.02	0.02(0.07)	0.75	0.01	-0.04(0.07)	0.62	-0.02
•18 month follow up			0.03(0.08)	0.75	0.01	-0.07(0.09)	0.41	-0.04	-0.02(0.09)	0.86	-0.01
Perceptions of number of peers who use condoms	759	None									
•6 month follow up			-0.04(0.06)	0.51	-0.03	0.01(0.07)	0.85	0.01	-0.02(0.07)	0.74	-0.02
•18 month follow up			-0.04(0.09)	0.68	-0.02	-0.2(0.1)	0.04	-0.09	-0.06(0.11)	0.58	-0.03
Sense of Future											
Optimism	754	L, S									
•6 month follow up			-0.04(0.04)	0.29	-0.05	-0.02(0.04)	0.59	-0.02	-0.11(0.04)	0.01	-0.11
•18 month follow up			-0.07(0.05)	0.18	-0.06	-0.01(0.06)	0.88	-0.01	-0.11(0.06)	0.08	-0.08
Future Orientation	757	A, L									
•6 month follow up			0.00(0.05)	0.97	0	-0.02(0.05)	0.70	-0.02	-0.06(0.05)	0.25	-0.05
•18 month follow up			-0.02(0.06)	0.77	-0.01	-0.04(0.06)	0.56	-0.03	-0.05(0.07)	0.45	-0.04
Fatalism	758	A									
•6 month follow up			0.04(0.05)	0.49	0.03	-0.04(0.06)	0.50	-0.03	-0.03(0.06)	0.59	-0.02
•18 month follow up			0.05(0.07)	0.44	0.04	-0.01(0.07)	0.93	0	-0.06(0.08)	0.50	-0.03
Self-efficacy to make positive change	751	L, S									

Outcome	n ^a	Cov. in model ^b	HIV/STI & Pregnancy Prevention Curriculum Compared to Attention Control			Service Learning Compared to Attention Control			Combined HIV/STI/Pregnancy Prevention & Service Learning Compared to Attention Control		
			Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size	Group Estimate (SE)	p Value	Estimated Effect Size
•6 month follow up	757	A, L	-0.06(0.04)	0.16	-0.07	-0.13(0.04)	<0.01	-0.14	-0.08(0.04)	0.06	-0.09
•18 month follow up			-0.04(0.05)	0.45	-0.03	-0.11(0.05)	0.05	-0.09	-0.15(0.06)	0.01	-0.11
Self-esteem											
•6 month follow up	757	A, L	0(0.05)	0.95	0	0.01(0.05)	0.86	0.01	-0.07(0.05)	0.16	-0.07
•18 month follow up			0.06(0.06)	0.34	0.04	0.02(0.06)	0.77	0.01	-0.08(0.07)	0.21	-0.06
Connectedness	749	L, S									
Connectedness to a caring adult outside of family											
•6 month follow up			-0.03(0.05)	0.51	-0.03	-0.05(0.05)	0.33	-0.05	-0.05(0.05)	0.32	-0.05
•18 month follow up	750	S	-0.02(0.07)	0.81	-0.01	-0.05(0.07)	0.49	-0.03	0.08(0.08)	0.32	0.05
Connections to school											
•6 month follow up			0.01(0.05)	0.92	0	-0.04(0.06)	0.42	-0.04	-0.03(0.06)	0.59	-0.03
•18 month follow up	758	A, L	-0.04(0.07)	0.58	-0.03	-0.05(0.07)	0.51	-0.03	0.04(0.08)	0.63	0.02
Communication											
Communication skills											
•6 month follow up	758	A, L	-0.04(0.04)	0.33	-0.05	0.01(0.04)	0.76	0.01	-0.04(0.04)	0.38	-0.04
•18 month follow up			-0.02(0.05)	0.68	-0.02	0.04(0.05)	0.45	0.04	-0.02(0.06)	0.79	-0.01

^a n represents the number of individuals included in the analyses. The tests of significance are based on the number of observations rather than number of individuals. Each individual had two or three observations.

^b Covariates retained in the final model; A=Age, L=Language at Home, S= Suspension P=Probation.