

Effects of a Sexual Risk Reduction Program for African-American Adolescents on Social Cognitive Antecedents of Behavior Change

Sarah Walsh, PhD; Eric Jenner, PhD; Rebekah Leger, MPH; Marsha Broussard, DrPH, MPH

Objectives: To identify social cognitive outcomes relevant to a specific adolescent sexual risk reduction intervention, and to examine the program's impact on these. **Methods:** A randomized control trial involving 763 adolescents (recruited during 2012-2014) who were randomly assigned to either an 8-session general health intervention (control) or an 8-session sexual risk reduction intervention (treatment). Seven social cognitive outcomes were identified and assessed post-program using ordinary least squares regression. **Results:** Post-program, the treatment group ex-

hibited greater knowledge, self-efficacy, attitudes, and intentions related to safer sex practices. No differences in attitudes toward abstinence, peer norms, or perceived vulnerability. **Conclusions:** Results are promising, though insignificant results may diminish the program's behavioral impact. More research is needed to determine the extent to which outcomes are related to short and long term risk behaviors.

Key words: adolescents; sexual behavior; intervention; social cognitive

Am J Health Behav. 2015;39(5):610-622

DOI: <http://dx.doi.org/10.5993/AJHB.39.5.3>

When adolescents engage in high-risk sexual activity, they expose themselves to the possibility of deleterious outcomes, including sexually transmitted infections, HIV, and unintended pregnancy.^{1,2} The severe health, economic, and social consequences of these outcomes³⁻⁵ have compelled researchers to examine the causes and correlates of high-risk behaviors and to investigate what works to reduce that risk. In addition to socio-demographic^{6,7} and environmental factors,^{8,9} social-cognitive factors (eg, knowledge, beliefs, attitudes, self-efficacy) are hypothesized to be predictive of variation in adolescent sexual behavior.¹⁰⁻¹⁴ Given that researchers and practitioners believe these social-cognitive factors can be influenced through educational, cognitive-behavioral, and motivational interventions, there has been an emphasis over the past 20 years on developing programs that target these behavioral antecedents.^{15,16} Out of the body of research that examines the efficacy of these programs, a number of inter-

ventions have been identified that can be effective at reducing risky sexual behaviors (eg, number of partners, frequency of sex, and unprotected sex) and increasing protective behaviors (eg, abstinence, condom use consistency, HIV/STI testing, and partner communication).¹⁷⁻²² Often these are promoted and packaged as evidence-based programs (EBPs) and practices that can be replicated or adapted by organizations seeking to assuage the negative impact of adolescent sexual behaviors in their communities.²³⁻²⁵

Whereas findings on behavioral outcomes are promising, several reviews of literature have pointed out a need for better understanding of the hypothesized processes that are believed to be the basis of these behavioral effects.²⁶⁻²⁸ Although most sexual health interventions are said to have a theoretical underpinning, studies largely fail to explicate this theory, and many do not report on the effects of interventions on these antecedents in sufficient detail. Consider, for example, the 16 interventions identified in the US Department of Health and Human Services Office of Adolescent Health's (OAH's) Evidence-Based Programs Database as sexuality education EBPs.²⁹ Although research evidence cited in the database suggests nearly all the interventions are based in social cognitive or related theory,^{19-22,30-43} in only one case does a cited study explain the program's theoretic-

Sarah Walsh, Lead Senior Research Analyst, The Policy & Research Group, New Orleans, LA. Eric Jenner, Director of Research, The Policy & Research Group, New Orleans, LA. Rebekah Leger, Lead Research Analyst, The Policy & Research Group, New Orleans, LA. Marsha Broussard, OTPPP Project Director, Louisiana Public Health Institute, New Orleans, LA. Correspondence; Dr Walsh; sarah@policyandresearch.com

cal framework, discuss how and why the intervention aims to affect relevant social cognitive factors, and measure these.³⁹ For the remaining interventions, either social cognitive constructs are not examined (5 cases)^{30,34,38,40,43} or they are examined as baseline covariates⁴¹ or outcomes^{19-22,31-33,35-37,42} without explication of their connection to the program's underlying theory (10 cases). Whereas the behavioral effects are clearly the focus of these programs and the most important outcomes from a policy standpoint, more consideration of social-cognitive factors is needed, as these are the putative means by which sexual behaviors are influenced. More deliberate examination of how programs target these antecedents to behavior, and to what end, will allow researchers and program developers to improve their understanding of what the necessary components of risk-reduction interventions are, and, in the case of EBPs, which elements must be retained as programs are adapted and modified.

The current study contributes both broadly to literature on effective risk reduction strategies and narrowly to the evidence base for a specific HIV risk-reduction program by exploring the theoretical basis of 1 of the 16 sexuality education EBPs identified by OAH – *Becoming A Responsible Teen* (BART) – and by assessing the causal impacts of the program on theoretically relevant antecedents to behavioral change. BART is an out-of-school risk-reduction program targeted toward African-American youth that aims to provide cognitive behavioral training to reduce HIV risk.^{22,44} It has been identified as an intervention that “works” to reduce adolescent risk behavior by Advocates for Youth and is promoted as an EBP by both OAH and the Centers for Disease Control and Prevention (CDC).⁴⁵⁻⁴⁷ Though the program has been implemented numerous times across a variety of settings, the primary research evidence cited for its efficacy is a study published in 1995 that suggests it is effective in improving risk-related social-cognitive factors (eg, knowledge, attitudes, and self-efficacy) and reducing or delaying some sexual risk behaviors (eg, engagement in sex, unprotected sex) in African-American youth.²² To the authors' knowledge, 5 subsequent randomized control trials (RCTs) have been published that examine BART's efficacy when adapted to different target populations (eg, Haitian-American adolescents, incarcerated females) and different settings (eg, a juvenile reformatory, substance use treatment facility).⁴⁸⁻⁵² Though there is variation in sample demographics, sample sizes, and in outcomes examined, 3 of these^{48,50,51} report positive effects similar to those reported in the 1995 study (2 studies on incarcerated youth found limited program effects). Taken together, these studies suggest BART can be a promising and adaptable risk reduction intervention; however, they also indicate that it has limitations. What is problematic, and what the current study aims to address, is that even though several

of the studies indicate they are informed by theory (eg, information-motivation-behavior, social learning theory), they do not consistently emphasize and examine the same theoretical constructs (eg, some measure perceived risk, others intentions). Therefore, from this literature, we have only a partial understanding of the set of social cognitive factors that are influenced by the program and theoretically important for understanding its behavioral effects (or, lack thereof).

We propose to build on this literature by using Social Cognitive Theory (SCT), which is a common framework for interventions⁵³ and akin to the theories (social learning and efficacy) behind BART,^{44,54} to identify and test the full set of social-cognitive factors that program literature and theory imply are integral to behavior change and that hypothetically may be influenced by the intervention. To this end, first we used SCT to lay out a general framework for behavior change within the context of sexual risk reduction interventions. We then specified a set of social-cognitive outcomes that are indicated by SCT and are hypothesized to be influenced by specific BART program components. Finally, by way of an RCT, we examined the extent to which the intervention affects the social-cognitive constructs that theory and program literature suggest are the basis for the desired reduction in high-risk sexual behavior.

Our aim was to develop a more nuanced understanding of how this promising program works and to add to the evidence base specific to its programmatic effects. We also believe the applicability of this work extends beyond BART. As previously stated, interventions and EBPs often claim to be couched in SCT or related theory, yet few studies detail the theoretical framework and how and why theory is incorporated into programming. This potentially limits our understanding of what mechanisms are working in interventions to reduce sexual risks; therefore, we expect both our discussion of SCT and our findings to contribute more generally to an understanding of how theory informs risk reduction strategies and, ultimately, expected and observed outcomes.

Theoretical Framework: Social-Cognitive Theory

According to SCT, knowledge is a necessary foundation of behavior change because it influences cognitive and affective constructs, such as perceptions, beliefs, and attitudes that are believed to motivate behavior. As it relates to risk behaviors, knowledge is particularly important with regard to its influence on our perceptions of personal vulnerability to risk and our attitudes toward objects relevant to protective and risk behaviors.^{10,55,56} Both Bandura⁵⁵ and Fisher and Fisher⁵⁷ argue that for a risk reduction intervention to be effective participants must be informed not only of what risk behaviors are and of what the consequences of these behaviors are, but they also must be given

Table 1
Key Components in Each Session

Session	Overview
1. Understanding HIV & AIDS	Provides information on what HIV is, how it is transmitted, risk and protective behaviors, and HIV prevalence among the target population; it also dispels common HIV myths
2. Making sexual decisions and understanding your values	Reviews information on HIV transmission, risks, stereotypes, and prevalence; it also includes activities intended to personalize risk and to help participants identify support systems
3. Developing & Using Condom Skills	Presents facts about condoms, examines attitudes toward condoms and common barriers to their use, and provides demonstration of how to use condoms
4. Learning Assertive Communication Skills	Presents ways to negotiate safer sex, identifies common communication problems and possible solutions, and demonstrates different communication styles
5. Practicing Assertive Communication Skills	Presents tips for assertive communication, explores ways to say no; demonstrates and allows participants to practice assertive communication through role-play
6. Personalizing the Risks	Presents personal accounts of HIV through in person presentations or videos
7. Spreading the Word	Participants link assertive communication skills to their lives and identify ways to get out of risky situations; demonstrates and allows participants to practice sharing what they have learned
8. Taking BART with You	Reviews HIV facts; participants discuss how their behaviors or attitudes have changed and experiences sharing what they learned

information that makes them internalize these risks and understand that they could be affected adversely by engaging in risk behaviors. Participants also must be made aware that there are reasonable alternatives to the risk behaviors that they are capable of undertaking, and these alternatives will not diminish the pleasure or benefits they associate with the risk behaviors.

Whereas the provision of accurate information necessarily precedes purposeful attempts to engage in preventive behavior, information alone is not believed to be sufficient to eventuate behavior change. According to SCT, information and knowledge must be accompanied by the acquisition of self-regulatory and risk-reduction skills and the self-efficacy to use them.^{14,57,58} Self-efficacy, according to Bandura, “is the foundation of human motivation and action;”⁵⁶ without the belief that we can achieve a particular goal or successfully enact a particular behavior, we will lack the desire and self-motivation to attempt to do so.

SCT suggests that individuals’ perceptions of past performances and performances of “similar” others are key to building self-efficacy. If individuals see others perform a task and believe, based on that performance, that they too can undertake the task, they will be more likely to engage in the behavior. Similarly, if individuals perform a task or skill and perceive some level of success, they will be more likely to continue to engage in and sustain that behavior.^{13,14,56,59} Within the context of risk prevention and reduction interventions, both modeling and role play have been effective methods of developing and enhancing needed skills. Through such activities, participants can, within a safe en-

vironment, learn and practice their skills and receive feedback on how they performed. The more participants are able to engage in guided practice, the more they will become proficient in the skills and the more self-efficacy they will have to use those skills in real-life situations.^{55,58}

Another key principle of SCT is that that behavioral change is not entirely an internal process; social influences, especially the norms established by our peers and other groups with which we have affinity, can have a great effect on our motivation to carry out particular tasks or behaviors. Even in the face of past failure, or when equipped with knowledge that suggests otherwise, norms can encourage or proscribe certain behaviors. If individuals are socially rewarded for behaviors, they are more likely to perform them; however, if they are socially sanctioned, they are more likely to curtail them.^{55,59} Because peer norms and supports are thought to be particularly important influences on attitudes, intentions, and self-efficacy, SCT suggests that interventions must acknowledge the social context in which participants are rooted, and they must encourage participants to identify and cultivate social supports for behavior change and the adoption of safe-sex practices.^{55,57}

BART Program Objectives and Components

According to program material, BART includes 4 core components—information, skills training, opportunities to practice skills, and social support—that are meant to increase participants’ knowledge and awareness of risk, develop and enhance participants’ risk reduction skills, build attitudes supportive of condom use, and foster intentions/goals

Table 2
Research Questions and Hypothesized Outcomes

Research Question	Key Sessions	Hypothesized Social Cognitive Outcome
1. What is the impact of BART on participants' <i>knowledge</i> of STI risk, pregnancy risk, and safe-sex practices?	1, 2, 3, 4, 5, 8	Through information provided in group sessions, the treatment group is expected to exhibit more knowledge of how HIV is transmitted, HIV prevalence, risky and safe sex behaviors and consequences
2. What is the impact of BART on participants' <i>perceptions of vulnerability</i> related to high-risk sexual behaviors?	1, 2, 6	Through information provided on HIV prevalence and risk and through activities demonstrating HIV's impact on similar others the treatment group is expected to demonstrate greater awareness that their behaviors may put them at risk
3. What is the impact of BART on participants' <i>attitudes toward condoms</i> ?	1, 3, 4, 5, 6, 8	Having accurate information about HIV, having a better understanding of how to use condoms and the benefits of their use, understanding the potential for personal risk if condoms are not used during sex, and having the confidence to effectively negotiate condom use, the treatment group is expected to have more positive attitudes toward condom use and safe-sex practices
4. What is the impact of BART on participants' <i>attitudes toward sexual abstinence</i> ?	1, 4, 5	While the curriculum includes information and instruction on abstinence being the only certain protection against pregnancy and the transmission of HIV, the program emphasizes condom use and safe-sex skills. No difference between groups is expected.
5. What is the impact of BART on participants' <i>perceptions of peer group norms</i> regarding sexual activity and use of condoms?	7,8	BART does not directly attempt to affect peer support or peer norms through the development or identification of existing social supports or discussion of normative behaviors. However, through participants' discussions of what they have learned, their attitudes, and behaviors the treatment group is expected to perceive peers to be more supportive of safe-sex practices.
6. What is the impact of BART on participants' <i>self-efficacy to engage in safe-sex behaviors</i> ?	3,4,5,7	By learning and becoming proficient in risk reduction skills in a safe environment, the treatment group is expected to exhibit greater self-confidence in their abilities to buy condoms, to negotiate their use, and to say no to sex or sex without a condom
7. What is the impact of BART on participants' <i>intentions to engage in safe-sex behaviors</i> ?	2,3,4,5,7	Having more knowledge of HIV, pregnancy, safe sex, and by building risk reduction skills and self-efficacy to use those skills, the treatment group is expected to exhibit greater intentions to practice safe sex

to reduce high-risk behaviors.⁴⁴ The intervention is to be delivered in 8 sessions, 90 to 120 minutes each. Using the BART curriculum, we have constructed a synopsis of each of the 8 program sessions. We present this condensed summary in Table 1.

Based on this information, we identified a set of SCT constructs that may be influenced by the program. In Table 2, we present each construct formalized as both a research question and hypothesized outcome, and we indicate which sessions we expect to contribute to the hypothesized outcomes. Part of the challenge of this research was that the specific causal relationships between program content and social-cognitive outcomes are not clearly specified. As the intent of our study is exploratory, we have made the decision to be as inclusive as possible in this classification. Further specification of the model and exploration of mediating effects on behavioral outcomes will be developed in future research.

METHODS

Research Design and Procedures

Eligible participants were randomly assigned to the treatment or control condition. BART was the treatment condition. The control condition was a knowledge-based intervention that aims to impact nutrition, healthy eating, body image, and exercise; it provides a 2-hour informational session on HIV transmission and prevention that is identical to the first session of BART. Both interventions were offered to youth over 3 consecutive summers (2012 to 2014) under the auspices of a health education program, which was integrated into 3 youth summer employment programs in a large city in the southeast United States. The health education program was administered by a local public health entity and was funded through a federal teen pregnancy prevention initiative (Office of Public Health and Science/Office of Adolescent Health – Teenage Pregnancy Prevention: Replication of Evidence-based Programs).

Table 3
Outcome Measure Descriptions and Measures of Reliability

Variable	Number of Items	Sample Item	Response Format*	Chronbach's Alpha
Knowledge⁶⁰⁻⁶²				
Knowledge index	19	Lambskin condoms and latex condoms are equally protective against sexually transmitted infections.(F)	Multiple choice/ true false (0 = incorrect, 1 = correct; index score ranges from 0=no correct answers to 19 = all correct answers).	0.72
Perceived Vulnerability^{63,64}				
Belief of risk scale	3	If you were to have any type of sex but <i>not</i> use condoms, how likely do you think it is that you would become infected with HIV over the next year ?	5-point scale (1= very unlikely, 5 = very likely)	0.76
Attitudes Toward Condom Use⁶⁵				
Reliability scale	2	Condoms are unreliable.	5-point scale (1= strongly disagree, 5 = strongly agree) (negatively worded statements reverse coded).	0.32
Pleasure scale	3	The use of condoms can make sex more stimulating or enjoyable.		0.43
Stigma scale	3	Guys who suggest using a condom are really boring.		0.59
Negotiation scale	3	It is easy to suggest to my partner(s) that we use a condom.		0.56
Purchase scale	2	It is very embarrassing to buy condoms.		0.57
Attitudes Toward Abstinence⁶⁶				
Abstinence scale	3	I don't feel that I am ready to have sex at this point in my life.	5-point scale (1= strongly disagree, 5 = strongly agree) (negatively worded statements reverse coded)	0.63
Perceived Peer Group Norms⁶⁷				
Engagement in sex	1	Most of the people my age are having sex.	5-point scale (1= strongly disagree, 5 = strongly agree) (negatively worded statements reverse coded)	N/A
Use of condoms	1	Most of the people my age who have sex always use condoms.		N/A
Self-Efficacy⁶⁸				
Refuse sex scale	3	Imagine that you met someone at a party. He or she wants to have sex with you. Even though you are very attracted to each other, you're not ready to have sex. How sure are you that you could <i>keep from having sex</i> ?	3-point scale (1= Not sure at all, 3 = totally sure) (negatively worded statements reverse coded)	0.73
Communicate about condom use scale	2	If you have sexual intercourse with your boyfriend or girlfriend, how sure are you <i>that you could talk with him/her about birth control</i> ?		0.69
Buy and use condoms scale	3	How sure are you that you could use a condom correctly or explain to your partner how to use a condom correctly?		0.78
Intentions⁶⁹				
Practice safe sex scale	3	If you have sex during the next year , how likely is it that you or your partner will always use a condom?	4-point scale (1 = very unlikely, 4 = very likely)	0.93

Note.
a = Mean scores used in analysis of all scales

Numerous steps were taken to minimize bias resulting from study design. First, to maintain consistency across conditions, BART fidelity requirements were carried out in both the treatment and control interventions. This means that, in both conditions, classes were sex-specific and (with a few exceptions) contained between 5 and 15 participants, and teams (29 in all) consisting of 2 trained

health educators (1 man and 1 woman) facilitated both interventions. In addition, though fidelity requirements stipulate BART be completed in 8 sessions over 8 weeks, due to time constraints of the summer employment programs, both interventions were modified in the second and third summer to be completed in 8 sessions over 6 weeks. Second, for each cohort, the treatment and control inter-

ventions were offered on the same days and at the same times at each employment site (each site had multiple rooms to hold separate classes). Third, each health education team was required to facilitate equal numbers of sessions in both the control and treatment conditions, for each sex-specific group at each site; that is, if a team facilitated a session in the treatment intervention at one site to one group of either boys or girls, they were required to lead a session in the control intervention to the same sex at the same site.

Sample Selection and Assignment

To be eligible, teens were required to have: (1) been between the ages of 14 and 18 at the time of consent; (2) been assigned to a summer employment site offering the health education program; (3) not previously participated in a number of pre-specified risk reduction/pregnancy programs; and (4) assented to participate in the study and (if under age 18) provided parental consent to participate. Eligibility was assessed with screener questions included on the youth evaluation assent form which was mailed to all potential participants prior to site assignment; youth were asked to indicate their sex, age, and any prior participation in other teen pregnancy prevention programs operating in the city over the course of the evaluation (a list of programs was provided).

If participants met eligibility criteria, they were randomized into the study. Due to variation between sites and fidelity requirements for BART, the researchers used a blocked random assignment design; individuals were randomly assigned to treatment or control within cohort and site, according to sex and work shift. That is, each summer, individuals at each employment site were randomized into sex-specific treatment and control groups according to work shift (morning or afternoon).

At the end of the 3 years of programming, 850 youth were deemed eligible and randomized into 86 sex-specific study groups (ie, classes); each group comprised between 4 and 16 participants. Implementation data indicate participants attended an average of 6 of 8 sessions.

Data Collection

Data were obtained from a questionnaire comprised of 116 items that assessed participants' self-reported demographic characteristics, sexual behaviors, and antecedents to those behaviors. Items were adapted (by the researchers) from scales and instruments validated in prior research. Prior to the first survey administration, the questionnaire was field-tested with 10 health professionals (including MDs, MPHs, PhDs) as well as 12 adolescents (6 boys and 6 girl, ages 14 to 15) to ensure the questions were valid, relevant, and comprehensible by youth.

Trained proctors administered the questionnaire to the treatment and control groups at baseline

(prior to the start of the first program session) and post-program (following the conclusion of the final session). The questionnaires were administered during pre-allotted class time so that the treatment and control groups were taking the questionnaires at the same time (but in different rooms). The questionnaire was identical for both treatment and comparison groups at both data collection points (ie, the same questionnaire, with identical measures, was administered to both groups at baseline and post-program). To reduce attrition, proctors followed up with all participants who were not present at the post administration, and, to the extent possible, arranged to have participants complete the questionnaire either in person at an arranged administration site, via email/Internet, or through a mailed paper-and-pencil form. The average time for post completion was 5 days from program end, with over 75% of participants completing it on the day of the last program session. As incentive to participate, youth who enrolled in the study received one entry into a semi-annual raffle for an iPod Touch for each questionnaire completed.

Measures

Outcomes. Outcome measures were adapted from prior research and were the cognitive and affective antecedents of behavior identified in research questions (ie, knowledge, perceived vulnerability, attitudes toward condom use and abstinence, peer norms, self-efficacy, and intentions). With the exceptions of our measures of knowledge (which was a summative index score) and peer norms (which were individual item scores), all of our outcome measures were scales; scale scores reflect the mean of items composing each scale. For all outcomes, higher scores were desired. We provide details of our outcome measures, including the number of items in each measure, sample items, response format, score ranges, and where applicable, measures of scale and index reliability (Cronbach's α) in Table 3.

Independent variables. Our primary independent variable of interest was treatment group status (assignment to treatment group=1, control group=0). In addition, we included the following individual-level covariates (measured at baseline) and blocking variables: age (in years; range 14 to 18), sex (female=1, male=0), race (black/African-American=1, else=0), Hispanic (Hispanic=1, not Hispanic=0), parents' education (mean for mother and father; 1=less than high school to 5=graduate degree), family structure (lives with both biological parents=1, else=0), employment site (set of 12-1=11 indicators), employed (at site=1, else=0), cohort (set of 3-1=2 indicators; in cohort=1, else=0), and work shift (afternoon=0; morning=1).

Analytic Procedures

Informed by literature on how to address and mitigate the problems associated with missing

Table 4
Baseline Equivalence in
Analytic Samples

Measures	Standardized Differences ^a
Baseline Outcome Measures	
Knowledge	
Knowledge index	0.04
Perceived Vulnerability	
Belief of risk scale	0.25
Attitudes Toward Condom Use	
Reliability scale	0.07
Pleasure scale	0.15
Stigma scale	0.22
Negotiation scale	0.11
Purchase scale	0.02
Attitudes Toward Abstinence	
Abstinence scale	0.06
Perceived Peer Group Norms	
Engagement in sex	0.04
Use of condoms	0.08
Self-Efficacy	
Refuse sex scale	0.03
Communicate about condom use scale	0.09
Buy and use condoms scale	0.12
Intentions	
Practice safe sex scale	0.00
Socio-demographic Measures	
Age at baseline	0.07
Gender	0.06
Race	0.04
Hispanic	0.10
Parents' education	0.03
Family structure	0.12

Note.

a = For demographic variables, we present the maximum difference reported across samples.

data in RCTs,⁷⁰ our benchmark approach to handling missing data was to use dummy variable adjustment for missing pretest and covariate data and use case deletion for missing outcome data. Though a common practice in RCTs, we did not conduct significance tests to determine if our samples were equivalent or if covariates should be included in our analyses. Rather, following research on establishing balance in RCTs and quasi-

experimental designs,⁷¹⁻⁷⁴ all covariates were selected according to *a priori* expectations that they may be influential, and we examined equivalence of groups in our analytic samples by calculating standardized mean differences of covariate measures. Though there is no standard for determining imbalance, we considered differences of less than or equal to .25 as evidence of balance.⁷⁴

We estimated the causal impact of BART on each outcome separately using a regression-estimated (ordinary least squares) approach that modeled that outcome as a function of treatment status and the covariates identified above. Whereas the random assignment procedure should be sufficient to balance the analytic sample and the unadjusted mean difference in values of the outcome variables at posttest should provide an unbiased estimate of program impact, we statistically adjusted for covariates to increase the precision of our estimates and to account for blocking procedures. Impact estimates from our analyses are presented as coefficients, standardized coefficients, and in terms of standardized effect sizes (Hedges' *g*). We inferred a causal impact if differences in treatment and control groups are significant at the $\alpha = .05$ level. We did not control for multiple comparisons across or within research questions. Our rationale rested on the fact that each research question dealt with a distinct theoretical construct, and, though we use multiple measures for 3 of our outcomes (attitudes toward condoms, peer group norms, and self-efficacy), they captured distinct domains of those outcomes.^{75,76}

RESULTS

Of the initial 850 youth who were eligible and randomized, 763 (approximately 90%) completed a baseline and post-program questionnaire, with less than a 1% difference in response between the treatment and control groups (though due to item non-response in our outcome variables, there is variation in our analytic samples). In the resulting analytic samples approximately 85% identified as African-American or black, 13% identified as multiracial, 3% identified as Hispanic, and half were girls; at the time of enrollment, participants were an average of 15 years old.

For each sample, baseline equivalence was convincing. In no case were standardized differences greater than .25. Results of the equivalence tests for our analytic samples are presented in Table 4. A descriptive profile of the mean baseline and post-program scores of the outcome measures in our analytic samples are presented in Table 5. Causal impact estimates are presented in Table 6.

Outcomes

Knowledge. BART had a significant and positive impact on knowledge relevant to the reduction of high-risk sex. Table 5 shows mean scores improved for both treatment and comparison groups; however, Table 6 shows the treatment group dem-

Table 5
Mean Baseline and Postprogram Scores of Outcome Measures in Analytic Samples

Outcome	Control			BART		
	N	Baseline	Posttest	N	Baseline	Posttest
Knowledge						
Knowledge index	377	9.66	10.05	386	9.81	11.92
Perceived Vulnerability						
Belief of risk scale	340	3.11	2.99	349	3.37	3.14
Attitudes Toward Condom Use						
Reliability scale	339	3.49	3.50	355	3.55	3.74
Pleasure scale	334	3.08	3.10	352	3.17	3.28
Stigma scale	329	3.93	3.75	349	4.09	3.93
Negotiation scale	329	3.67	3.58	355	3.75	3.73
Purchase scale	348	3.49	3.35	359	3.47	3.53
Attitudes Toward Abstinence						
Abstinence scale	338	3.13	3.14	359	3.18	3.18
Perceived Peer Group Norms						
Engagement in sex	352	1.92	1.90	373	1.88	1.94
Use of condoms	353	3.06	3.00	372	2.99	3.03
Self-Efficacy						
Refuse sex scale	341	2.42	2.37	347	2.41	2.48
Communicate about condom use scale	341	2.49	2.38	344	2.56	2.53
Buy and use condoms scale	338	2.29	2.23	344	2.34	2.47
Intentions						
Practice safe sex scale	352	3.58	3.47	368	3.58	3.76

Note.

N = number of participants included in the analytic sample for each outcome.

onstrated significantly higher posttest index scores than the control group. The treatment effect in our OLS regression was positive and statistically significant ($b = 1.80$; $p < .001$, $g = .44$).

Perceived vulnerability. BART had no effect on participants' perceptions of personal vulnerability. Results in Table 6 demonstrate there was no significant difference between groups at posttest; Table 5 shows perceived risk declines for both groups post-program.

Attitudes toward condoms. BART had a significant and positive impact on participants' attitudes toward condoms. Table 5 shows that in both the treatment and control groups, reliability, pleasure, and purchasing scale scores were generally higher post-program, signifying that attitudes were more supportive toward these objects for both groups. By contrast, posttest scores for stigma and negotiation were lower for both treatment and control groups, as compared to baseline, signifying that both groups' attitudes had become less support-

ive of condom use in the stigma and negotiation dimensions. Nevertheless, as shown in Table 3, after the program, BART participants scored significantly higher on each of the 5 attitude scales that measure perceived benefits of condom use: reliability scale ($b = .22$; $p < .001$, $g = .26$), pleasure scale ($b = .15$; $p < .01$, $g = .24$), stigma scale ($b = .12$; $p < .05$, $g = .15$), negotiation scale ($b = .11$; $p < .05$, $g = .15$), and purchase scale ($b = .19$; $p < .01$, $g = .19$).

Attitudes toward abstinence. BART did not appear to influence participants' attitudes toward abstinence. Results indicated there were no significant differences between groups' attitudinal scale scores postprogram.

Peer group norms. No intervention effects are evident regarding participants' perceptions of peer group norms. Post-program, there were no significant differences in item scores reflecting the extent to which participants believe their peers are: (1) engaging in sex; and (2) using condoms.

Table 6
Regression Results: Impact of BART on Social Cognitive Outcomes

Outcome	N	b(SE)	β	p	g	Adjusted R ²
Knowledge						
Knowledge index	763	1.80(0.23)	0.22	0.000	0.44	0.42
Perceived Vulnerability						
Belief of risk scale	689	0.08(0.08)	0.03	0.352	0.07	0.11
Attitudes Toward Condom Use						
Reliability scale	694	0.22(0.06)	0.13	0.000	0.26	0.12
Pleasure scale	686	0.15(0.04)	0.12	0.001	0.24	0.15
Stigma scale	678	0.12(0.06)	0.08	0.030	0.15	0.19
Negotiation scale	684	0.11(0.05)	0.07	0.035	0.15	0.19
Purchase scale	707	0.19(0.07)	0.09	0.004	0.19	0.26
Attitudes Toward Abstinence						
Abstinence scale	697	0.42(0.42)	0.01	0.833	0.01	0.42
Perceived Peer Group Norms						
Engagement in sex	725	0.06(0.06)	0.03	0.309	0.07	0.24
Use of condoms	725	0.05(0.07)	0.03	0.474	0.05	0.09
Self-Efficacy						
Refuse sex scale	688	0.13(0.04)	0.11	0.000	0.22	0.38
Communicate about condom use scale	685	0.13(0.04)	0.20	0.003	0.41	0.23
Buy and use condoms scale	682	0.23(0.04)	0.10	0.000	0.21	0.18
Intentions						
Practice safe sex scale	720	0.30(0.1)	0.10	0.003	0.20	0.25

Note.

b = unstandardized regression coefficient of treatment indicator

SE = standard error of the treatment indicator

β = standardized regression coefficient of treatment indicator

p = p value

g = standardized effect size (Hedges' *g*) of treatment indicator

Adjusted R² = variance in each model explained by treatment indicator and covariates

Self-efficacy. Results suggest a positive treatment effect on participants' self-efficacy to engage in safer-sex practices. Positive and statistically significant regression coefficients, presented in Table 6, suggest that at post-program, the BART group had higher levels of self-efficacy to refuse sex ($b = .13$; $p < .001$; $g = .22$), to be assertive in their communication about condom use ($b = .13$; $p < .01$; $g = .21$), and to buy and use condoms ($b = .23$; $p < .001$; $g = .41$) than the control group. Note that whereas both groups had higher post-program scores for self-efficacy to refuse sex and to buy and use condoms, they reported lower self-efficacy to communicate about condom use (Table 2).

Intentions. BART had a significant and positive impact on participants' intentions to engage in safe-sex practices. The mean intentions scale scores were higher for both groups at post-program, but the regression coefficient in Table 6 is

positive and statistically significant, suggesting that BART participants exhibited greater intentions to practice safer sex ($b = .30$; $p < .01$; $g = .20$).

DISCUSSION

The purpose of this study was two-fold. First, we systematically identified a set of social-cognitive outcomes that theory suggests are relevant antecedents to behavior change and hypothetically, should be influenced by a promising risk-reduction program. This preliminary theoretical work was necessary, as prior studies had not been thorough in specifying the theoretical constructs that should be affected by the program. Second, we tested the causal effects of the intervention on those outcomes by way of an RCT.

Consistent with our expectations and past research on BART, we found that immediately after the program, relative to the control group, BART

participants exhibited the following traits: greater knowledge of STIs, HIV, risks, and safer-sex practices; more positive attitudes regarding support for condom use (but no difference in attitudes toward abstinence); greater self-efficacy to refuse sex, to communicate about condom use, and to buy and use condoms; and greater intentions to practice safer sex. Whereas the finding for knowledge may appear counterintuitive as both the treatment and control received the same initial 2-hour informational session, it was expected because BART participants were exposed to information relative to risk reduction and prevention throughout the 8-session curriculum that control participants were not.

Contrary to our hypotheses, we found no evidence that the program influences perceptions of peer norms or perceptions of personal vulnerability to risks, and, in fact, perceptions of personal vulnerability appear to decrease for both the control and treatment group post-program. The first finding was not entirely surprising because the program does not directly address perceptions of peer norms, but instead, aims to have participants actively change the norms in their communities. Whereas to the authors' knowledge no other studies on BART have examined peer norms, similar programs that have included more explicit attempts to increase social supports for safer-sex behaviors or to change beliefs about what is considered "normal" adolescent sexual behavior have been evinced to affect peer norms either by increasing perceptions that peers engage in safer sex practices or by preventing perceptions that "everyone is doing it" from increasing over time.^{31,39}

The second finding was surprising, even in light of the fact that prior research on BART has reported similar results.^{22,50} Prior research suggests that the failure of BART to increase perceived risk is potentially a result of "optimistic bias," or the belief that people, especially youth, perceive themselves to be at a lower risk than others.²² Without clear evidence to suggest this is the case, this explanation is not convincing because the BART curriculum overtly deals with this issue by devoting considerable time (one full session and emphasis throughout) to personalizing risk through imparting knowledge relevant to youth, examining experiences of similar others, and examining personal risk factors; other researchers have noted that these components are developmentally appropriate.⁷⁷ The finding also did not appear to be a result of other related issues – neither age nor baseline sexual behaviors (eg, lifetime or recent engagement in sex, recent engagement in unprotected sex) were significantly related to perceived risk post-program (results not presented), nor were there significant interactions between treatment status and these variables. This suggests no obvious influence of participants' cognitive or sexual maturity on outcomes.⁷⁷ Although it is not clear why the program did not impact perceived vulnerability, staff mem-

bers involved with the health education program do offer one possible explanation for the reported declines. They indicate that prior to the program, participants often had incomplete or inaccurate knowledge of HIV transmission (eg, they might have thought HIV can be contracted through hugging or riding in a car). Through exposure to the informational component of BART, which both treatment and control received, participants' personal sense of risk declined because they realized these assumptions to be false.

Regardless of the reason we did not find statistically significant results, because both peer norms and perceived vulnerability are integral components of SCT (and other related behavioral theories), research should be done to explore these findings. Our future research will examine the extent to which the intervention reduces high-risk sexual behaviors and mediates the outcomes examined here.

This study adds to the evidence base and theoretical understanding of a specific sexual risk-reduction program, BART. Findings concerning the impact of the program on social cognitive factors are consistent with past research, and, at the same time, point to a need for further investigation into why particular elements of the program did not produce intended results and what (if anything) may be the consequence of this. The study's contents and findings are also relevant to the larger body of work on the efficacy of similar programs. They show that programs steeped in theory can, but do not necessarily, have a significant impact on antecedents to sexual risk behaviors. This is especially pertinent given a noted contradiction in this body of work – whereas most interventions are said to be based on theory, few studies adequately highlight the role of theory in the interventions or outcomes. Therefore, although we have an increasing knowledge of particular programs and practices that are effective at reducing risk, we still have a limited understanding of how and why these work to affect social cognitive constructs, and thereby, promote risk reduction behavior.

There are both strengths and limitations of the current research. The primary strength rests on the strong study design. This study is an RCT with a large and balanced sample, and the researchers made many methodological considerations to minimize bias from being insinuated through program implementation and data collection procedures. The primary weakness concerns the reliability of our data and measures. Self-reported data have well-known weaknesses; although we took steps to improve the quality of the data, we cannot be assured of their reliability. Also, we adapted our outcome measures from scales and instruments used in prior research, but we decided in some cases to abbreviate these scales or to use single-item measures to reduce respondent burden. Because they are comprised of a few items, a number of our composite measures (most notably our attitude mea-

tures) do not meet the conventional standard for reliability of $\alpha \geq .70$. Though we could have combined our attitude scales to create a global measure of condom attitudes with a more satisfactory reliability coefficient ($\alpha = .73$), we followed the advice of the authors of these items not to do so as the subscales more accurately capture the multidimensionality of the attitudes measured.⁶⁵

Human Subjects Approval Statement

The study was approved by Ethical & Independent Review Services (Study Number 11049-04).

Conflicts of Interest

The authors declare no conflicts of interest. The first 3 authors serve as external evaluators for the grant, and the third author is the program director, responsible for program implementation and monitoring.

Acknowledgments

This publication was made possible by Grant Number 5 TP1AH000003-02-00 from the Office of Adolescent Health (OAH). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Office of Adolescent Health, the Office of the Assistant Secretary for Health, or the Department of Health and Human Services.

References

- Martinez G, Copen CE, Abma JC. Teenagers in the United States: sexual activity, contraceptive use, and child-bearing 2006-2010. *Vital Health Stat* 23. 2011;23(31).
- Centers for Disease Control and Prevention. Sexually transmitted disease surveillance 2012. Available at: <http://www.cdc.gov/std/stats12/Surv2012.pdf>. Accessed June 15, 2014.
- Centers for Disease Control and Prevention. CDC fact sheet: incidence, prevalence, and cost of sexually transmitted infections in the United States. Available at: <http://www.cdc.gov/std/stats/STI-Estimates-Fact-Sheet-Feb-2013.pdf>. Accessed June 15, 2014.
- The National Campaign to Prevent Teen and Unplanned Pregnancy. Counting it up: key data. Available at: <https://thenationalcampaign.org/resource/counting-it-key-data-2013>. Accessed June 15, 2014.
- Owusu-Edusei K, Chesson H, Gift T, et al. The estimated direct medical cost of selected sexually transmitted infections in the United States, 2008. *Sex Transm Dis*. 2013;40(3):197-201.
- Blum RW, Beuhring T, Shew ML, et al. The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *Am J Public Health*. 2000;90(12):1879-1884.
- Santelli JS, Lowry R, Brenner ND, Robin L. The association of sexual behaviors with socioeconomic status, family structure, and race/ethnicity among US adolescents. *Am J Public Health*. 2000;90(10):1582-1588.
- Brewster KL. Race differences in sexual activity among adolescent women: the role of neighborhood characteristics. *Am Sociol Rev*. 1994;59(3):408-424.
- Miller BC, Benson B, Galbraith KA. Family relationships and adolescent pregnancy risk: a research synthesis. *Developmental Review*. 2001;21(1):1-38.
- Ajzen I, Joyce N, Sheikh S, Cote N. Knowledge and the prediction of behavior: the role of information accuracy in the theory of planned behavior. *Basic Appl Soc Psych*. 2011;33(2):101-117.
- Fisher W, Williams S, Fisher J, Malloy T. Understanding AIDS risk behavior among sexually active urban adolescents: an empirical test of the information-motivation-behavioral skills model. *AIDS Behav*. 1999;3(1):13-23.
- Taylor D, Bury M, Camping N, et al. A review of the use of the Health Belief Model (HBM), the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB) and the Trans-Theoretical Model (TTM) to study and predict health related behavior change. *National Institute for Health and Clinical Excellence*. NICE guidelines PH6. 2006;1-215.
- Bandura A, Adams NE, Beyer J. Cognitive processes mediating behavioral change. *J Pers Soc Psychol*. 1977;35(3):125-139.
- Bandura A. Self-efficacy mechanism in human agency. *Am Psychol*. 1982;37(2):122-147.
- Kirby D. The impact of schools and school programs upon adolescent sexual behavior. *J Sex Res*. 2002;39(1):27-33.
- Kirby D. *Emerging Answers: Research Findings on Programs to Reduce Teen Pregnancy and Sexually Transmitted Diseases*. Washington, DC: The National Campaign to Prevent Teen and Unplanned Pregnancy; 2007.
- Borawski E, Trapl E, Lovegreen L, et al. Effectiveness of abstinence-only intervention in middle school teens. *Am J Health Behav*. 2005;29(5):423-434.
- Denny G, Young M, Rausch S, Spear C. An evaluation of an abstinence education curriculum series: Sex Can Wait. *Am J Health Behav*. 2002;26(5):366-377.
- Jemmott III JB, Jemmott L, Fong GT. Abstinence and safer sex HIV risk-reduction interventions for African American adolescents: a randomized controlled trial. *JAMA*. 1998;279(19):1529-1536.
- DiClemente RJ, Wingood GM, Rose ES, et al. Efficacy of sexually transmitted disease/human immunodeficiency virus sexual risk-reduction intervention for African American adolescent females seeking sexual health services: a randomized controlled trial. *Arch Pediatr Adolesc Med*. 2009;163(12):1112-1121.
- Jemmott III JB, Jemmott LS, Braverman PK, Fong GT. HIV/STD risk reduction interventions for African American and Latino adolescent girls at an adolescent medicine clinic: a randomized controlled trial. *Arch Pediatr Adolesc Med*. 2005;159(5):440-449.
- St Lawrence JS, Brasfield TL, Jefferson KW, et al. Cognitive-behavioral intervention to reduce African American adolescents' risk for HIV infection. *J Consult Clin Psychol*. 1995;63(2):221-237.
- Centers for Disease Control and Prevention. Replicating effective programs plus. Available at: <http://www.cdc.gov/hiv/prevention/research/rep/index.html>. Accessed March 20, 2015.
- Rotheram-Borus MJ, Ingram BL, Swendeman D, Flannery D. Common principles embedded in effective adolescent HIV prevention programs. *AIDS Behav*. 2009;13(3):387-398.
- US Department of Health and Human Services, Office of Adolescent Health. TPP Resource Center: evidence-based programs. Available at: <http://www.hhs.gov/ash/oah/oah-initiatives/teen-pregnancy/db/>. Accessed March 20, 2015.
- Huebner DM, Neilands TB, Rebchook GM, Kegeles SM. Sorting through chickens and eggs: a longitudinal examination of the associations between attitudes, norms, and sexual risk behavior. *Health Psychol*. 2011;30(1):110-118.
- Pedlow CT, Carey MP. HIV sexual risk-reduction interventions for youth: a review and methodological critique of randomized controlled trials. *Behav Modif*. 2003;27(2):135-190.
- Fisher JD, Fisher WA. *Theoretical Approaches to Individ-*

- ual-Level Change in HIV Risk Behavior. CHIP Documents. 2000;4. Available at: http://digitalcommons.uconn.edu/chip_docs/4. Accessed June 16, 2014.
29. US Department of Health and Human Services, Office of Adolescent Health. Evidence-based programs searchable program database. Available at: http://www.hhs.gov/ash/oah/oah-initiatives/teen_pregnancy/db/tpp-searchable.html. Accessed March 20, 2015.
 30. Boyer CB, Shafer M, Shaffer RA, et al. Evaluation of a cognitive-behavioral, group randomized controlled intervention trial to prevent sexually transmitted infections and unintended pregnancies in young women. *Prev Med*. 2005;40(4):420-431.
 31. Coyle K, Basen-Engquist K, Kirby D, et al. Safer choices: reducing teen pregnancy, HIV, and STDs. *Public Health Rep*. 2001;116(Suppl 1):82-93.
 32. Coyle KK, Kirby DB, Marin BV, et al. Draw the line/ respect the line: a randomized trial of a middle school intervention to reduce sexual risk behaviors. *Am J Public Health*. 2004;94(5):843-851.
 33. DiClemente RJ, Wingood GM, Harrington KF, et al. Efficacy of an HIV prevention intervention for African American adolescent girls: a randomized controlled trial. *JAMA*. 2004; 292(2):171-179.
 34. Erkut S, Grossman JM, Frye AA, et al. Can sex education delay early sexual debut? *J Early Adolesc*. 2013;33(4):482-497.
 35. Jemmott III, JB. Reductions in HIV risk-associated sexual behaviors among black male adolescents: effects of an AIDS prevention intervention. *Am J Public Health*. 1992;82(3):372-377.
 36. Jemmott JB, Jemmott L, Fong GT, McCaffree K. Reducing HIV risk associated sexual behavior among African American adolescents: testing the generality of intervention effects. *Am J Community Psychol*. 1999;27(2):161-187.
 37. Jemmott III JB, Jemmott LS, Fong GT, Morales KH. Effectiveness of an HIV/STD risk-reduction intervention for adolescents when implemented by community based organizations: a cluster-randomized controlled trial. *Am J Public Health*. 2010;100(4):720-726.
 38. Jemmott JB III, Jemmott LS, Fong GT. Efficacy of a theory based abstinence-only intervention over 24 months: a randomized controlled trial with young adolescents. *Arch Pediatr Adolesc Med*. 2010;164(2):152-159.
 39. Kirby D, Barth RP, Leland N, Fetro JV. Reducing the risk: impact of a new curriculum on sexual risk-taking. *Fam Plann Perspect*. 1991;23(6):253-263.
 40. Morrison-Beedy D, Jones SH, Xia Y, et al. Reducing sexual risk behavior in adolescent girls: results from a randomized controlled trial. *J Adolesc Health*. 2013;52(3):314-321.
 41. Sikkema KJ, Anderson ES, Kelly JA, et al. Outcomes of a randomized, controlled community-level HIV prevention intervention for adolescents in low-income housing developments. *AIDS*. 2005;19(14):1509-1516.
 42. Tortolero SR, Markham CM, Fleschler Peskin M, et al. It's your game: keep it real: delaying sexual behavior with an effective middle school program. *J Adolesc Health*. 2010;46(2):169-179.
 43. Villarruel AM, Jemmott JB, Jemmott LS. A randomized controlled trial testing an HIV prevention intervention for Latino youth. *Arch Pediatr Adolesc Med*. 2010;160(8):772-777.
 44. St. Lawrence JS. *B.A.R.T.: Becoming a Responsible Teen: An HIV Risk-Reduction Program for Adolescents*. Santa Cruz, CA: ETR Associates; 2005.
 45. Advocates for Youth. *Science and Success - Sex Education and Other Programs that Work to Prevent Teen Pregnancy, HIV and Sexually Transmitted Infections*. 2nd ed. Washington DC: Advocates for Youth; 2008. Available at: <http://www.advocatesforyouth.org/publications/1138?task=view>. Accessed March 30, 2015.
 46. Centers for Disease Control and Prevention. Evidence-based interventions and best practices for HIV prevention. Available at: <http://www.cdc.gov/hiv/prevention/research/compendium/rr/complete.html>. Accessed March 30, 2015.
 47. Office of Adolescent Health TPP Resource Center. Evidence based programs. Available at: http://www.hhs.gov/ash/oah/oah-initiatives/teen_pregnancy/db/. Accessed March 30, 2015.
 48. St. Lawrence JS, Jefferson KW, Alleyne E, Brasfield TL. Comparison of education versus behavioral skills training interventions in lowering sexual HIV-risk behavior of substance-dependent adolescents. *J Consult Clin Psychol*. 1995;63(1):154-157.
 49. St Lawrence J, Crosby R, Belcher L, et al. Sexual risk reduction and anger management interventions for incarcerated male adolescents: a randomized controlled trial of 2 interventions. *Journal of Sex Education and Therapy*. 1999;24(1-2):9-17.
 50. St Lawrence J, Crosby R, Brasfield T, O'Bannon III R. Reducing STD and HIV risk behavior of substance dependent adolescents: a randomized controlled trial. *J Consult Clin Psychol*. 2002;70(4):1010-1021.
 51. Malow RM, Stein JA, McMahon RC, et al. Effects of a culturally adapted HIV prevention intervention in Haitian youth. *J Assoc Nurses AIDS Care*. 2009;20(2):110-121.
 52. Robertson AA, St Lawrence JS, Morse DT, et al. Comparison of health education and STD risk reduction interventions for incarcerated adolescent females. *Health Educ Behav*. 2011;38(3):241-250.
 53. Malow RM, Kershaw T, Sipsma H, et al. HIV preventive interventions for adolescents: a look back and ahead. *Curr HIV/AIDS Rep*. 2007;4(4):173-80.
 54. St Lawrence JS, Fortenberry JD. Behavioral interventions for STDs: theoretical models and intervention methods. In Aral SO, Douglas JM, eds. *Behavioral Interventions for Prevention and Control of Sexually Transmitted Diseases*. New York: Springer Science+Business Media, LLC; 2007:23-59.
 55. Bandura A. Social cognitive theory and exercise of control over HIV infection. In DiClemente RJ, Peterson JL, eds. *Preventing AIDS: Theories and Methods of Behavioral Interventions*. New York, NY: Plenum Press; 1994:25-59.
 56. Bandura A. Health promotion by social cognitive means. *Health Educ Behav*. 2004;31(2):143-164.
 57. Fisher JD, Fisher WA. Theoretical approaches to individual-level change in HIV risk behavior. In Peterson JL, DiClemente RJ, eds. *Handbook of HIV Prevention*. Dordrecht Netherlands: Kluwer Academic Publishers; 2000:3-55.
 58. Bandura A. Social cognitive theory of self-regulation. *Org Behav Hum Decis Process*. 1991;50(2):248-287.
 59. Bandura A. Social cognitive theory. In Vasta R, ed. *Annals of Child Development*. Vol. 6. *Six Theories of Child Development*. Greenwich, CT: JAI Press; 1992:1-60.
 60. Kirby D. Mathtech questionnaires: sexuality questionnaires for adolescents. In Davis C, Yarber W, Bauserman R, et al, eds. *Handbook of Sexuality-Related Measures*. Thousand Oaks, CA: SAGE; 1998:35-47.
 61. Shrier LA, Ancheta RR, Goodman EE, et al. Randomized controlled trial of a safer sex intervention for high-risk adolescent girls. *Arch Pediatr Adolesc Med*. 2001;155(1):73-79.
 62. Yarber W, Torabi M. HIV prevention knowledge test for teenagers. In Davis C, Yarber W, Bauserman R, et al, eds. *Handbook of Sexuality-Related Measures*. Thousand Oaks, CA: SAGE; 1998:361-364.
 63. Condelli L. Social and attitudinal determinants of contraceptive choice: using the health belief model. *J Sex Res*. 1986;22(4):478-491.

64. Condelli L. The contraceptive utilities, intention and knowledge scale. In Davis C, Yarber W, Bauserman R, et al, eds. *Handbook of Sexuality-Related Measures*. Thousand Oaks, CA: SAGE; 1998:147-152.
65. Helweg-Larsen M, Collins BE. The UCLA Multidimensional Condom Attitudes Scale: documenting the complex determinants of condom use in college students. *Health Psychol.* 1994;13(3):224-237.
66. Miller BC, Norton MC, Fan X, Christopherson CR. Pubertal development, parent communication, and sexual values in relation to adolescent sexual behaviors. *J Early Adolesc.* 1998;18(1):27-52.
67. Misovich SJ, Fisher WA, Fisher JD. Health and relationships survey – behavioral intentions for AIDS prevention scale. In Davis C, Yarber W, Bauserman R, et al, eds. *Handbook of Sexuality-Related Measures*. Thousand Oaks, CA: SAGE; 1998:35-47.
68. Basen-Engquist K, Masse LC, Coyle K, et al. Validity of scales measuring the psychosocial determinants of HIV/STD-related risk behavior in adolescents. *Health Educ Res.* 1999;14(1):25-38.
69. Mausbach BT, Semple SJ, Strathdee SA, Patterson TL. Predictors of safer sex intentions and protected sex among heterosexual HIV-negative methamphetamine users: an expanded model of the theory of planned behavior. *AIDS Care.* 2009;21(1):17-24.
70. Puma MJ. What to do when data are missing in group randomized controlled trials. *National Center for Education Evaluation and Regional Assistance: Institute of Education Sciences*. Washington, DC: US Department of Education; 2009:0049.
71. Austin PC. Balance diagnostics for comparing the distribution of baseline covariates between treatment groups in propensity-score matched samples. *Stat Med.* 2009;28(25):3083-3107.
72. Roberts C, Torgerson DJ. Baseline imbalance in randomised controlled trials. *BMJ.* 1999;319(7203):185.
73. Senn S. Testing for baseline balance in clinical trials. *Stat Med.* 1994;13(17):1715-1726.
74. Stuart EA. Matching methods for causal inference: a review and a look forward. *Stat Sci.* 2010;25(1):1-21.
75. Cook RJ, Farewell VT. Multiplicity considerations in the design and analysis of clinical trials. *J Royal Stat Soc Ser A Stat Soc.* 1996;159(1):93-110.
76. Schochet PZ. Technical methods report: guidelines for multiple testing in impact evaluations. *National Center for Education Evaluation and Regional Assistance: Institute of Education Sciences*. Washington, DC: US Department of Education; 2008:4018.
77. Pedlow CT, Carey MP. Developmentally-appropriate sexual risk reduction interventions for adolescents: rationale, review of interventions, and recommendations for research and practice. *Ann Behav Med.* 2004;27(3):172-184.