

Original article

Influence of prior sexual risk experience on response to intervention targeting multiple risk behaviors among adolescents

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Abstract

Purpose: To identify correlates of sexual risk variations among African-American adolescents, and to examine the influence of prior sexual experience on response to a HIV risk-reduction intervention.

Methods: Eight hundred seventeen African-American youth aged 13 to 16 years living in and around urban public housing in Baltimore were recruited to participate in a HIV risk-reduction intervention targeting multiple risk behaviors. An instrument designed to measure three levels of sexual risk (“abstinent,” “protected sex” [having sex with a condom], and “unprotected sex” [having sex without a condom]) was administered at baseline, 6 months and 12 months postintervention. Multiple regression analyses were conducted to identify predictors of the degree of sexual risk using longitudinal data. Repeated measure analyses were conducted to assess behavioral changes over time among the three groups.

Results: Data confirmed the co-variation of sexual risk behavior and other problem behaviors among adolescents, cross-sectionally and longitudinally. After exposure to an 8-session risk-reduction intervention, youth engaging in the highest degree of sexual risk demonstrated the greatest reduction in both sexual risk and other risks. These improvements were seen at both 6 months and 12 months postintervention. Youth who were abstinent at baseline maintained the lowest levels in risk involvement throughout the study period when compared with sexually active youth. However, abstinent youth risk involvement significantly increased at 6 months and 12 months after baseline. Youth engaging in protected sex at baseline demonstrated a significant increase in non-condom use and a significant decrease in multiple risk involvement over time.

Conclusions: Results support HIV risk-reduction intervention efforts that target multiple risk behaviors. Response of adolescents to the intervention is directly related to the sexual risk behavior at baseline. These data may suggest that the response to risk behavior intervention depends in part on the risk behavior profile of the population to which it is being applied. © 2005 Society for Adolescent Medicine. All rights reserved.

Keywords: Adolescent; African-American; HIV; Sexual risk behavior

The rates of condom use among sexually active adolescents have increased over the past decade. The Centers for

Disease Control (CDC) reported in 2001 that 58.2% of youth used a condom at their last sexual encounter [1]. Because condom use may now be considered “normative,” it is reasonable to speculate that unprotected sexual behavior, rather than simply a history of sexual intercourse, may be associated with other problem behaviors (e.g., substance abuse, delinquent behavior and precocious sexual activity).

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The Problem Behavior Theory of Donovan and Jessor [2,3] acknowledges the complexity of risk-taking in youth and proposes that problem behaviors tend to cluster in an individual owing to environmental and personality factors. Although there is considerable evidence that sexual intercourse is associated with other problem behaviors [2,3], there are reports of a lack of association of sexual intercourse alone with other risk behaviors among early African-American youth [4,5]. Given these facts and the importance of this population in the HIV epidemic [6,7], the question of co-variation of risk behaviors among African-American youth practicing sex without using condoms is of particular interest.

Earlier research argued that the specific sexual behaviors that put one at high risk for HIV infection and other STDs (high-risk sexual behaviors) are more likely to be practiced by deviance-prone adolescents [8]. Recently, researchers have examined correlates of high-risk sexual behaviors with substance use and drug use among high school students and African-American adolescents [8–12]. High-risk sexual behaviors in these studies have been defined as sex without a condom, sex with multiple partners, frequent sexual activity, or sex with a high-risk partner including prostitutes, homosexual or bisexual men, or intravenous drug users. Indices of high-risk sexual behaviors composed from the scores of some or all of these items were introduced in these studies. Consistent results indicated that adolescents were more likely to engage in high-risk sexual behavior when they were engaging in other forms of problem behaviors.

Numerous intervention efforts have sought ways to increase condom use among sexually active adolescents [13–18]. There has been a growing recognition of the need for programs that broaden intervention effects over a wider range of risk behaviors [19]. There is also some evidence that interventions targeting multiple risk behaviors are less effective than those focusing more narrowly on a specific behavior [20]. Few intervention studies have been designed to address the question of multiple risk behaviors. Recently we conducted an analysis using the same sample as our current study to determine the effectiveness of three adolescent risk-reduction intervention strategies targeting multiple risk behaviors including sexual risk (sexual initiation and safer sex), drug abuse (tobacco, alcohol and illegal drugs) and drug trafficking (selling and delivering drugs) [21]. Findings revealed that youth who received a parenting intervention in addition to a basic youth-centered intervention demonstrated a significant increase in condom use at short-term (6 months). However, at 12 months postintervention, condom-use behaviors were the same across the three different intervention strategies. This raises the question of whether the short-lived outcomes of broader intervention efforts have resulted from the intervention approaches or from other issues related to analysis methods. We have noted that most of the analyses reported the effectiveness of interventions in increasing protected sex among all the participants. As an intervention focuses on safe sex, it is reasonable to

speculate that youth with varying degrees of sexual risk might respond differently. It is possible that the lack of impact was caused by the mixing of youth with different characteristics, such that the mixed intervention effects by sub-groups negated an overall effect. Of particular importance is the effect of interventions on high sexual risk youth, the population most vulnerable to HIV and other STDs. Developmentally, youth will participate in an increasing number of risk behaviors with advancing age [22]. We anticipate that abstinent youth will display an increasing trend in risk participation over time. There have been no data to predict the response of youth with different sexual risk characteristics on HIV risk-reduction interventions. Understanding how high-risk adolescents differ from their lower risk or abstinent counterparts may provide information to inform interventions that can be targeted to different risk groups. Looking at differential responses relative to other risk groups is important in refining intervention strategies.

Accordingly, in this study, we classified the sample into three groups based on sexual risk status at baseline (“abstinent,” “protected sex,” “unprotected sex”). The purpose is: (a) to identify cross-sectional and longitudinal correlates of sexual risk variations, and (b) to examine the influence of prior sexual experience on response to an HIV risk-reduction intervention targeting multiple risk behaviors.

Methods

Subjects

Eight hundred seventeen African-American youth and their parents from 35 low-income housing developments, community centers, and recreation centers in Baltimore were recruited during 1999–2000. The youth and their parents participated in a randomized longitudinal trial of HIV risk-reduction interventions. The research staff at each site described the purpose, general design, and enrollment criteria to potentially eligible youth who were 13 through 16 years of age. Interested youth were given written materials and consent/assent forms to be signed by the youth and their parent. The research was approved by the Institutional Review Board at the University of Maryland, Baltimore.

Intervention design

This project was primarily designed for evaluation of three intervention strategies by combining the following three intervention components: a basic youth-centered intervention [10], a parenting intervention [23], and a booster intervention. After completing baseline assessment instruments, all youth received a basic “face-to-face” adolescent risk-reduction intervention that consisted of eight sessions and emphasized decision-making, goal-setting, communication, negotiating, consensual relationships, and information regarding abstinence, safe sex, tobacco, alcohol, illegal drugs, and drug-selling. The interventions, based on Protec-

tion Motivation Theory [24], were provided through naturally formed small friendship groups. Whereas about one-third of the sample were controlled for their parents' attention, others with their parent received an additional parenting intervention program delivered in the youth's home by the interventionist. The parenting intervention included a 20-minute video emphasizing several concepts of parental monitoring and communication. The video was followed by two instructor-led role-play vignettes. Six months after baseline, among the youth who had received the parenting intervention, approximately one-half received further booster intervention. The booster sessions consisted of a review of activities that had been done in the primary sessions and a few new activities with information on decision-making, sexual abuse, and sexual responsibility.

Measures

Each youth completed a multi-component risk assessment questionnaire at baseline, and 6 months and 12 months postintervention. The questionnaire was administered visually in private via a "talking computer" [25] and aurally through individual earphones.

Sexual behaviors. All participants were asked whether they had sexual intercourse (vaginal or anal) during the past 6 months. Youth who reported ever having sexual intercourse were asked additional sexual behavior questions such as condom use during the last episode of vaginal and/or anal intercourse ("yes"/"no"); consistent condom use (5-point scale from "always" to "never"); and frequency of sexual intercourse (1 = "less than once a month," 5 = "more than two times a week"). Skip buttons allowed youth to refuse answering a question (data from youth selecting "skip" option were treated as missing values in the analyses.) Bivariate association between last condom use and consistent condom use was significant (odds ratio = 1.82, $p < .0001$). Youth who reported having unprotected sex last time were more likely to report rare condom use, which indicated the reliability of condom use assessment in this study. A sexual risk index for measuring the degree of sexual risk was created by combining the responses to the sexual intercourse (past 6 months) item and the condom use (last time sexual encounter) item. The three resulting levels were coded as follows: "0 = abstinence" if no history of either vaginal or anal sex; "1 = low risk" if had sex and used a condom; and, "2 = high risk" if did not use a condom when having vaginal and/or anal sex.

Other problem behaviors. Other investigated risk behaviors included violence (carrying a knife, fighting, assaulting someone), substance use (smoking cigarettes, consuming alcoholic beverages), and drug activity (using marijuana, using crack/cocaine, selling drugs, and delivering drugs) during the previous 6 months. Dichotomous responses (0 = "no," 1 = "yes") were used for each of the risk items. A composite score of violence (ranged from 0 to 3) was

calculated by summing the responses to "carrying a knife," "fighting," and "assaulting someone." With a similar method, the substance use and drug activity scales yielded scores ranging from 0 to 2 and from 0 to 4, respectively. An index of multiple problem behaviors [3] was calculated by summing the total frequency of the nine risk activities during the past 6 months. The Cronbach alpha values for measuring scale reliability are listed in Table 3.

Family interaction. The Parental Monitoring scale [26], with six items such as "my parent always know where I am after school," was employed to assess youth perceptions of parental monitoring ($\alpha = 0.87, 0.93,$ and 0.94 at baseline, 6 months and 12 months, respectively). The Parent Adolescent Communication scale [27] was employed to assess the effectiveness of family communication. The scale included two subscales: the Open Communication scale with nine items asking questions such as "I openly show affection to my parents" ($\alpha = 0.87, 0.90,$ and 0.92 at baseline, 6 months, and 12 months, respectively); and the Problem Communication scale with 10 items asking questions such as "Sometimes I have trouble believing everything my parent tells me" ($\alpha = 0.73, 0.79,$ and 0.82 at baseline, 6 months, and 12 months, respectively). Higher scores indicated more parental knowledge of a child's activity, higher levels of perceived effective communication in the family, and more perceived problems in family communication.

Analysis

Bivariate analysis of baseline data. We first compared the demographic and behavioral characteristics of the three sexual risk groups at baseline. Chi-square tests were used to determine the significance of differences in proportions. One-way ANOVA were used to compare the mean scores differences among the three groups. Because a test would be significant if at least one pair of means was different, further analysis was undertaken using Duncan's multiple range test [28] to identify the source of the difference when a test indicated that the hypothesis of equal means was not met.

Prospective multivariate analysis. Multivariate associations of sexual risk behaviors were assessed by multiple regression analyses. The significant items identified from bivariate analysis were entered into the three models (the baseline, the 6-month, and the 12-month models) to assess which of the items had the strongest independent influences on the sexual risk index. Gender was included as a covariate in all three regression models. Baseline sexual risk scores were included in the 6-month and the 12-month models.

Behavioral changes over time. To assess short-term and long-term behavioral changes, repeated measure analyses were conducted for two time intervals: from baseline to 6 months and from baseline to 12 months. Mean values of the behavioral variables among the three groups were calculated using data

Table 1
Demographics and behavioral characteristics of 817 African-American adolescents and comparisons of those among the three groups

	Overall (n = 817)	Sexual Risk Index ^a			p
		0 (n = 451)	1 (n = 244)	2 (n = 88)	
Demographics - mean (STD)					
Age (years)	14.18 (1.11)	13.80	<u>14.68</u>	<u>14.72</u>	<.0001
School performance	3.90 (0.91)	4.01	<u>3.78</u>	<u>3.74</u>	.001
Church attendance	2.69 (1.08)	2.86	<u>2.50</u>	<u>2.47</u>	<.0001
Parental monitoring	4.08 (0.92)	4.30	<u>3.80</u>	<u>3.77</u>	<.0001
Open communication	3.85 (0.85)	3.95	<u>3.72</u>	<u>3.63</u>	.0002
Problem communication	3.17 (0.75)	3.15	3.18	3.27	.39
Other problem behaviors - mean (STD)					
Violence	0.48 (0.76)	0.29	0.67	0.91	<.0001
Substance use	0.39 (0.65)	0.19	<u>0.67</u>	<u>0.69</u>	<.0001
Drug use	0.28 (0.62)	0.08	0.49	0.67	<.0001
Multiple problem behavior index	1.15 (1.64)	0.56	1.83	2.27	<.0001
Patterns of sexual behavior - n(%)					
Had sexual intercourse	236 (72)	—	(69)	(78)	0.1
Had sexual intercourse weekly	32 (10)	—	(7)	(19)	.005
Ever had anal sex	68 (21)	—	(14)	(39)	<.0001
Had more than 1 sexual partner	76 (34)	—	(36)	(28)	.26
Pregnant or gotten a girl pregnant	19 (6)	—	(4)	(12)	.01*
Had a STD	20 (6)	—	(5)	(11)	.06*
Consistent condom use					
Always	228 (70)	—	(81)	(38)	<.0001
Sometimes	21 (6)	—	(5)	(12)	
Rarely or never	79 (24)	—	(15)	(50)	

^a Sexual risk index: 0 = abstinent, 1 = low-risk and 2 = high-risk.

* Significance of the difference in proportion was determined by Chi-square test, and by Fisher's exact test.

Significance of the difference in group mean score was determined by ANOVA (means underlined were not significantly different).

measured at three points of time (baseline, 6 months, and 12 months postintervention). Within-subjects differences over time were assessed among the three groups independently. To examine between-subjects differences over time, we included the interaction term Time \times Group in the repeated measure MANOVA [29] models. A significant interaction of Time \times Group indicated that the behavioral changes among the groups over time were significantly different.

Results

Overall

Among the 817 African-American youth who participated in the study, 40 subjects who did not respond to the sexual risk questions were excluded from the present analysis. Among the 783 subjects included in this study, 58% were abstinent, 31% were classified as low-sexual risk, and 11% were high-sexual risk at baseline. The mean age of the sample was 14 years old; 58% were female.

Bivariate associations of sexual risk variations at baseline

Table 1 displays the demographic and behavioral characteristics of youth by their sexual risk index with 0 being abstinent, 1 being low risk, and 2 being high risk. Problem

behaviors such as violence, drug use, and multiple problem behavior indexes were significantly different across the three groups. High-risk youth were significantly more likely to be among the most deviance-prone adolescents. Their conventional behaviors and family interaction were similar to those of the low-risk youth.

Figure 1 displays the probabilities of the three sexual risk statuses for an individual, as a function of the Multiple Problem Behavior Index. The index (ranging from 0 to 9) reflects the number of risky activities involved. At baseline, no one had engaged in all 9 risky activities during the past 6 months. The three curves in the graph fitting the observed data by generalized logit regression [30] represented the three different sexual risk statuses. The number of other risk activities strongly affected the change of sexual status. If a youth was not involved in any other risk activity, his/her probabilities of being abstinent, having sex with a condom, and having unprotected sex would be 0.74, 0.21, and 0.05, respectively. As the number of other risks increased, the probability of abstinence declined sharply. For example, when a youth had engaged in 8 risky activities during the 6-month period, the chance of being abstinent, practicing safe sex, and having unprotected sex would be 0.01, 0.62, and 0.37, respectively.

Relationship between Sexual Risk and Multiple Problem Behavior

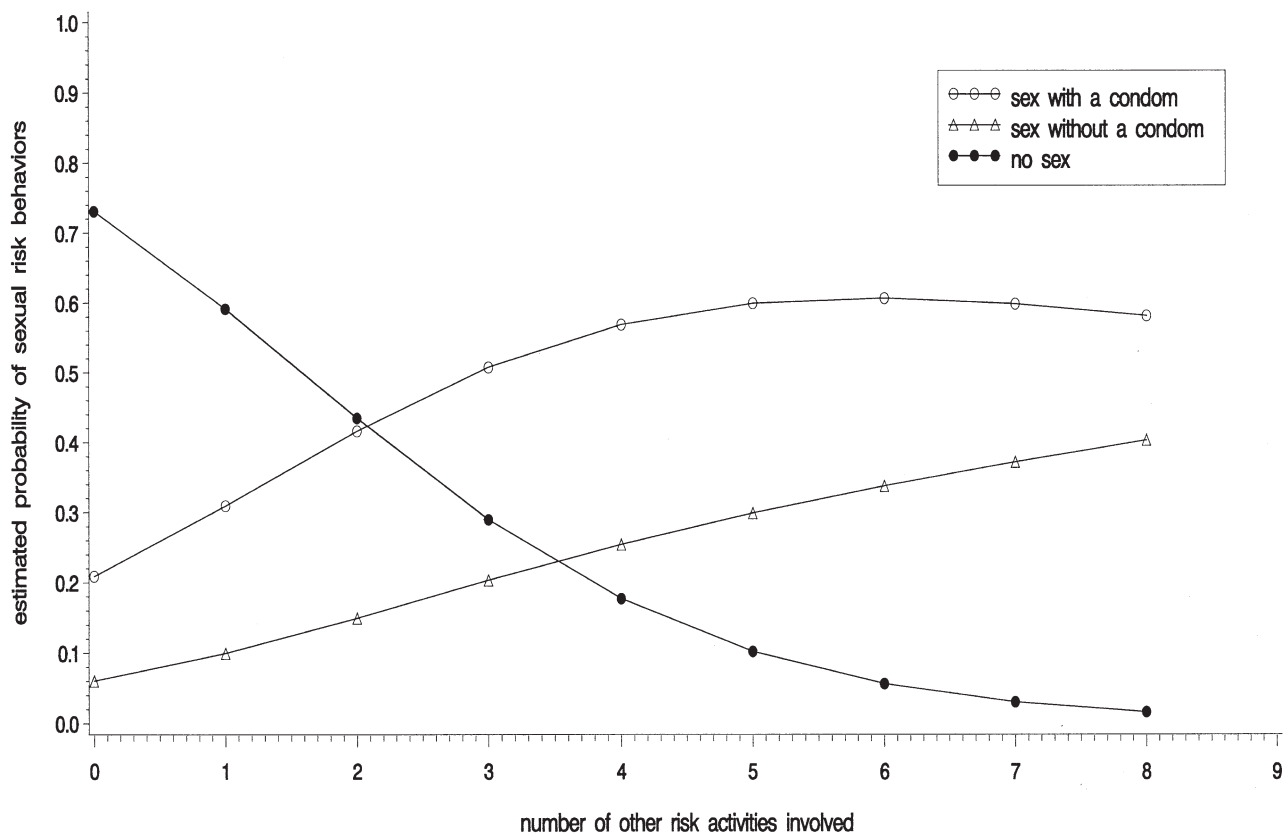


Fig. 1. The probabilities of the three sexual risk statuses for an individual (abstinent, sex with a condom, sex without a condom), as a function of multiple problem behavior index. The horizontal scale represents the number of risk activities involved. The vertical scale represents the probabilities of the three sexual risk statuses. The figure was generated by generalized logit regression for sexual risk index at baseline ($n = 783$). The likelihood ratio test for goodness-of-fit indicated that this model fitted the observed frequencies very well ($\chi^2 = 11.73$, $df = 14$, $p = .63$).

Longitudinal predictors of sexual risk variations

Table 2 presents the results of multiple regressions for the sexual risk index (with three levels: 0, 1, and 2), using baseline and follow-up data. The independent variables entered into the models were the significant bivariate findings from baseline data. The significant longitudinal correlates of sexual risk index across different assessment periods were age and other problem behaviors (violence, substance use, and drug activities). Findings also revealed that baseline sexual risk behavior was a strong predictor of subsequent sexual risk involvements over the year. Conventional behaviors such as attending church and school performance were negatively correlated with the degree of sexual risks prospectively, but the influences were not significant when compared with age and other problem behaviors.

Behavioral changes after participation in HIV risk reduction intervention

The mean scores of the behavioral variables and the results of repeated measure analyses are presented in Table

3. Overall, for both sexual risk and other risks, the abstinent group remained the lowest (scored the best), whereas the high-risk group remained the highest (scored the worst) over time.

However, looking into each group independently by within-subject analysis, high-risk youth exhibited a significant improvement in condom-use behaviors at both 6 months and 12 months postintervention compared with baseline. The level of multiple risks was also significantly reduced at 12 months. On the other hand, the abstinent group demonstrated a significant increasing trend in substance use, drug use, and multiple risk involvement through the year. Between-subjects analyses indicated that the behavioral changes among the three groups were significantly different over time for all the behavioral items, except for drug activity. For example, the levels of multiple risks at 12-month assessment across the three groups (abstinent, low-risk, high-risk) were 0.73, 1.35, and 1.62, respectively. There were changes from baseline of 0.21, -0.47 , and -0.69 , respectively,

Table 2
Multiple regression analyses regressing sexual risk indexes at baseline, 6 months, and 12 months after baseline

Independent Variables	Estimated Coefficients (β)		
	Baseline (n = 701)	6-month (n = 463)	12-month (n = 507)
Gender	0.066	0.002	-0.094
Age	0.168****	0.082***	0.048 (*)
Church attending	-0.020	-0.018	0.013
School performance	-0.047*	-0.006	-0.009
Substance use	0.112**	0.164***	0.093*
Drug use	0.172***	0.120**	0.192***
Violence	0.120***	0.086*	0.131***
Parental monitoring	-0.096***	-0.004	-0.013
Open communication	-0.018	-0.008	-0.053
Problem communication	0.016	0.015	0.005
Baseline sexual risk index ^a	—	0.265****	0.218****
R ²	0.28	0.34	0.23

^a 6-month and 12-month regression models included baseline sexual risk index as a covariate.

* $p < .05$; ** $p < .01$; *** $p < .001$; **** $p < .0001$; (*) $p = 0.06$.

with the high-risk group exhibiting the largest amount of risk reduction.

Discussion

Consistent with the literature, data confirm the co-variation of risk behaviors [31] and repeated involvement in multiple problem behaviors in adolescence [32,33]. As most of the existing research on sexual risk behavior has been conducted using cross-sectional data to assess relationship between high-risk sexual behavior and single-risk behavior such as smoking, alcohol use, and drug use [8–11], our findings further indicated that youth who engaged in unprotected sexual behavior were significantly more likely to be involved simultaneously in multiple problem behaviors when compared with youth engaged in protected sex or with abstinent youth. The degree of sexual risk increases as the number of other risks increases. Our longitudinal data and multivariate analyses particularly emphasize the correlation between high sexual risk and other risks, as well as the correlation between baseline risk and subsequent risk behavior. This observation suggests that having sex without using a condom is not an isolated phenomenon of sexual behavior in adolescents, but rather represents a more complex high-risk behavior pattern. These findings suggest that intervention efforts to reduce risk of HIV infection will need to target not only sexual risk behavior, but also the whole spectrum of problem behaviors.

This theory-based intervention trial was designed to target a wider risk domain including abstinence, safe sex, drug use, and drug trafficking. Data provided important evidence that youth engaging in the highest degree of sexual risk demonstrated the greatest improvement in both sexual risk and other risks. These improvements can be seen at 6 months and again at 12 months postintervention. The most

significant reduction in the nonsexual behaviors occurred a year after intervention, and the moderate risk group also responded to the intervention. Among those sexually inexperienced youth at baseline, all categories of risk behaviors still remained at the lowest level when compared with the two higher sexual risk groups throughout the study period, although their risk involvement significantly increased at 6-month and 12-month assessment periods in contrast to their baseline scores. These findings imply that broad-based interventions targeting multiple behaviors are effective for adolescents who exhibit multiple high-risk behaviors, which contrasts to the current literature that recommends programs focus on a narrow behavior [20]. Additionally, interventions preventing onset of problem behaviors among abstinent adolescents may need to be structured differently from interventions for higher risk youth because there was a significant progression of risk behaviors in this group in contrast to the higher risk groups.

These data reveal that prior sexual risk experience will influence response to an HIV risk reduction intervention and the behavioral changes among different sexual risk groups were not in the same direction. Youth who were the highest risk at baseline remained the highest in risk-taking over time but demonstrated a significant decreasing trend, whereas abstinent youth remained the lowest in risk-taking over time but demonstrated a significant increasing trend. Therefore, researchers should be particularly cautious in interpreting the results of interventions when using the whole sample. The increasing trend of risk-taking among an abstinent group may reflect the natural increase of risk participation during adolescence. Intervention effects on this group may be seen as a reduction of the increasing trend. The increasing (at a reduced rate) trend of the nonrisk group may have negated the decreasing trend of the high-risk group, and

Table 3
Mean score comparisons over time across the three groups and results of repeated measure analyses

	Abstinent ^a		Low Risk ^b		High Risk ^c		Time × Group
	Mean	Change ^d	Mean	Change ^d	Mean	Change ^d	F value
Used condom last time							
Baseline	—	—	1.00	—	0.00	—	—
6 month	0.80	—	0.84	−0.16****	0.70	0.70****	—
12 month	0.77	—	0.74	−0.26****	0.62	0.64****	—
Consistent condom use							
Baseline	—	—	4.32	—	2.85	—	—
6 month	4.05	—	3.89	−0.43*	3.65	0.80**	15.55****
12 month	3.91	—	3.75	−0.57**	3.55	0.70**	19.79****
Violence							
Baseline ($\alpha = .46$)	0.29	—	0.67	—	0.90	—	—
6 month ($\alpha = .57$)	0.36	0.07	0.49	−0.18*	0.65	−0.25	4.20**
12 month ($\alpha = .60$)	0.30	0.01	0.39	−0.28***	0.48	−0.42***	10.74****
Substance use							
Baseline ($\alpha = .55$)	0.19	—	0.67	—	0.69	—	—
6 month ($\alpha = .66$)	0.30	0.11*	0.62	−0.05	0.62	−0.07	2.21
12 month ($\alpha = .67$)	0.31	0.12**	0.54	−0.13*	0.59	−0.10 (*)	10.00****
Drug activities							
Baseline ($\alpha = .54$)	0.08	—	0.49	—	0.67	—	—
6 month ($\alpha = .71$)	0.18	0.10**	0.55	0.06	0.49	−0.18	0.24
12 month ($\alpha = .70$)	0.17	0.09***	0.47	−0.02	0.57	−0.10	1.55
Multiple problem behavior index							
Baseline ($\alpha = .72$)	0.56	—	1.83	—	2.27	—	—
6 month ($\alpha = .79$)	0.85	0.29**	1.66	−0.17	1.76	−0.51	2.75 (*)
12 month ($\alpha = .77$)	0.77	0.21**	1.41	−0.42*	1.63	−0.64*	11.68****

^a The sizes of abstinence group are 451, 355 and 346 at baseline, 6-month and 12-month respectively.

^b The sizes of low-risk group are 244, 193 and 165 at baseline, 6-month and 12-month respectively.

^c The sizes of high-risk group are 88, 38 and 50 at baseline, 6-month and 12-month respectively.

^d Change = follow up score − baseline score. Significance of the difference:

* $p < .05$; *** $p < .001$; **** $p < .000$; (*) $p = .06$ –.08.

resulted in a picture not revealing the actual intervention effect without a reference of control.

Limitations

Youth sexual risk levels were classified based on self-reported sexual intercourse and condom use. The condom question refers only to use of a condom during the last sexual episode. Measurement at a single point of time may not reflect a youth's typical condom use behavioral pattern. However, we also assessed consistent condom use by asking "how often did you use a condom in the past 6 months?"

In addition, although all participants received an intervention, these data were from participants in a three-celled trial of a sexual risk reduction intervention that was primarily designed for evaluation of three intervention strategies [21]. We hypothesized that one or two programs would be more effective than the others. Therefore, the possibility exists that youth behavioral changes over time among the different groups were affected by intervention condition. However, computation results for the contingency tables of (intervention condition) × (sexual risk group) indicated that the sexual risk status across the three intervention conditions was comparable

at baseline ($p = .7$) and at 12 month postintervention ($p = .28$). At 6-months postintervention, the distribution of the three sexual risk categories among the three intervention conditions was not even ($p = .05$).

Finally, because the current study population is African-American, the findings of this study may not be applicable to adolescents in general or to adolescents of other races or ethnicities.

Conclusions

Analyses results support intervention efforts targeting multiple risk behaviors, and provide strong evidence that HIV risk-reduction interventions targeting the whole spectrum of risk behaviors is effective in increasing condom use and decreasing problem behavior engagements. Response to the intervention was influenced significantly by the degree of sexual risk involvement at baseline. Youth engaging in the highest degree of sexual risk demonstrated the greatest reduction in both sexual risk and other risks, whereas abstinent youth exhibited a significantly increasing trend in problem behaviors.

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