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HIV Risk Reduction Among Detained Adolescents: A Randomized, Controlled Trial

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HIV Risk Reduction Among Detained Adolescents: A Randomized, Controlled Trial

WHAT'S KNOWN ON THIS SUBJECT: There are few interventions that target both alcohol use and risky sexual behavior among youth at high risk and even fewer in juvenile justice settings.

WHAT THIS STUDY ADDS: We detail a group intervention that was implemented in a juvenile justice system and prevented increases in risk behavior compared with an information-control intervention across 12 months.

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KEY WORDS

HIV/AIDS, sexually transmitted disease, adolescent, condom use, alcohol, motivational enhancement therapy

ABBREVIATIONS

STD—sexually transmitted disease
GINFO—group information-only intervention
GPI—group psychosocial intervention
MET—motivational enhancement therapy
GMET—group motivational enhancement therapy
RAPI—Rutgers Alcohol Problem Index
NS—not significant
RMSEA—root-mean-square error of approximation
CI—confidence interval
CFI—comparative fit index

This trial has been registered at www.clinicaltrials.gov (identifier NCT00914719).

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abstract

OBJECTIVES: Criminally involved adolescents engage in high levels of alcohol-related risky sex. A theory-based sexual and alcohol risk-reduction intervention was designed, implemented, and evaluated in juvenile detention facilities.

PARTICIPANTS AND METHODS. In a randomized, controlled trial, 484 detained adolescents received 1 of 3 group-based interventions: combined sexual and alcohol risk reduction (group psychosocial intervention [GPI] + group motivational enhancement therapy [GMET]); sexual risk reduction only (GPI); or HIV/sexually transmitted disease prevention information only (group information-only intervention [GINFO]). Follow-up data were obtained 3, 6, 9, and 12 months after the intervention. Behavioral outcomes were condom-use behavior, frequency of intercourse while drinking, and alcohol-related problems.

RESULTS: Condom-use behavior measured as frequency of condom use during sex (ranging from never to always) decreased over time, although the GPI and GPI + GMET interventions mitigated this tendency at the 3-, 6-, and 9-month follow-up assessments. Although both active interventions were significantly more successful than the GINFO condition and the pattern of effects favored the GPI + GMET, there were no statistically significant differences between the GPI and GPI + GMET interventions.

CONCLUSIONS: Findings support the feasibility of integrating alcohol-specific sexual risk content into a theory-based sexual risk-reduction intervention and provide additional evidence that theory-based interventions are effective at reducing risky sex in this population. There was limited evidence of intervention effects on alcohol-use outcomes. Future research should focus on strengthening the GPI + GMET to most effectively target risky sexual behavior among at-risk adolescents. *Pediatrics* 2009;124:e1180–e1188

Adolescents are at great risk for acquiring sexually transmitted diseases (STDs), including HIV/AIDS.[1,2] Young people who commit offenses resulting in their arrest and entry into the juvenile justice system are a subgroup at particularly high risk of acquiring STDs.[3–6] Interventions to promote safer sex among these adolescents are critical.

Alcohol use is commonly cited as a reason for lack of condom use, and the relationship between alcohol use and risky sex is generally strongest among adolescents.[7,8] Recent data revealed an event-level relationship of alcohol use to lack of condom use in high-risk adolescents[9] and experimental studies revealed that intoxication compromises intentions to use condoms[10] and condom-use negotiation skills.[11,12] The exact nature of the association between alcohol use and risky sexual behavior is under debate,[11,13–16] but exclusive focus on increasing condom use among high risk adolescents without consideration of the effects of alcohol intoxication is not likely to optimally decrease risky sex.[12]

HIV Prevention Among Adolescents

Moderately successful HIV preventive interventions with adolescents have been implemented in school settings[17,18] or in community-based settings,[19–22] including public health clinics.[23] Few interventions have been conducted in criminal justice settings,[24–29] and most have been methodologically limited.[24,26,27,28] Both reviews[30,31] and individual intervention studies with adolescents have either revealed no effects on sexual risk,[32,33] effects assessed at short-term follow-up,[25,34] or effects dissipated over time.[35,36]

Despite the link between alcohol use and risky sex, the majority of interventions have not contained theoretically motivated alcohol-use components. Aside from a few studies,[37,38] there are relatively few interventions that target both substance use and sexual risk reduction in groups who are not in treatment for substance abuse, and even fewer for criminally involved adolescents.[34]

PROGRAM OVERVIEW AND HYPOTHESES

Adolescents in detention were randomly assigned to 1 of 3 group-based interventions: (1) an information-only control (group information-only intervention [GINFO]); (2) a theoretically driven psychosocial sexual risk-reduction intervention (group psychosocial intervention [GPI]); or (3) the GPI intervention including a motivational enhancement therapy (MET; group motivational enhancement therapy [GMET])[39,40] component targeting the reduction of alcohol-related sexual risk (GPI + GMET). The GPI was based on the theory of planned behavior,[41] and we have documented elsewhere[42] that the GPI + GMET had a significantly stronger effect on the theory of planned behavior mediators (eg, attitudes, norms, self-efficacy, intentions) at immediate post test than the other 2 interventions, leading to lower risky sexual behavior at 3-month follow-up. Here we focused on whether behavioral changes were maintained at a longer term follow-up. It was hypothesized that the sexual risk-reduction intervention with an additional focus on sexual risk in the context of alcohol use would reduce long-term risky sexual behavior more effectively than the sexual risk-reduction intervention alone, and that both theory-driven interventions would result in lower risky sexual behavior than the information-only intervention. Consistent with MET principles and the nondirective way of building ambivalence in MET, participants in the GPI + GMET were not expressly told to stop drinking, but rather to contemplate and reduce the ways in which their alcohol use might make them vulnerable to engaging in risky sexual behavior. Therefore, we did not expect reductions in alcohol use per se. Nevertheless, we conducted exploratory tests of the impact of the interventions on alcohol related-problems and the use of alcohol during sex.

PARTICIPANTS AND METHODS

Description of Participants

Participants were 484 adolescents recruited from 3 juvenile detention facilities in the Denver, Colorado, judicial district from January 2004 to July 2006. The mean age of the participants was 15.8 (SD: 1.1), and the majority (82.7%) of participants were boys. The sample was ethnically diverse: 36.6% white; 28.5% Hispanic; 12.9% black; 4.8% Native American; 3.5% Asian; 2.1% other ethnicity; and 12.6% biracial/mixed ethnicity. Most participants (92.7%) reported ever having had intercourse, defined as any time a man puts his penis inside a woman's vagina or inside the anus. Any reported intercourse behavior could thus have been heterosexual vaginal intercourse or heterosexual or homosexual anal intercourse. Overall, 91.38% of participants identified exclusively as heterosexual, 2.87% identified exclusively as homosexual, and 5.75% identified as bisexual. Orientation does not, however, correspond perfectly to behavior, and none of our results changed when including sexual orientation in analyses.

The mean age of first intercourse was 13.0 (SD: 1.7), and the median number of sexual partners was 6.0 (mode was 4). At baseline only 27.1% reported condom use in all sexual encounters; 8.1% reported never using condoms. Most participants (90.9%) reported using alcohol in the previous year. Of those who were also sexually active, the majority (82.0%) had used alcohol at least once during a sexual encounter. Overall, 32.5% of participants who

were girls and 24.3% of participants who were boys reported ever being or getting someone pregnant, and 23.8% of participants who were girls and 3.3% of participants who were boys had had an STD.

Procedure

Study procedures were approved by the local institutional review board and the federal Office for Human Research Protections, and a federal certificate of confidentiality was obtained. Eligible adolescents were 14 to 17 years old, English-speaking, current residents at 1 of the detention facilities, had fully informed consent from a parent or legal guardian, and gave their own fully informed assent. The facilities involved were secure detention facilities that predominantly serve youth who have been arrested and charged with a crime, but have not gone before a judge, and those with short sentences. The average stay for adolescents is ~14 days. Additional details are given by Schmiege et al.[42]

All measures were completed on laptop computers via audio-computer assisted self-interview. Participants received $25 for completing the immediate preintervention and postintervention assessments and the intervention itself at baseline, $25 for each of the 3-month, 6-month, and 9-month follow-ups, and $50 for the 12-month follow-up. Figure 1 demonstrates the flow of participants through the study.

Random assignment was determined the morning of the session by using a random numbers table blocked on gender. Masters-level intervention leaders were trained to criterion in the presentation of each manualized intervention. The gender of the intervention leader was matched to the gender of the participants. The GPI and GPI + GMET differed from the GINFO in that they employed skills training and active participation from group members as well as a strong focus on attitudinal and normative change. All interventions were conducted in 1 session, with the GPI lasting ~3 hours, the GPI + GMET lasting 3 to 4 hours, and the GINFO lasting approximately 1 hour. Fidelity of intervention delivery was confirmed by using established procedures.[18,43,44] See Schmiege et al[42] for a more complete description of the intervention content.

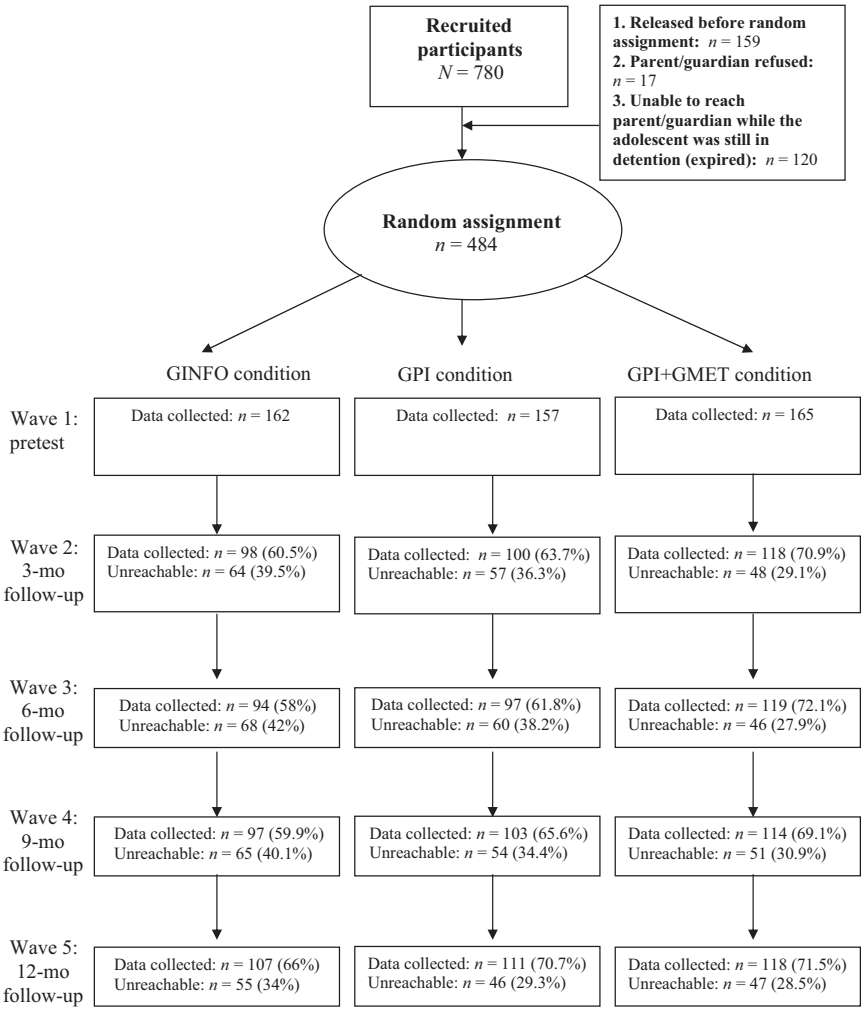

FIGURE 1
Diagram of participant flow through the waves of the study according to condition.

Measures

We examined condom use and frequency of intercourse while drinking at all waves, and we examined alcohol problems at baseline and 12-month follow-up. Participants were blind to intervention assignment when completing baseline measures. Condom use and alcohol use during intercourse were measured on 5-point scales asking "In the past 3 months, how much of the time did you use condoms when you had sexual intercourse?" and "In the past 3 months, how much of the time have you used alcohol when you've had sexual intercourse?" Response options ranged from "never" to "always." Alcohol problems were assessed by using the Rutgers Alcohol Problem Index (RAPI).[45] RAPI scores constitute the sum of a 23-item measure that asks participants to rate how often certain problems have occurred in the

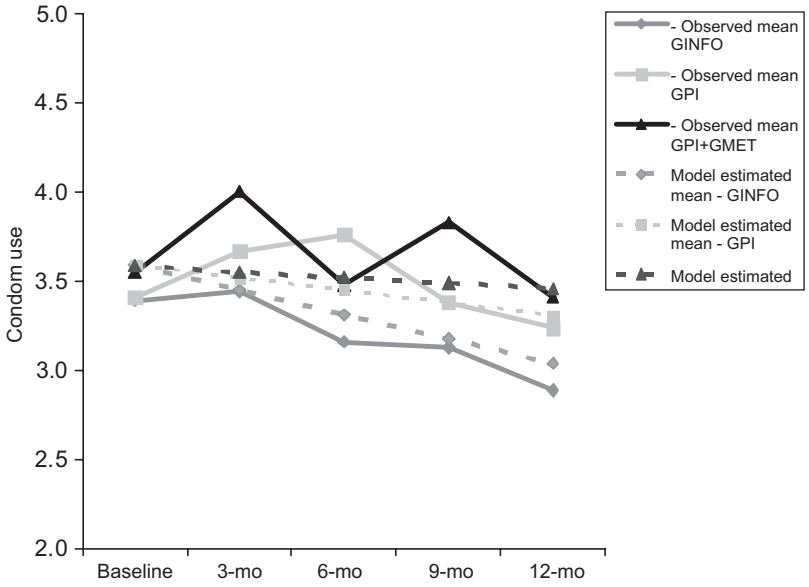

FIGURE 2
Observed and model estimated means for condom use according to condition. Note that the original model estimated demonstrated marginal fit to the data (χ^2_{36} [$n = 484$] $= 62.92$; $P < .05$; root-mean-square error of approximation [RMSEA]: 0.07 [95% confidence interval (CI): 0.04–0.10]; comparative fit index [CFI]: 0.87). Using an exploratory approach, we estimated improvements to model fit by allowing correlations among residual error variances. The final estimated model demonstrated good fit to the data (χ^2_{32} [$n = 484$] $= 45.12$, NS; RMSEA: 0.05 [95% CI: 0.00–0.09]; CFI: 0.94).

past year because of their drinking on a scale ranging from 1 (never) to 5 (>10 times) ($\alpha = .91$).

Data Analyses

A series of preliminary analyses confirmed success of random assignment and examined the potential impact of attrition at the follow-up assessments. Longitudinal growth curve models were estimated to examine changes in condom use and frequency of intercourse while drinking from baseline through 12-month follow-up. Growth curve modeling uses a structural equation modeling framework to model repeated-measures variables (ie, condom use) as random effects of intercept and slope, describing the average trajectory and capturing individual variation in the trajectory.[46] The effect of condition was examined by conducting the growth analyses in a multiple group framework. For RAPI scores, a repeated-measures regression was used where a significant interaction between condition and changes in scores across time would indicate differential changes in alcohol problems by condition. Growth models were estimated in Mplus 5.1,[47] and SAS 9.1 (SAS Institute, Inc, Cary, NC) was used for the repeated-measures regression analyses. Models were estimated by using a maximum-likelihood estimator that makes use of all available data and is considered state-of-the art for addressing missing data.[48,49]

RESULTS

Pretest Equivalence of Conditions

No pretest differences between conditions on demographic or behavioral variables emerged, indicating successful random assignment. There were also no baseline differences between conditions on outcomes, although baseline scores were still accounted for in the analyses through the estimation of the model intercepts.

Impact of Attrition

The most common reason for missing data at follow-ups was that many participants were unreachable despite repeated efforts of our staff. If they were in any facility they could not leave, then follow-ups were conducted at that facility or, in rare cases, over the telephone. A series of analyses of variance were conducted to examine the interaction between attrition at each follow-up (retained versus not retained) and condition (GINFO versus GPI versus GPI + GMET) on pretest measures of all behavioral outcomes.[50] No significant interaction effects emerged, indicating that differential attrition by condition had not occurred.

Model Results

Condom Use

The pattern of means depicted in Fig 2 demonstrates a general tendency for condom use to decline in the GINFO, consistent with research on adolescent condom use.[51–53] In contrast, par-

TABLE 1 Growth Parameters From Longitudinal Growth Models of Condom Use and Frequency of Intercourse While Drinking

Behavioral Measure	Intercept		Slope GINFO		Slope GPI		Slope GPI + GMET		Model Fit		
	β (SE)	P	β (SE)	P	β (SE)	P	β (SE)	P	χ^2_{32}	RMSEA	CFI
Condom use	3.59 (.07)	<.001	−.14 (.05)	<.01	−.07 (.04)	NS	−.03 (.04)	NS	45.12, NS	.05	.94
Frequency of intercourse while drinking	2.15 (.05)	<.001	−.12 (.03)	<.001	−.11 (.03)	<.001	−.11 (.03)	<.001	37.13, NS	.03	.95

ticipation in a theory-driven intervention mitigated this tendency. As shown by the growth parameters depicted in Table 1, there was a significant, negative slope, indicating decreased condom use over time in the GINFO but nonsignificant change over time in the 2 theory-based interventions.

Additional analyses evaluated whether the differences in the slopes across the 3 conditions were statistically significant by comparing the change in model fit, by using χ^2 difference tests, between the initial model and subsequent models where the slopes were constrained to be equal across conditions. The growth trajectories of the GINFO and the GPI + GMET were significantly different ($\Delta\chi^2_1 = 4.42$; $P < .05$), and the difference between the growth trajectories of the GINFO and GPI approached significance ($\Delta\chi^2_1 = 3.74$; $P = .053$). The slopes did not differ between the GPI and GPI + GMET ($\Delta\chi^2_1 = 1.65$, not significant [NS]). Exploration of differences by condition at specific timepoints revealed significant differences between the GPI + GMET and the GINFO at the 6, 9, and 12 month timepoints and a marginally significant difference at the 3-month follow-up ($\Delta\chi^2_1 = 3$; $P = .07$). With the exception of the 6-month follow-up, the GINFO and GPI were not significantly different from each other; however, the GPI and GPI + GMET also did not significantly differ at any time point.

Frequency of Intercourse While Drinking

As shown in Fig 3, frequency of intercourse while drinking decreased over time in all 3 conditions. The estimated growth model (see Table 1) confirmed that the slopes of all 3 conditions were negative and significant. There were no significant differences observed across conditions in the slopes or in the means at any time point.

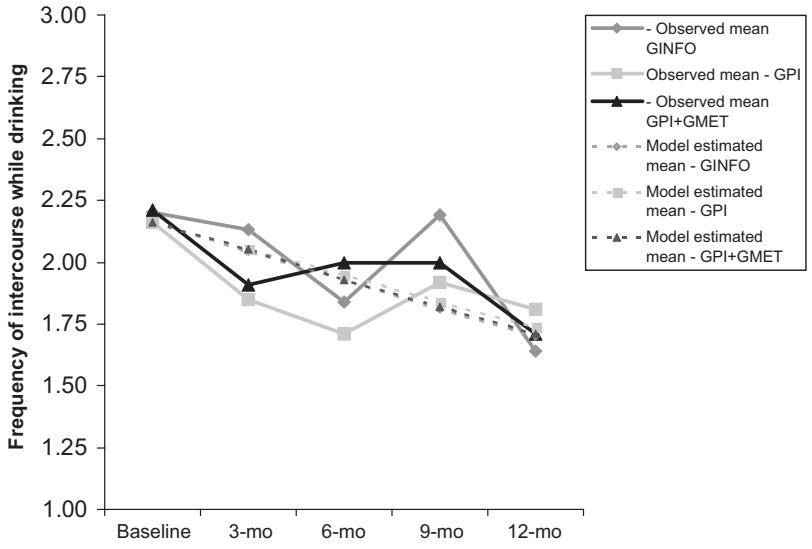

FIGURE 3
Observed and model estimated means for frequency of intercourse while drinking according to condition. Note that the original model estimated demonstrated marginal fit to the data (χ^2_{36} [$n = 484$] = 57.97; $P <$ .05; RMSEA: 0.06 [95% CI: 0.03–0.09]; CFI: 0.75). Following the same approach of allowing correlations among residual error variances, the final estimated model demonstrated good fit to the data (χ^2_{32} [$n = 484$] = 37.13, NS; RMSEA: 0.03 [95% CI: 0.00–0.07]; CFI: 0.95).

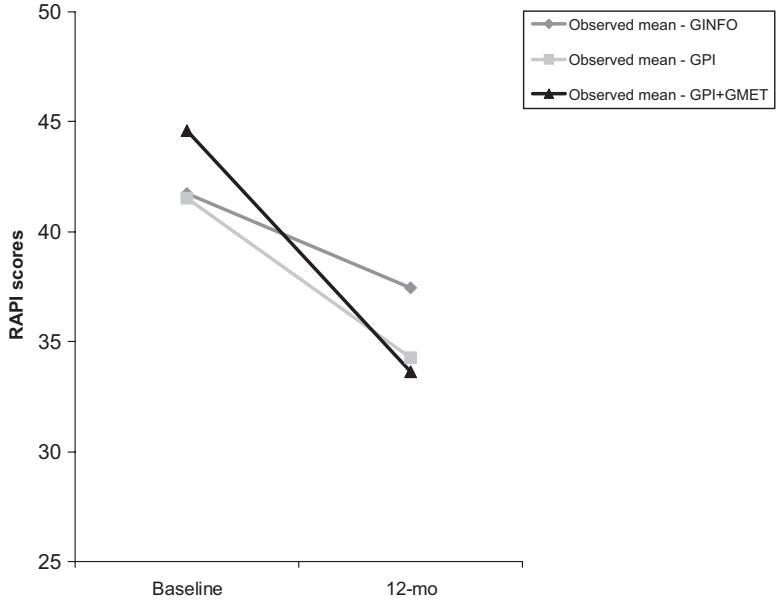

FIGURE 4
RAPI means at baseline and at the 12-month follow-up according to condition.

Alcohol Problems (RAPI)

RAPI scores from baseline to the 12-month follow-up are depicted in Fig 4. As shown, alcohol problems were highest (although not statistically significantly) in the GPI + GMET at baseline and were highest in the INFO condition at the final follow-up. The main effect of time was highly significant ($F_{1,807} = 38.55$; $P < .001$), confirming significant decreases in alcohol problems over time. There was no main effect of condition ($F_{2,807} = .95$, NS). The interaction between time and condition ap-

proached significance ($F_{2,807} = 2.75$; $P = .06$), providing some evidence that the significant changes over time were dependent on condition. In addition, the decreases over time were statistically significant in the GPI and the GPI + GMET, but not in the GINFO.

DISCUSSION

We presented an evaluation of a randomized, controlled trial to increase condom use in high-risk adolescents. This is one of only a few interventions conducted among detained adolescents and is only the second of which we are aware to evaluate both sexual risk reduction and alcohol risk reduction simultaneously.[34] There is some evidence that a sexual risk-reduction intervention that includes an alcohol component is feasible and successful at encouraging safer sexual behavior among criminally involved adolescents as compared with an information-only control. Although the GPI + GMET intervention was longer and asked participants to talk about their own alcohol use in a face-to-face format with their peers and an intervention leader, this did not prove to be difficult for participants. In supplementary analyses (not reported here), process evaluators reported greater participant enjoyment and more participant engagement in the GPI + GMET than in the GINFO condition.

Unfortunately, there were no statistically significant differences in study outcomes between the GPI and GPI + GMET. Both theory-driven interventions were clearly more successful than the information-only control and the pattern of means was consistent with predictions in that the GPI + GMET showed the highest condom use and lowest alcohol problems at 12 months, the GPI showed the predicted middle range of values, and the GINFO showed the lowest condom use and highest alcohol problems. In addition, although the GPI + GMET was significantly more effective than the GINFO, the GPI did not significantly differ from the GINFO. One explanation for the lack of statistical difference between the GPI + GMET and GPI is that it is notoriously difficult to find such differences between 2 active interventions.[54] In a meta-analysis of 44 randomized, controlled trials of HIV risk-reduction in adolescents, intervention studies with the strongest effect sizes used comparison groups that either spent more time on non–HIV-related material or less time on HIV-related material.[55] Considering how similar the 2 active interventions were in time of exposure to HIV-related material in this study, it is perhaps unsurprising that no differences were found between them. In current work we have added expert MET coinvestigators who have strengthened the GMET component of the intervention; we hope these improvements will better differentiate the 2 active interventions in the future, if there is indeed a statistically and clinically significant differentiation to be found.

The impact of the intervention decayed over time, consistent with other work with adolescents.[35,36] One difficulty in evaluating these interventions is that adolescent sexual behavior is sporadic, such that the frequency and type (casual versus serious versus concurrent) of sexual events can fluctuate over time.[56] This is evident from our own pattern of results where observed condom use changed dramatically in the GPI + GMET at the 6-month follow-up, a blip in the data that remained even after extensive outlier and covariate analyses. It may be appropriate to consider a number of indicators of risky sexual behavior for a full understanding of intervention effects (eg, condom use in general, condom use at last intercourse, type of partner, number of partners, frequency of intercourse, anal sex, etc).

Multisession interventions are likely to have larger effects on behavior than 1-session interventions.[48,57,58] However, single-session interventions may be the most practical given the environmental constraints of the detention setting and may be ideal to eventually develop interventions that can be disseminated as standard of care in detention settings. Nonetheless, it is important for future research to develop ways to make the 1 session more impactful, or design a feasible strategy for the implementation of booster sessions postrelease.[28] Small-group, manualized interventions have been lauded for their grounding in theory, and their ability to be easily disseminated to resource-limited community-based organizations.[5] However, a limitation of this approach is the inability for this type of intervention to address the structural and social ecological influences on adolescent risky sexual behavior, such as family context,[5] disadvantaged social context,[6] homelessness, and warrants or other restrictions that interfere with access to health services.[59]

There was limited evidence of intervention effects on alcohol-use problems and intercourse while drinking, although this is consistent with the focus of the intervention on reduction of sexual risk, not necessarily reduction of alcohol use. There may also be other substance use that makes condom use more difficult in this population. Criminally involved adolescents evidence extremely high rates of marijuana use,[60] and the association between marijuana and risky sex may be greater than that for alcohol use and risky sex.[61,62] Future studies should examine the efficacy of a sexual risk-reduction intervention that includes marijuana risk.

We are limited by the self-report nature of the behavioral measures. We did attempt to minimize this limitation by using audio-computer assisted self-

interview technology. Another potential limitation of this work relates to the representativeness of the sample. However, the sample is consistent with the demographics of the population of criminally involved adolescents from which it was drawn, both in terms of gender and ethnicity. Although the retention rate of <70% across follow-ups might have limited our power to observe significant effects, of utmost importance is that supplementary analyses confirmed no significant pretest differences between those who attrited and those who were retained.

CONCLUSIONS

Interventions among criminally involved adolescents are critical because of high levels of sexual and alcohol risk behavior. Interventions that specifically target alcohol-related risky sex have been called for,[12,63,64,17] although few successful interventions of this nature exist. We have shown that a brief, theory-driven 1-session intervention can be effective in promoting behavior change, and because intervention leaders followed a structured program, this intervention could be easily disseminated more widely within the criminal justice setting. We have further demonstrated the feasibility of an HIV/STD risk-reduction intervention that includes an alcohol risk-reduction component specifically targeted at the event-level association of alcohol and risky sex. Nonetheless, there is certainly room for improvement if we hope to have a stronger impact on alcohol-related risky sex and to maintain those behavioral changes over time.

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