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RESEARCH ARTICLE

Horizons and Group Motivational Enhancement Therapy: HIV Prevention for Alcohol-Using Young Black Women, a Randomized Experiment

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Introduction: Black women are at disproportionately greater risk for HIV and sexually transmitted infections than women of other ethnic/racial backgrounds. Alcohol use may further elevate the risk of HIV/sexually transmitted infection acquisition and transmission.

Study Design: A random-assignment parallel-group comparative treatment efficacy trial was conducted with random assignment to 1 of 3 conditions.

Setting/participants: The sample comprised 560 Black or African American women aged 18–24 years who reported recent unprotected vaginal or anal sex and recent alcohol use. Participants were recruited from community settings in Atlanta, Georgia, from January 2012 to February 2014.

Intervention: A Group Motivational Enhancement Therapy module was designed to complement a Centers for Disease Control and Prevention–designated evidence-based intervention (Horizons) to reduce sexual risk behaviors, alcohol use, and sexually transmitted infections, with 3 comparison groups: (1) Horizons + Group Motivational Enhancement Therapy intervention, (2) Horizons + General Health Promotion intervention, and (3) enhanced standard of care.

Main outcome measures: Outcome measures included safe sex (abstinence or 100% condom use); condom nonuse; proportion of condom use during sexual episodes; incident chlamydia, gonorrhea, and trichomonas infections; and problematic alcohol use measured by Alcohol Use Disorders Identification Test score. Treatment effects were estimated using an intention-to-treat protocol–generalized estimating equations with logistic regression for binomial outcomes and Poisson regression for count outcomes. Analyses were conducted between October 2018 and October 2019.

Results: Participants assigned to Horizons + Group Motivational Enhancement Therapy had greater odds of safe sex (AOR=1.45, 95% CI=1.04, 2.02, p=0.03), greater proportion of condom use (AOR=1.68, 95% CI=1.18, 2.41, p=0.004), and lower odds of condom nonuse (AOR=0.57, 95%

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CI=0.38, 0.83, p=0.004). Both interventions had lower odds of problematic alcohol use (Horizons: AOR=0.57, 95% CI=0.39, 0.85, p=0.006; Horizons + Group Motivational Enhancement Therapy: AOR=0.61, 95% CI=0.41, 0.90, p=0.01).

Conclusions: Complementing an evidence-based HIV prevention intervention with Group Motivational Enhancement Therapy may increase safer sexual behaviors and concomitantly reduce alcohol use among young Black women who consume alcohol.

Trial registration: This study is registered at www.clinicaltrials.gov NCT01553682.

INTRODUCTION

Young Black women continue to experience marked and persistent disparities in the rate of new HIV diagnoses relative to young White women.[1] Young Black women are much more likely to contract gonorrhea and chlamydia than their same-age White counterparts.[2] Sexually transmitted infections (STIs) increase HIV infection susceptibility,[3−5] so greater STI rates among Black women may partially explain higher rates of HIV.

Alcohol consumption is associated with a lower likelihood of consistent condom use and greater risk of STI acquisition in the general population[6−10] and among young Black women.[11,12] Proposed explanations for this association highlight the role of physiologic and cognitive factors in lower condom use, including heightened arousal, impaired judgment, and expectations about alcohol's effects.[7,13−17] Furthermore, alcohol use may reduce HIV/STI prevention interventions' efficacy owing to unprotected sexual behavior.[18] In the Horizons intervention, designated a best practice evidence-based HIV prevention intervention by the Centers for Disease Control and Prevention (CDC), participants' alcohol use was associated with unsafe sex and reduced intervention efficacy, especially among participants who used alcohol ≥3 times in the past 90 days.[19] Interventions that address both alcohol and condom use may be more effective in improving safe sex and reducing STI incidence than interventions that solely address sexual behaviors. However, few HIV/STI prevention interventions for young Black women address alcohol-related sexual risk.

Alcohol use and HIV/STI-associated behaviors in young Black women have both public health and clinical significance, suggesting a compelling need for effective HIV/STI interventions for this vulnerable population. This study evaluates the efficacy of a Group Motivational Enhancement Therapy (GMET) module to complement the evidence-based horizons intervention in reducing alcohol-related STI/HIV risk, incident STIs, and risky alcohol use among young Black women.

METHODS

Study Population

The participants were Black women in Atlanta, Georgia, aged 18−24 years recruited from January 2012 to February 2014. The initial sampling pool came from a study recruiting women from a similar demographic from reproductive health clinics and also came from directly recruiting women in reproductive health clinics, but few clinic-recruited women used alcohol 3 times in 90 days. Trained Black community outreach staff also recruited participants in metropolitan community settings identified by the advisory board, including shopping malls and public transit stops near shopping areas and college campuses, and by placing flyers on cars outside clubs. The baseline data collection was between March 3, 2012 and February 8, 2014, with the final 12-month follow-up assessment data collection between March 9, 2013 and February 13, 2015 when the study ended as planned.

Study staff approached potentially eligible young women to provide brief information about the study and collect contact information from interested individuals who were later called for eligibility screening. Women who were eligible and wanted to enroll were scheduled for an enrollment visit.

Young women were eligible to participate in the study if they self-identified as Black or African American, were aged 18−24 years, were not married or pregnant (verified with a urine pregnancy test before baseline assessment and randomization), had consumed alcohol on ≥3 occasions in the past 90 days, and had unprotected vaginal or anal sex with a male in the past 90 days. Respondent-driven sampling was used to recruit additional participants. Participants who referred contacts for eligibility screening received $5 for each woman successfully enrolled (3 maximum).

Written informed consent was obtained from participants before initiating study procedures. For the urine pregnancy test, participants were instructed to provide a urine sample to study staff who conducted tests in a separate room. Participants with positive pregnancy test results were counseled in a private location, informed that they were not currently eligible to participate, and compensated for their time.

Of the eligible women, 96% (n=560) enrolled, completed baseline assessments, and were randomized to study conditions

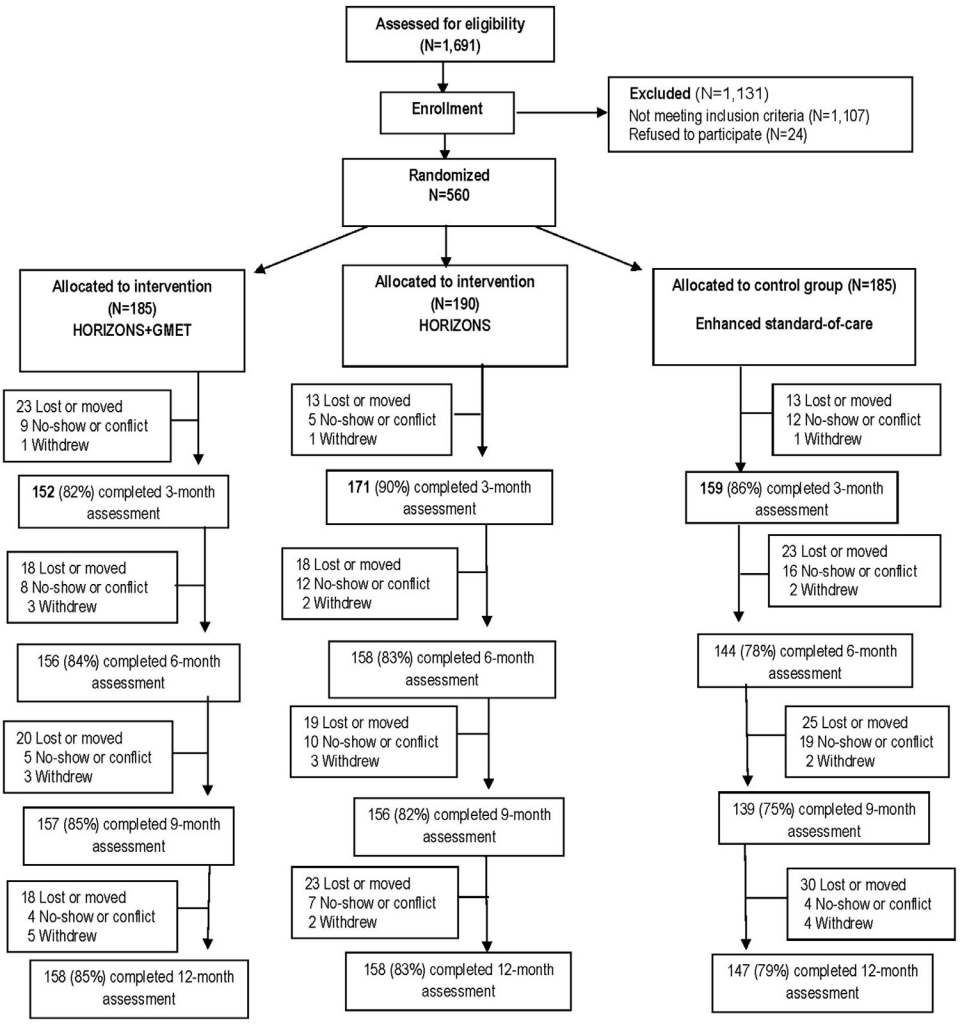

Figure 1. CONSORT diagram of treatment assignment.
GMET, Group Motivational Enhancement Therapy.

(Figure 1). A power calculation determined the sample size using Power Analysis and Sample Size 2008 software to detect an absolute difference of 10 percentage points in STI incidence between the Horizons + GMET and control, yielding a power of 81% for 85% retention for repeated-measures logistic regression analyses. Participants were compensated up to $445 for completing all intervention sessions and assessments during the 12-month study. No unintended adverse events were noted during the course of this study. The Emory University IRB approved all study protocols. The trial is registered as NCT01553682. The full trial protocol can be requested from the corresponding author. The study was funded by the U.S. National Institute on Alcohol Abuse and Alcoholism (5R01AA018096).

Intervention

After administering the baseline assessment, participants were randomly assigned to 1 of 3 conditions: (1) Horizons + GMET, (2) a time-equivalent Horizons-only (Horizons), or (3) an enhanced standard of care (control). The study design allowed for comparison of the efficacy of the Horizons + GMET and Horizons interventions relative to the efficacy of the enhanced standard of care (control).

For this 3-arm parallel design study, using a 1:1:1 allocation ratio, the statistician assigned participants randomly without blocking to 1 of 3 treatment conditions using computer-generated random numbers. Randomization yielded the following sample sizes: n=185 for Horizons + GMET intervention, n=190 for Horizons intervention, and n=185 for control. No participants were excluded after randomization.

With the guidance of an advisory board of Black women aged 18–24 years, health educators developed the content for the Horizons + GMET condition, which added a GMET module to Horizons, an existing CDC-designated evidence-based intervention. The advisory board and health educators also updated the original Horizons intervention to maintain the relevance of the role-play scenarios while leaving intact the core intervention elements such as ethnic and gender pride, goal setting, and negotiating safer sex.[19] Advisory board members were recruited from the community in the same manner as the study participants. All intervention

sessions were facilitated by 2 trained Black female health educators: a lead educator who had worked on the previous Horizons study and a masters-level health education student. Because they were not licensed childcare providers, the study staff were not able to provide child care for participants with children.

The time-equivalent Horizons + GMET and Horizons conditions comprised 2 sessions (5 hours each) on consecutive Saturdays with 8 participants per session; implementation notes are available in Appendix Text 2 (available online). Horizons addresses gender and ethnic pride and STI/HIV knowledge, including STI/HIV transmission, assertive communication, and refusal skills with both modeling and role-play practice, with activities guided by social cognitive theory. The GMET module enhanced young women's awareness of the consequences of alcohol use and its effects on decision making, presented strategies to reduce alcohol-related sexual risk behavior, and increased their ability to effectively communicate their intentions to use condoms or abstain from sex, especially when using alcohol. GMET uses an active rather than passive learning approach and is derived from motivational interviewing.[20] Motivational interviewing and its extension, motivational enhancement therapy, have received continuing and significant empirical support in the context of successful, brief behavior change interventions with substance-using populations. For the Horizons-only condition, a time-equivalent General Health Promotion module was added to Horizons to educate participants about health and nutrition. All intervention participants received vouchers for free STI testing and treatment services for up to 3 sexual partners after the first session; Horizons + GMET participants received $20 reimbursement if their partners used the vouchers at partner health clinics.

Participants in the enhanced standard of care (control) condition received a 1-hour group session implemented by 1 trained Black female health educator, which included a 30-minute culturally and gender-appropriate HIV/STI prevention video, a question-and-answer session, and group discussion. The treatment and control interventions were conducted in university settings.

All participants attended the first workshop. Horizons + GMET participants who missed the second workshop were encouraged to attend the subsequent cohort's GMET session instead of meeting with a health educator. The research team and GMET consultants determined that group-based sessions were the preferred delivery method for missed sessions: 26 participants (6.9%) attended a different cohort's GMET workshop, and 5 participants (2.7%) met with a health educator. The 23 Horizons participants (12.1%) who missed a workshop met individually with a health educator to discuss workshop content. A total of 9 Horizons (4.7%) and 17 Horizons + GMET (9.2%) participants missed a workshop without any make-up session (p=0.14).

After group sessions, Horizons + GMET participants received 8 educator-led telephone booster sessions (15 minutes in duration) approximately 1 month and 2 months after each assessment. Health educators reviewed participants' progress toward meeting sexual health goals from in-person workshops and helped participants work through identified barriers related to communication and HIV/STI testing. Intervention participants also received 8 text messages to reinforce intervention content. Horizons participants received a phone booster session and a retention call approximately 1 month and 2 months after each assessment, and they received text messages if they did not answer the phone. The proportions receiving each call and text are in Appendix Table 4 (available online).

A retention team used texting, calls, and postcards to remind all participants 4 weeks, 1 week, and 1−2 days before workshops and follow-up assessments. Study staff called the contacts provided by participants during study enrollment if unable to reach participants by phone. Staff texted and called participants who had not arrived for scheduled appointments. Staff were flexible with a multi-hour window for participants to attend.

Data collection occurred at baseline, immediately after the completion of the in-person intervention (immediate post-test data collection), and at 3, 6, 9, and 12 months after randomization. Data consisted of 3 components: a urine pregnancy screen, a self-collected vaginal swab to assess incident STIs, and an audio computer−assisted self-interview (ACASI) survey.

At baseline and 3-, 6-, 9-, and 12-month follow-up assessment, participants provided a urine sample to detect pregnancy. At baseline and 3-, 6-, 9-, and 12-month follow-up assessments, staff instructed participants on the appropriate procedure to self-collect a vaginal swab specimen using an anatomic model of a vagina.[21] Laboratory technicians processing specimens were blinded to respondents' treatment assignments. Specimens were assayed for 2 bacterial pathogens, *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, using the BDProbeTec ET *C. trachomatis* and *N. gonorrhoeae* Amplified DNA assay (BD, Franklin Lakes, NJ).[22] Specimens were also tested for *Trichomonas vaginalis* using a noncommercial real-time polymerase chain reaction assay.[23]

Regardless of participants' treatment assignment, the study nurse contacted all participants who tested positive for an STI and provided CDC-recommended treatment: directly observed single-dose antimicrobial treatment, risk-reduction counseling, and encouragement to refer sex partners for treatment. The county health department was notified of reportable STIs.

After biospecimen collection, ACASI was utilized to administer a behavioral health survey assessing sociodemographics, sexual history, alcohol and drug use, communication, and psychosocial constructs associated with HIV/STI-preventive behaviors. To be consistent with previous Horizons surveys,[19,24] sexual and condom use behaviors were assessed for the past 7 days and past 90 days. The 7-day interval is consistent with Timeline Followback Methodology,[25] but it is missing for the large proportion of participants who did not have sex in the past week,[24] so past 90 −day condom use was also collected.

The ACASI technology enhances the accuracy and validity of self-reported sexual behaviors by addressing potential literacy challenges and reducing social desirability bias for reporting sensitive information, such as sexual behavior and substance use.[26] To enhance perceived confidentiality, participants were informed that unique identification numbers were used to identify records instead of names. Behaviors were assessed over brief time intervals using the Timeline Followback Methodology, an effective methodology to facilitate retrospective recall of HIV/STI sexual behaviors.[25]

Missing data were primarily attributable to nonparticipation in follow-up assessments. Participants who did not participate in 1 follow-up assessment were allowed to participate in all future follow-up assessments. Of the 560 women at baseline, 86% completed follow-up assessments at 3-month, 82% at 6-month, 81% at 9-month, and 83% at 12-month follow-up, with retention

comparable with that of previous interventions.[19,24] To assess whether participants who attended each follow-up assessment differed from those who did not participate on 34 continuous and categorical covariates, Kruskal–Wallis tests were used for continuous variables and Pearson chi-square tests for categorical variables. Of the 136 comparisons, 5 comparisons were significant at $p \leq 0.05$, and 11 comparisons were significant at $p \leq 0.1$ within the range expected by chance, which is consistent with the data missing completely at random (Appendix Table 3, available online). Despite the lack of association of data missingness with observed data, a sensitivity analysis was conducted for the contingency that data were missing at random by repeating the analysis after multiple imputations with 10 imputations using Stata SE, version 15.1 (Appendix Text 1, available online).

Measures

Safe sex was a binary outcome, where 1 signified that the participant either reported sexual abstinence or 100% condom use in the 90 days before the assessment. Participants' proportion of condom use was defined as the self-reported proportion of vaginal sexual acts in which condoms were used in the 90 days before the assessment, elicited by sequential items asking women to report the number of coital episodes in the past 90 days followed by the number of those episodes in which condom was used. Condom nonuse was defined as 1 for participants who used no condoms during sex in the past 90 days and 0 for participants who abstained or used condoms at least once in the past 90 days.

The biological outcomes were laboratory-confirmed incident chlamydia, gonorrhea, or trichomoniasis at each follow-up assessment. At each assessment, chlamydia, gonorrhea, and trichomoniasis were defined as 1 for a positive test and 0 for a negative test.

Potentially problematic alcohol use was defined by the 10-item Alcohol Use Disorders Identification Test (AUDIT) score and as a binary variable dichotomized at ≥8, the standard cut off used as a screen for alcohol use disorder.

Binge drinking was determined on the basis of the answer to the question: *How often do you have six or more drinks on one occasion?* Responses were coded as 1 for *weekly* or *daily or almost daily* and 0 for *never, less than monthly*, or *monthly*. The question was worded to ask about ≥6 drinks instead of the standard cut off for women of ≥3 drinks, representing a greater quantity of alcohol consumption.

Drinking context score was defined by the scale comprising 9-point Likert-type items, describing how likely participants were to drink excessively in situations, including parties, on a date, and before sex.[27] The scale can be divided into 3 subscales, but in confirmatory factor analysis in this sample, this scale comprised a single factor with Cronbach's α of 0.91.

Statistical Analysis

Treatment effects were estimated using an intention-to-treat protocol with participants analyzed in their assigned treatment conditions, regardless of the number of completed additional telephone contacts for participants in the Horizons + GMET and Horizons groups. The analyses were conducted in Stata SE, version 15.1, and R, version 3.6.0, between October 2018 and October 2019, a delay between data collection and analysis related to staff turnover.

Bivariate analyses assessed whether randomization yielded baseline comparability across conditions: chi-square tests for categorical variables and Kruskal–Wallis tests for continuous variables because continuous variables were not symmetric.

Data analysis used generalized estimating equations, controlling for the number of months after treatment, assuming that data were missing completely at random. Exploratory multivariate regressions were conducted for each follow-up assessment. All analyses were intention-to-treat analyses using 1,855 observations for 560 participants in all assessments. Post-estimation analyses predicted the proportion of condom use with Robinson's semiparametric regression estimator, with baseline condom use as the nonlinear term, and predicted chlamydia, gonorrhea, and trichomoniasis with logistic regression.

RESULTS

Randomization yielded a balance across the 3 conditions for 34 variables measured at baseline (Table 1). At baseline, 33.0% of the participants reported having used a condom at least once during the past 90 days, 18.8% tested positive for chlamydia, 5.2% for gonorrhea, and 18.6% for trichomoniasis.

Averaged over all the 4 follow-up assessments, 44.1% of the respondents reported safe sex (abstinence or 100% condom use), and 66.7% reported safe sex at ≥1 assessment. Horizons + GMET but not Horizons alone increased the frequency of safe sex relative to the control condition: averaged over the 4 follow-up assessments, 48.0% of participants in Horizons + GMET reported safe sex versus 38.6% in the control condition (panel regression: p=0.02). Participants in Horizons + GMET had 45.0% greater odds of safe sex than those in the control condition (AOR=1.45, 95% CI=1.04, 2.02, p=0.03), but those in Horizons alone did not differ from those in the control condition (AOR=1.23, 95% CI=0.88, 1.71, p=0.22) (Table 2).

Horizons + GMET but not Horizons alone increased the proportion of condom use in the past 3 months relative to the control condition averaged over the 4 follow-up assessments: the participants in the control and Horizons + GMET groups used condoms in 50.2% and 63.0% of coital episodes, respectively (p=0.001). Horizons + GMET increased the odds of condom use relative to control by 68% (AOR=1.68, 95% CI=1.18, 2.41, p=0.004), but Horizons alone did not (AOR=1.27, 95% CI=0.90, 1.82) (Table 2). In the exploratory semiparametric regressions, both interventions predicted a greater proportion of condom use at 3 months, and Horizons + GMET was effective at all follow-up assessments (Figure 2). Horizons + GMET participants had 43% lower odds of condom nonuse in the past 90 days than control participants (AOR=0.57, 95% CI=0.38, 0.83, p=0.004), but Horizons alone did not differ from the control group (AOR=0.83, 95% CI=0.58, 1.18) (Table 2).

Table 1. Comparability Between Treatment Conditions at Baseline for 31 Variables

Characteristics	Control (*n*=185)	Horizons (*n*=190)	Horizons + GMET (*n*=185)	Test statistic	*p*-value
Sociodemographic indicators					
Age, years, mean (SD)	20.55 (1.84)	20.64 (1.92)	20.55 (1.93)	KW $\chi^2(2) = 0.22$	0.90
Graduated high school, *n* (%)	125 (67.6)	130 (68.4)	120 (64.9)	$\chi^2(2) = 0.581$	0.75
Family aid index (0–4), mean (SD)	1.36 (0.92)	1.35 (0.97)	1.36 (0.90)	$\chi^2(8) = 4.02$	0.89
Employed, *n* (%)	45 (24.3)	63 (33.2)	44 (23.8)	$\chi^2(2) = 5.28$	0.07
Poor neighborhood quality					
Abandoned homes or apartments, *n* (%)	83 (44.9)	106 (55.8)	101 (54.6)	$\chi^2(2) = 5.35$	0.07
Buildings with broken windows, *n* (%)	47 (25.4)	47 (24.7)	52 (28.1)	$\chi^2(2) = 0.62$	0.7
Homes with bars on the windows and doors, *n* (%)	81 (43.8)	66 (34.7)	67 (36.2)	$\chi^2(2) = 3.72$	0.2
Relationship					
Current boyfriend, *n* (%)	157 (84.9)	169 (88.9)	147 (79.5)	$\chi^2(2) = 6.46$	**0.04**
Current relationship duration, months, mean (SD)	21.7 (26.8)	20.7 (22.2)	19.2 (21.7)	KW $\chi^2(2) = 0.44$	0.80
Perceived partner concurrency, *n* (%)	39 (24.8)	45 (26.6)	32 (21.8)	$\chi^2(2) = 1.02$	0.60
Relative age of sex partners, *n* (%)				$\chi^2(4) = 7.92$	0.10
About the same age or younger	80 (43.2)	90 (47.4)	63 (34.1)		
2–3 years older	63 (34.1)	60 (31.6)	79 (42.7)		
More than 4 years older	42 (22.7)	40 (21.1)	43 (23.2)		
Psychosocial mediator, mean (SD)					
Condom use self-efficacy (9–45)	38.59 (6.88)	37.03 (7.85)	37.68 (7.63)	KW $\chi^2(2) = 4.10$	0.13
Communication self-efficacy (6–28)	19.25 (4.22)	19.27 (4.25)	19.44 (4.24)	KW $\chi^2(2) = 0.23$	0.89
Communication frequency (5–20)	9.57 (4.02)	9.39 (3.88)	9.79 (3.86)	KW $\chi^2(2) = 1.83$	0.40
Sex refusal self-efficacy (7–28)	23.55 (4.54)	23.72 (4.33)	23.65 (4.77)	KW $\chi^2(2) = 0.20$	0.90
Fear of condom negotiation (7–40)	9.07 (4.60)	9.11 (4.42)	8.88 (4.14)	KW $\chi^2(2) = 1.03$	0.60
Sexual behavior					
Condom use in the past 90 days, mean (SD)	0.36 (0.31)	0.32 (0.30)	0.32 (0.31)	KW $\chi^2(2) = 1.89$	0.39
Positive result for sexually transmitted infection, *n* (%)					
Chlamydial infections	41 (22.2)	33 (17.4)	31 (16.8)	$\chi^2(2) = 2.13$	0.34
Gonococcal infections	10 (5.4)	10 (5.3)	9 (4.9)	$\chi^2(2) = 0.06$	0.97
Trichomonas	44 (23.8)	33 (17.4)	27 (14.6)	$\chi^2(2) = 5.44$	0.07
Other factors					
Ever douched, *n* (%)	95 (51.4)	93 (48.9)	103 (55.7)	$\chi^2(2) = 1.74$	0.42
Douched in the past 3 months, *n* (%)	60 (32.4)	60 (31.6)	69 (37.3)	$\chi^2(2) = 1.59$	0.45
Depression, mean (SD)	13.37 (6.25)	13.14 (5.45)	13.56 (5.87)	KW $\chi^2(2) = 0.84$	0.66
Impulsivity, mean (SD)	41.03 (6.46)	41.08 (6.90)	40.46 (6.86)	KW $\chi^2(2) = 0.75$	0.69
History of abuse, *n* (%)					
Emotional	71 (38.4)	85 (44.7)	85 (45.9)	$\chi^2(2) = 2.50$	0.29
Physical	54 (29.2)	65 (34.2)	59 (31.9)	$\chi^2(2) = 1.09$	0.58
Reproductive coercion	77 (41.6)	93 (49.0)	87 (47.0)	$\chi^2(2) = 2.17$	0.34
Reproductive coercion, past 3 months	50 (27.0)	57 (30.0)	56 (30.3)	$\chi^2(2) = 0.58$	0.75
Ever used marijuana, *n* (%)	145 (78.4)	153 (80.5)	146 (78.9)	$\chi^2(2) = 0.29$	0.87
AUDIT score (0–40), mean (SD)	9.46 (8.86)	9.28 (7.21)	9.81 (8.38)	KW $\chi^2(2) = 1.59$	0.45
AUDIT risk zone, *n* (%)				$\chi^2(6) = 7.79$	0.25
Low risk: Zone 1 (0–7)	107 (57.8)	102 (53.7)	98 (53.0)		
At risk: Zone 2 (8–15)	39 (21.1)	57 (30.0)	47 (25.4)		
High risk: Zone 3 (16–19)	13 (7.0)	12 (6.3)	15 (8.1)		
Probable substance use disorder: Zone 4 (20–40)	26 (14.1)	19 (10.0)	25 (13.5)		
Weekly binge drinking	41 (22.2)	42 (22.1)	41 (22.2)	$\chi^2(2) < 0.001$	1.0
Frequency of drinking at least 6 drinks, *n* (%)				$\chi^2(8) = 9.86$	0.28

(*continued on next page*)

Table 1. Comparability Between Treatment Conditions at Baseline for 31 Variables (*continued*)

Characteristics	Control (*n*=185)	Horizons (*n*=190)	Horizons + GMET (*n*=185)	Test statistic	*p*-value
Never	62 (33.5)	43 (22.6)	55 (29.7)		
Less than monthly	46 (24.9)	52 (27.4)	51 (27.6)		
Monthly	36 (19.5)	53 (27.9)	38 (20.5)		
Weekly	29 (15.7)	35 (18.4)	30 (16.2)		
Daily or almost daily	12 (6.5)	7 (3.7)	11 (6.0)		
Drinking context scale (9–45), mean (SD)	21.6 (8.8)	22.4 (7.3)	21.8 (8.6)	KW $\chi^2(2) = 2.43$	0.30

Note: Boldface indicates statistical significance ($p<0.05$).
AUDIT, Alcohol Use Disorders Identification Test; GMET, Group Motivational Enhancement Therapy; KW, Kruskal–Wallis.

Table 2. Panel Multivariate Regression Results, Controlling for Number of Months After Intervention

	OR (95% CI)		
Variables	Control	Horizons	Horizons + GMET
Safe sex in the past 90 days (abstinence or 100% condom use)	ref=1.0	1.23 (0.88, 1.71)	1.45 (1.04, 2.02)
0% condom use in the past 90 days	ref=1.0	0.83 (0.58, 1.18)	0.57 (0.38, 0.83)
% condom use	ref=1.0	1.27 (0.90, 1.82)	1.68 (1.18, 2.41)
Chlamydia	ref=1.0	1.04 (0.64, 1.70)	1.07 (0.66, 1.74)
Gonorrhea	ref=1.0	0.89 (0.48, 1.65)	0.52 (0.26, 1.07)
Trichomoniasis	ref=1.0	1.02 (0.64, 1.62)	1.22 (0.77, 1.92)
Risky alcohol use	ref=1.0	0.57 (0.39, 0.85)	0.61 (0.41, 0.90)
Weekly binge drinking	ref=1.0	0.52 (0.29, 0.93)	0.41 (0.21, 0.77)
AUDIT score[a]	ref=1.0	0.77 (0.72, 0.83)	0.81 (0.75, 0.88)
Drinking context scale[a]	ref=1.0	0.88 (0.85, 0.91)	0.88 (0.85, 0.91)

[a]Incidence rate ratio (95% CI).
AUDIT, Alcohol Use Disorders Identification Test; GMET, Group Motivational Enhancement Therapy.

The intervention did not affect chlamydia, gonorrhea, and trichomonas incidence. Averaged over the 4 follow-up assessments, in the control condition, 7.8% of participants tested positive for chlamydia, and 22.5% tested positive for chlamydia at least once; in Horizons, 8.1% of participants tested positive for chlamydia, and 20.6% tested positive at least once (AOR=1.04, 95% CI=0.64, 1.70); and in Horizons + GMET, 8.5% of participants tested positive for chlamydia, and 21.9% tested positive at least once (AOR=1.07, 95% CI=0.66, 1.74) (Table 2). Averaged over the 4 follow-up assessments, in the control group, 4.2% of participants tested positive for gonorrhea, and 13.3% tested positive for gonorrhea at least once; in Horizons, 3.7% of participants tested positive for gonorrhea, and 11.1% tested positive at least once (AOR=0.89, 95% CI=0.48, 1.65); and in Horizons + GMET, 2.3% of participants tested positive for gonorrhea, and 7.3% tested positive at least once (AOR=0.52, 95% CI=0.26, 1.07) (Table 2). Averaged over the 4 follow-up assessments, in the control group, 8.8% of participants tested positive for *Trichomonas*, and 22.5% tested positive for trichomoniasis at least once; in Horizons, 8.9% of participants tested positive for trichomoniasis, and 25.0% tested positive at least once (AOR=1.02, 95% CI=0.64, 1.62); and in Horizons + GMET, 10.4% of participants tested positive for trichomoniasis, and 25.3% tested positive at least once (AOR=1.22, 95% CI=0.77, 1.92) (Table 2).

In exploratory Poisson regressions, both interventions decreased chlamydia at 6 months but not at 3, 9, or 12 months: at 6 months, 5.7% of Horizons and 5.8% of Horizons + GMET participants tested positive for chlamydia versus 12.5% among control participants (Horizons: AOR=0.42, 95% CI=0.18, 0.97, p=0.04; Horizons + GMET: AOR=0.43, 95% CI=0.19, 0.99, p=0.05) (Table 2). This exploratory analysis performed 8 statistical tests at the 0.05 level, yielding a 33% chance of false significance.

Both interventions reduced risky alcohol use as assessed by AUDIT scores, drinking context scores, and weekly binge drinking. Averaged over the 4 follow-up assessments, 24.8% of the participants in the control group had problematic alcohol use, as measured by an AUDIT score of ≥8, and 42.8% had an AUDIT score ≥8

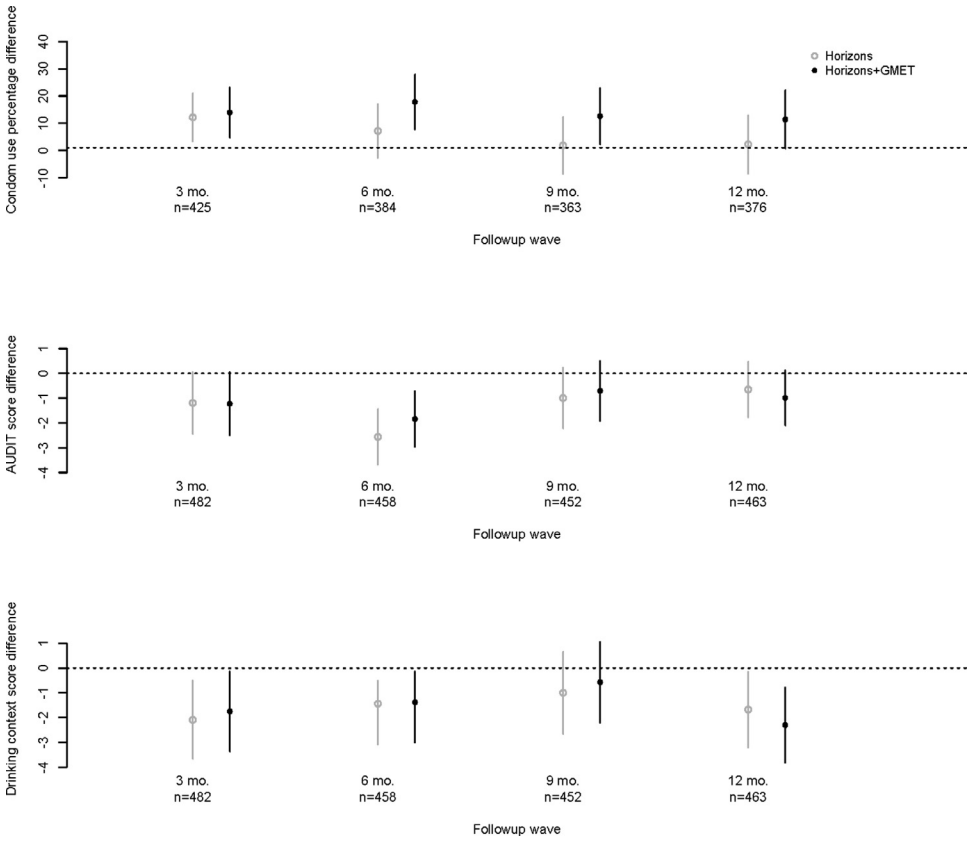

Figure 2. Semiparametric regression results predicting condom use percentage, AUDIT score, and drinking context score with respective baseline measurement as the nonlinear term.

AUDIT, Alcohol Use Disorders Identification Test; GMET, Group Motivational Enhancement Therapy; mo, month.

at least once; 15.7% of the participants in Horizons had an AUDIT score ≥8, and 35.0% had an AUDIT score ≥8 at least once (p=0.006); and 16.2% of the participants in Horizons + GMET had an AUDIT score ≥8, and 31.5% had an AUDIT score ≥8 at least once (p=0.008). Horizons and Horizons + GMET decreased the odds of problematic alcohol use by 43% (AOR=0.57, 95% CI=0.39, 0.85, p=0.006) and 49% (AOR=0.61, 95% CI=0.41, 0.90, p=0.01), respectively (Table 2).

Averaged over the 4 follow-up assessments, the control group had an average AUDIT score of 5.6, Horizons had an average AUDIT score of 4.3 (p=0.02), and Horizons + GMET had an average AUDIT score of 4.4 (p=0.04). Horizons and Horizons + GMET reduced AUDIT scores by 23% (incidence rate ratio=0.77, 95% CI=0.72, 0.83, p<0.001) and 19.0% (incidence rate ratio=0.81, 95% CI=0.75, 0.88, p<0.001), respectively (Figure 2, Table 2). Both interventions reduced the drinking context score by 12.0% (incidence rate ratio=0.88, 95% CI=0.85, 0.91, p<0.001) (Figure 2).

Averaged over the 4 follow-up assessments, 9.7% of the participants in the control group reported weekly binge drinking, and 17.9% reported weekly binge drinking at least once; in Horizons, 4.7% of the participants reported weekly binge drinking, and 11.7% did so at least once (p=0.03); and in Horizons + GMET, 4.0% of the participants reported weekly binge drinking, and 10.1% did so at least once (p=0.009). Horizons reduced the odds of weekly binge drinking by 48.0% (AOR=0.52, 95% CI=0.29, 0.93, p=0.03), and Horizons + GMET reduced the odds of weekly binge drinking by 59.0% (OR=0.41, 95% CI=0.21, 0.76, p=0.006) (Table 2).

The Horizons + GMET and Horizons interventions did not differ from each other significantly on any outcome: safe sex, chlamydia, gonorrhea, condom nonuse, proportion of condom use, AUDIT score, weekly binge drinking, risky alcohol use, and drinking context score.

DISCUSSION

Past research has established alcohol use as a barrier to HIV/STI prevention intervention efficacy for young Black women who use alcohol.[18,19] Horizons + GMET increased safe sex and condom use and reduced condom nonuse, and both interventions reduced risky alcohol use, weekly binge drinking, average AUDIT scores, and

drinking context score. This study suggests that Horizons + GMET may prevent HIV/STI among young Black women who use alcohol. Future interventions for this population can build on its successes, and more generally, HIV/STI risk behaviors can be reduced through a multifactorial approach addressing alcohol-related risks.

This study also suggests that more HIV/STI prevention interventions should include participants recruited from community settings rather than exclusively recruiting from reproductive health clinics. The Horizons intervention was effective with younger women recruited from reproductive health clinics who were more likely to have STIs at baseline and thus motivated to avoid repeat infection[19,24] than this community-recruited sample. Despite these differences, workshop attendance and follow-up were comparable with those in clinic-recruited horizons evaluations. This research suggests opportunities to reduce risk among an older community-based sample by targeting additional risk behaviors.

The Horizons intervention reduced incident chlamydia among adolescents recruited from clinical settings,[19,24] but this study did not find differences in incident STIs between Horizons + GMET, Horizons, and control on average, only at 6 months. The study was powered assuming the STI prevalence of earlier clinic-recruited horizons evaluations. However, the community-recruited sample had lower-than-expected STI prevalence and recurrence, so this study was underpowered to show differences in STI incidence.

The novel GMET module emphasized alcohol's effects on decision making and the resistance strategies women could employ to resist risky situations involving alcohol when confronted with a partner using alcohol and in condom negotiation discussions. Future interventions could explicitly incorporate decision-making emotional regulation skills for sexual decision making.[28] Both Horizons + GMET and Horizons interventions reduced alcohol use, but the GMET component addresses a key STI risk factor and adds only an extra hour at the end of each workshop.

Future interventions may increase participation by varying the health educator-delivered call schedule to include evenings and weekends; by soliciting feedback from community advisory board for intervention planning, implementation, and completion; and by engaging sexual partners in the intervention.

This study population was recruited from community settings, and 95% of eligible women chose to participate, so this sample is likely more similar to the general population than samples recruited from clinical venues used in the evaluation of many HIV/STI prevention interventions.

The study included objective and quantifiable biological markers of disease and used ACASI and the Timeline Followback[25] technique to enhance accurate self-report recall of behaviors and perceived confidentiality and minimize response bias.

Limitations

Owing to resource and logistical limitations, this study did not complement self-reported condom use with a semen exposure biomarker. Treatment and control arms may have misreported risk behaviors even with ACASI, which would bias results toward the null of no association because measurement error adds noise to both treatment and control groups,[29] so the treatment effect likely underestimates the true treatment effect.

CONCLUSIONS

Global association studies, event-based approaches, and other methodologies provide accumulating evidence that alcohol use contributes to sexual risk taking among Black women.[30] This study suggests that complementing gender- and culturally tailored HIV/STI prevention intervention with a group-delivered motivational enhancement creates a framework for addressing challenges and problem solving within sexual partnerships and may increase safe sex and condom use and reduce risky drinking. Interventions that reach at-risk Black women in community venues with novel outreach approaches and tailored content can address the alcohol–unprotected sex association within long-term relationships.

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RJD conceived the study. ESR, JMS, JLB, TR, ELPB, TLD, JER, and AC carried out the literature review. ESR, JMS, JLB, TR, ELPB, TLD, and GMW carried out the intervention and collected the data. JER analyzed the data, created the figures and tables, and wrote the manuscript. JER, RJD, JLB, JMS, and TLD interpreted the results and revised the paper. All authors approved the final submission.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2020.11.014.

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