Horizons and Group Motivational Enhancement Therapy

HIV Prevention for Alcohol-using Young Black Women

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Abbreviations:

GMET = Group Motivational Enhanced Therapy

GHP = General Health Promotion

AUDIT = Alcohol Use Disorders Identification Test

HIV = Human Immunodeficiency Virus

CDC = Centers for Disease Control and Prevention

AOR = Adjusted Odds Ratio

CI = confidence interval

STI = sexually transmitted infection

NIMH = National Institute of Mental Health

ABSTRACT (272 words)

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

Study Design: Parallel group comparative treatment efficacy trial with random assignment to one of three conditions.

Setting/participants: The sample comprised 560 Black or African American women, 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 - February 2014.

Intervention: Group Motivational Enhanced Therapy (GMET) module designed to complement a CDC-designated evidence-based intervention (Horizons) to reduce sexual risk behaviors, alcohol use, and STIs, with three comparison groups: (1) Horizons+GMET intervention, (2) Horizons+General Health Promotion (GHP) intervention, or (3) enhanced standard-of-care.

Main outcome measures: Safe sex (abstinence or 100% condom use); condom non-use; proportion condom use during sexual episodes; incident chlamydia, gonorrhea, and trichomonas infections; and problematic alcohol use measured by AUDIT 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+GMET had greater odds of safe sex (adjusted odds ratio [AOR]=1.45; 95% confidence interval [CI]=1.04, 2.02; p=0.03), greater proportion condom use (AOR=1.68; 95% CI=1.18, 2.41; p=0.004), and lower odds of condom non-use (AOR=0.57;

95% 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+GMET (AOR=0.61; 95% CI=0.41, 0.90; p=0.01).

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

Trial registration: NCT01553682.

BACKGROUND

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 as 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 physiological and cognitive factors in lower condom use, including heightened arousal, impaired judgment, and expectations about alcohol's effects.[7,13-17] Further, alcohol use may reduce HIV/STI prevention interventions' efficacy due to unprotected sexual behavior.[18] In the Horizons intervention, designated a "best practice" evidence-based HIV prevention intervention by CDC, participants' alcohol use was associated with unsafe sex and reduced intervention efficacy, especially among participants who used alcohol 3 or more 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. The present 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

Participants

The participants were Black women in Atlanta, Georgia, ages 18-24, 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 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 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 18-24 years old, not married or pregnant (verified with a urine pregnancy test before baseline assessment and randomization), had consumed alcohol on at least three 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 were counseled in a private location, informed 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). A power calculation determined the sample size using PASS 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 Institutional Review Board 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.)

Study Procedures

Study design. After administering the baseline assessment, participants were randomly assigned to one of three conditions: 1) Horizons+Group Motivational Enhancement Therapy (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 enhanced standard-of-care control.

Randomization and masking

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

Blinding. Lab technicians processing specimens for STI tests were blinded to respondents' treatment assignment.

Intervention methods. With the guidance of an advisory board of Black women aged 18 to 24, 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 two trained Black female health educators: a lead educator who had worked on the previous Horizons study[19] and a masters-level health education student. Due to not being licensed childcare providers, the study staff were not able to provide childcare for participants with children.

The time-equivalent Horizons+GMET and Horizons conditions comprised two 5-hour sessions on consecutive Saturdays with eight participants per session; see implementation notes in Appendix 2. Horizons addresses gender and ethnic pride, 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 and/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 (MET), have received continuing and significant empirical support in the context of successful, brief behavior change interventions with substance-using populations.[20] 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.

The Enhanced Standard of Care control condition received a 1-hour group session implemented by one 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.

Workshop attendance

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 group-based sessions was the preferred delivery method for missed sessions: 26 participants (6.9%) attended a different cohort's GMET workshop, and 5 (2.7%) met with a health educator. The 23 (12.1%) Horizons participants who missed a workshop met individually with a health educator to discuss workshop content. Nine Horizons (4.7%) and 17 Horizons+GMET (9.2%) missed a workshop without any make-up session ($p=0.14$).

Health educator-delivered telephone booster sessions

Following group sessions, Horizons+GMET participants received 8 15-minute health educator-led telephone booster sessions approximately 1 month and 2 months after each assessment.

Health educators reviewed participants' progress towards 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 proportion receiving each call and text are in Supplemental Table 2.

Study retention

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 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. Data collection occurred at baseline, immediately following completion of the in-person intervention (immediate posttest), and at 3-, 6-, 9- and 12-months post-randomization. Data consisted of three 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 anatomical model of a vagina.[21] Specimens were assayed for two bacterial pathogens, *C. trachomatis* and *N. gonorrhoeae* using the BDProbeTec ET *C. trachomatis* and *N. gonorrhoeae* Amplified DNA assay (Becton Dickinson and Company, Sparks, MD).[22] Specimens were also tested for *T. vaginalis* using a non-commercial 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.

Following bio-specimen collection, ACASI was utilized to administer a behavioral health survey assessing socio-demographics, sexual history, alcohol and drug use, communication, and psychosocial constructs associated with HIV/STI-preventive behaviors. To be consistent with previous Horizons surveys[19, 27], 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[27], so past 90-day condom use was also collected.

ACASI technology enhances 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.[24] 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

Missing data was primarily attributable to non-participation in follow-up assessments. Participants who did not participate in one 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, respectively, comparable retention to previous interventions [19,27]. 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-squared tests for categorical variables. Of the 136 comparisons, 5 comparisons were significant at $p \leq 0.05$ and 11 comparisons were $p \leq 0.1$, within the range expected by chance, which is consistent with the data being missing completely at random (Supplementary Table 1). Despite 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 imputation with 10 imputations using Stata SE 15.1 (Appendix 1).

Outcome Measures

Safe sex outcomes. Safe sex was a binary outcome where "1" signified that the participant either reported sexual abstinence or 100% condom use in the 90 days prior to 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 prior to assessment, elicited by sequential items asking women to report number of coital episodes in past 90 days followed by number of those episodes with a condom. Condom non-use 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.

Biological outcomes. 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.

Alcohol outcomes

Problematic alcohol use. 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 or greater, the standard cut-off used as a screen for alcohol use disorder.

Weekly binge drinking. Binge drinking was determined based on the answer to the question "How often do you have six or more drinks on one occasion?" and 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 six or more drinks instead of the standard cut-off for women of three or more drinks, representing a greater quantity of alcohol consumption.

Drinking context score. Drinking context score was defined by the scale comprising 9 Likert-

type items, describing how likely participants were to drink excessively in situations including parties, on a date, and before sex.[26] 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 alpha 0.91.

Statistical analyses

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 15.1 and R 3.6.0 between October 2018 and October 2019, a delay between data collection and analysis related to staff turnover.

Bivariate analyses

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

Multivariate analyses

Data analysis used generalized estimating equations (GEE), controlling for number of months post-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 using 1855 observations for 560 participants in all assessments. Post-estimation analyses

predicted proportion condom use with Robinson's semi-parametric regression estimator with baseline condom use as the non-linear term, and predicted chlamydia, gonorrhea, and trichomonasis with logistic regression.

RESULTS

Randomization yielded balance across the three 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.

Treatment effects on sexual behavior

Averaged over all four follow-up assessments, 44.1% of respondents reported safe sex (abstinence or 100% condom use) and 66.7% reported safe sex at least at one 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% 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 the control condition (adjusted odds ratio [AOR]=1.45; 95% confidence interval [CI]=1.04, 2.02; p=0.03), but Horizons alone did not differ from the control condition (AOR=1.23; 95% CI=0.88, 1.71; p=0.22).

Horizons+GMET but not Horizons alone increased the proportion of condom use in the past 3 months relative to the control group averaged over the 4 follow-up assessments: the control

group and Horizons+GMET used condoms in respectively 50.2% and 63.0% of coital episodes (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 did not (AOR=1.27; 95% CI=0.90, 1.82). In exploratory semiparametric regressions, both interventions predicted 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 non-use in the past 90 days than controls (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).

Treatment effects on STIs

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

10.4% tested positive for trichomoniasis, and 25.3% tested positive at least once (AOR=1.22; 95% CI=0.77, 1.92).

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 and Horizons+GMET: AOR=0.43; 95% CI=0.19, 0.99; p=0.05). This exploratory analysis performed 8 statistical tests at the 0.05 level, yielding a 33% chance of false significance.

Treatment effects on problematic alcohol use

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 control group had problematic alcohol use, as measured by an AUDIT score of at least 8, and 42.8% had an AUDIT score at least 8 at least once; 15.7% of Horizons had an AUDIT score at least 8 , and 35.0% had an AUDIT score at least 8 at least once (p=0.006); and 16.2% of Horizons+GMET had an AUDIT score at least 8 , and 31.5% had an AUDIT score at least 8 at least once (p=0.008). Horizons and Horizons+GMET decreased the odds of problematic alcohol use respectively 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).

The control group had an average AUDIT score of 5.6 averaged over the 4 follow-up assessments; Horizons had an average AUDIT score of 4.3 (p=0.02), and Horizons+GMET

averaged an AUDIT score of 4.4 (p=0.04). Horizons and Horizons+GMET reduced AUDIT scores by 23% (incidence rate ratio [IRR]=0.77; 95% CI=0.72, 0.83; p<0.001) and 19.0% (IRR=0.81; 95% CI=0.75, 0.88; p<0.001), respectively (Figure 3). Both interventions reduced the drinking context score by 12.0% (IRR=0.88; 95% CI=0.85, 0.91; p<0.001) (Figure 3).

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

Differences between the Horizons+GMET and Horizons treatment arms

The Horizons+GMET and Horizons interventions did not differ from each other significantly on any outcome: safe sex, chlamydia, gonorrhea, condom non-use, proportion 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 non-use, 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 motivation to avoid repeat infection[19,27] than this community-recruited sample. Despite these differences, workshop attendance and follow-up was comparable to clinic-recruited Horizons evaluations.[19,27] 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,[19,27] 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.[19,27] 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 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; soliciting feedback from community advisory board for intervention planning, implementation, and completion; and engaging sexual partners in the intervention.

Strengths and Limitations

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 participants 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.

Due 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 towards the null of no association because measurement error adds noise to both treatment and control groups,[29] so the treatment effect likely under-estimates the true treatment effect.

PUBLIC HEALTH IMPLICATIONS

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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Author contributions

RJD conceived the study. RJD, AB, SGW, ER, JH, SE contributed to the design of the GMET intervention, sampling, and recruitment strategies. ER, JS, JB, TR, EB, TLD, JR, AC carried out the literature review. ER, JS, JB, TR, EB, TLD, GW carried out the intervention and collected the data. SGW, YL JR devised the data analysis strategy and analyzed the data. JR revised data analysis strategy, analyzed data, created the figures and tables, and wrote the manuscript. JR, RJD, JB, JS, TLD interpreted the results and revised the paper. All authors approved the final submission.

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Ethics committee approval: The Emory University Institutional Review Board approved this study.

Figure 1: CONSORT diagram of treatment assignment.

Figure 2: Semiparametric regression results predicting condom use percentage, AUDIT score, and drinking context score with respective baseline measurement as non-linear term

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

Characteristic	Control (*n*=185)	Horizons (*n*=190)	Horizons +GMET (*n*=185)	Test Statistic[a]	*p*-value
Socio-demographic indicators					
Age, mean (SD), years	20.55 (1.84)	20.64 (1.92)	20.55 (1.93)	KW $\chi^2(2)$ = .22	.90
Graduated high school, No. (%)	125 (67.6)	130 (68.4)	120 (64.9)	$\chi^2(2) = .581$	.75
Family aid index (0-4), mean (SD)	1.36 (0.92)	1.35 (0.97)	1.36 (0.90)	$\chi^2(8) = 4.02$	.89
Employed, No. (%)	45 (24.3)	63 (33.2)	44 (23.8)	$\chi^2(2) = 5.28$	.07
Poor neighborhood quality					
Abandoned homes or apartments, No. (%)	83 (44.9)	106 (55.8)	101 (54.6)	$\chi^2(2) = 5.35$	0.07
Buildings with broken windows, No. (%)	47 (25.4)	47 (24.7)	52 (28.1)	$\chi^2(2) = 0.62$	0.7

Homes with bars on the windows & doors, No. (%)	81 (43.8)	66 (34.7)	67 (36.2)	$\chi^2(2) = 3.72$	0.2
Relationship					
Current boyfriend, No. (%)	157 (84.9)	169 (88.9)	147 (79.5)	$\chi^2(2) = 6.46$	**.04**
Current relationship duration, mean (SD), months	21.7 (26.8)	20.7 (22.2)	19.2 (21.7)	KW $\chi^2(2) =$ 0.44	.80
Perceived partner concurrency, No. (%)	39 (24.8)	45 (26.6)	32 (21.8)	$\chi^2(2) = 1.02$	.60
Relative age of sex partners				$\chi^2(4) = 7.92$	.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	.13

Communication self-efficacy (6-28)	19.25 (4.22)	19.27 (4.25)	19.44 (4.24)	KW $\chi^2(2)$ = 0.23	.89
Communication frequency (5-20)	9.57 (4.02)	9.39 (3.88)	9.79 (3.86)	KW $\chi^2(2)$ = 1.83	.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	.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	.60
Sexual behavior					
Condom use past 90 days[b], mean (SD)	0.36 (0.31)	0.32 (0.30)	0.32 (0.31)	KW $\chi^2(2)$ = 1.89	.39
Positive result for sexually transmitted infection, No. (%)					
Chlamydial infections	41 (22.2)	33 (17.4)	31 (16.8)	$\chi^2(2) = 2.13$	.34
Gonococcal infections	10 (5.4)	10 (5.3)	9 (4.9)	$\chi^2(2) = 0.06$	.97
Trichomonas	44 (23.8)	33 (17.4)	27 (14.6)	$\chi^2(2) = 5.44$	0.07
Other factors					

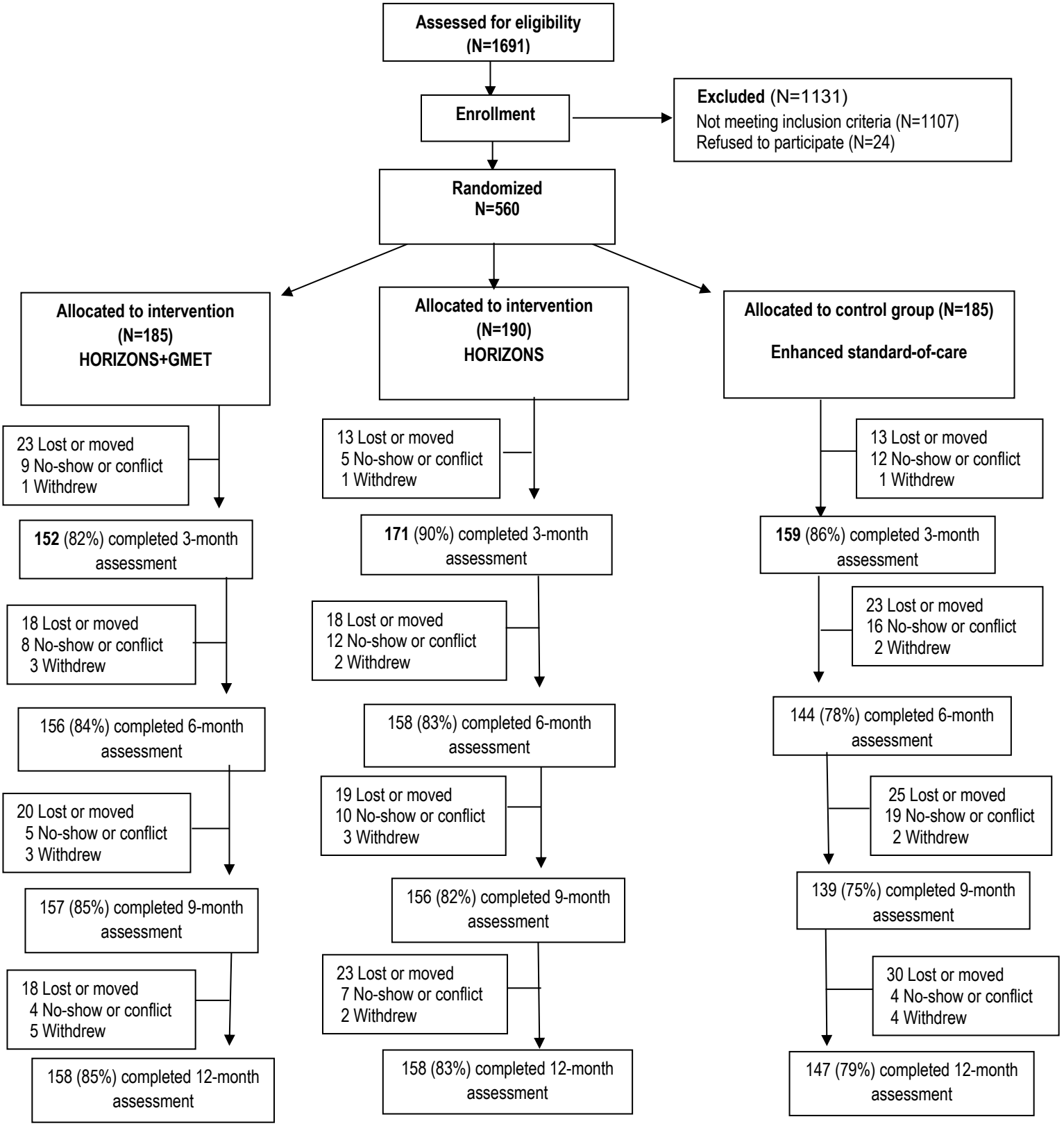
	Ever douched, No. (%)	95 (51.4)	93 (48.9)	103 (55.7)	$\chi^2(2) = 1.74$	.42
	Douched in past 3m	60 (32.4)	60 (31.6)	69 (37.3)	$\chi^2(2) = 1.59$	.45
	Depression, mean (SD)	13.37 (6.25)	13.14 (5.45)	13.56 (5.87)	KW $\chi^2(2) = 0.84$	.66
	Impulsivity, mean (SD)	41.03 (6.46)	41.08 (6.90)	40.46 (6.86)	KW $\chi^2(2) = 0.75$	.69
History of abuse, No. (%)						
	Emotional	71 (38.4)	85 (44.7)	85 (45.9)	$\chi^2(2) = 2.50$	.29
	Physical	54 (29.2)	65 (34.2)	59 (31.9)	$\chi^2(2) = 1.09$	.58
	Reproductive coercion	77 (41.6)	93 (49.0	87 (47.0)	$\chi^2(2) = 2.17$	.34
	Reproductive coercion, past 3m	50 (27.0)	57 (30.0)	56 (30.3)	$\chi^2(2) = 0.58$	.75
Ever used marijuana, No. (%)		145 (78.4)	153 (80.5)	146 (78.9)	$\chi^2(2) = 0.29$	.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	.45
AUDIT risk zone, No. (%)					$\chi^2(6) = 7.79$	.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, No. (%)				$\chi^2(8) = 9.86$	0.28
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 ($p<0.05$).

Table 2: Panel multivariate regression results, controlling for number of months post-intervention.

	Odds Ratio, 95% Confidence Interval		
	Control	Horizons	Horizons+GMET
Safe sex in 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 past 90 days	Ref.=1.0	0.83 (0.58, 1.18)	0.57 (0.38, 0.83)
Percent 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)
	Incidence rate ratio, 95% Confidence Interval		
AUDIT score	Ref.=1.0	0.77 (0.72, 0.83)	0.81 (0.75, 0.88)
Drinking context scale	Ref.=1.0	0.88 (0.85, 0.91)	0.88 (0.85, 0.91)


Assessed for eligibility (N=1691)
Enrollment
Excluded (N=1131)
Not meeting inclusion criteria (N=1107)
Refused to participate (N=24)
Randomized N=560
Allocated to intervention (N=185) HORIZONS+GMET
Allocated to intervention (N=190) HORIZONS
Allocated to control group (N=185) Enhanced standard-of-care
23 Lost or moved
9 No-show or conflict
1 Withdrew
13 Lost or moved
5 No-show or conflict
1 Withdrew
13 Lost or moved
12 No-show or conflict
1 Withdrew
152 (82%) completed 3-month assessment
171 (90%) completed 3-month assessment
159 (86%) completed 3-month assessment
18 Lost or moved
8 No-show or conflict
3 Withdrew
18 Lost or moved
12 No-show or conflict
2 Withdrew
23 Lost or moved
16 No-show or conflict
2 Withdrew
156 (84%) completed 6-month assessment
158 (83%) completed 6-month assessment
144 (78%) completed 6-month assessment
20 Lost or moved
5 No-show or conflict
3 Withdrew
19 Lost or moved
10 No-show or conflict
3 Withdrew
25 Lost or moved
19 No-show or conflict
2 Withdrew
157 (85%) completed 9-month assessment
156 (82%) completed 9-month assessment
139 (75%) completed 9-month assessment
18 Lost or moved
4 No-show or conflict
5 Withdrew
23 Lost or moved
7 No-show or conflict
2 Withdrew
30 Lost or moved
4 No-show or conflict
4 Withdrew
158 (85%) completed 12-month assessment
158 (83%) completed 12-month assessment
147 (79%) completed 12-month assessment

Appendix 1. Analysis after multiple imputation

All baseline data was available. For missing data with follow-up surveys, multiple imputation was performed in Stata SE 15.1 with 10 imputations, using the multivariate normal distribution, with baseline SNAP receipt, children, AUDIT score, condom non-use, alcohol risk, alcohol frequency, drinking context score, chlamydia, gonorrhea, trichomoniasis, daily marijuana use, monthly marijuana use, marijuana frequency, alcohol frequency, number of drinks usual, and moderate alcohol use. The analysis used GEE with the negative binomial family with robust standard errors.

Sensitivity analysis results

In sensitivity analysis using multiply imputed data, Horizons+GMET but not Horizons alone increased the frequency of safe sex, percent condom use, and decreased condom non-use; Horizons but not Horizons+GMET decreased risky alcohol use; and both interventions decreased weekly binge drinking (Appendix table 1). In sensitivity analysis with wave by treatment interactions in multiply imputed data, Horizons+GMET but not Horizons alone increased percent condom use, decreased condom non-use, and decreased weekly binge drinking, and Horizons but not Horizons+GMET decreased drinking context score (Appendix table 2).

Appendix Table 1: Panel multivariate regression results in multiply imputed data using a negative binomial model, controlling for number of months post-intervention (10 imputations).

	Incidence Rate Ratio, 95% Confidence Interval		
	Control	Horizons	Horizons+GMET
Safe sex in past 90 days (abstinence or 100% condom use)	Ref.=1.0	1.13 (0.91, 1.40)	1.23 (1.00, 1.51)
0% condom use in past 90 days	Ref.=1.0	0.86 (0.66, 1.12)	0.65 (0.48, 0.88)
Percent condom use	Ref.=1.0	1.10 (0.96, 1.25)	1.21 (1.07, 1.37)
Chlamydia	Ref.=1.0	1.08 (0.70, 1.68)	1.13 (0.73, 1.74)
Gonorrhea	Ref.=1.0	0.96 (0.52, 1.76)	0.58 (0.30, 1.14)
Trichomoniasis	Ref=1.0	1.07 (0.69, 1.64)	1.17 (0.75, 1.82)
Risky alcohol use	Ref.=1.0	0.70 (0.51, 0.96)	0.76 (0.55, 1.04)
Weekly binge drinking	Ref.=1.0	0.54 (0.31, 0.96)	0.44 (0.24, 0.80)
AUDIT score	Ref.=1.0	0.81 (0.65, 1.01)	0.86 (0.69, 1.07)
Drinking context scale	Ref.=1.0	0.95 (0.88, 1.02)	0.93 (0.86, 1.01)

N=2240 with 560 groups unless noted. Weekly binge drinking is n=1855 in 531 groups.

Appendix Table 2: Panel multivariate regression in multiply imputed data using a negative binomial model, controlling for number of months post-intervention and interaction between months post-intervention and treatment (10 imputations).

	Incidence Rate Ratio, 95% Confidence Interval		
	Control	Horizons	Horizons+GMET
Safe sex in past 90 days (abstinence or 100% condom use)	Ref.=1.0	1.34 (0.97, 1.86)	1.30 (0.92, 1.83)
0% condom use in past 90 days	Ref.=1.0	0.73 (0.47, 1.14)	0.53 (0.31, 0.90)
Percent condom use	Ref.=1.0	1.16 (0.99, 1.38)	1.22 (1.04, 1.43)
Chlamydia	Ref.=1.0	1.55 (0.66, 3.64)	1.92 (0.82, 4.51)
Gonorrhea	Ref.=1.0	0.81 (0.28, 2.35)	0.54 (0.14, 2.10)
Trichomoniasis	Ref=1.0	1.31 (0.61, 2.82)	0.99 (0.40, 2.44)
Risky alcohol use	Ref.=1.0	0.73 (0.50, 1.06)	0.82 (0.57, 1.18)
Weekly binge drinking	Ref.=1.0	0.60 (0.33, 1.12)	0.33 (0.15, 0.74)
AUDIT score	Ref.=1.0	0.83 (0.64, 1.06)	0.88 (0.69, 1.11)
Drinking context scale	Ref.=1.0	0.91 (0.83, 1.00)	0.91 (0.83, 1.01)

N=2240 with 560 groups unless noted. Weekly binge drinking is n=1855 in 531 groups.

Interaction terms between wave and treatment status were not significant at p=0.05.

Appendix 2: Implementation notes

The Horizons+GMET and Horizons conditions were planned to comprise 3 4-hour sessions on consecutive Saturdays. Among 18 Horizons and 17 Horizons+GMET participants who began the study between March 3 and April 7, 2012, 3 Horizons and 3 Horizons+GMET participants missed workshop 3, of whom 1 Horizons+GMET participant had an individual session with a health educator to cover workshop 3. To increase workshop attendance, both interventions were condensed to a time-equivalent 2-session format for the remaining 172 Horizons and 168 Horizons+GMET participants.

Supplemental Table 1. Association between missing data and 34 baseline covariates (136 comparisons, 5 significant at p<=0.05, 11 significant at p<=0.1)

Characteristic	Missing at 3 months	Missing at 6 months	Missing at 9 months	Missing at 12 months
Sociodemographic				
Age, years	$\chi^2(7)$ =16.0, **p=0.03**	$\chi^2(7)$ =8.3, ns	$\chi^2(7)$ =16.0, ns	$\chi^2(7)$ =4.0, ns
High school diploma or GED	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 0.7, ns	$\chi^2(1)$ = 0.9, ns
Family aid index (0-4)	$\chi^2(4)$ = 1.2, ns	$\chi^2(4)$ = 3.5, ns	$\chi^2(4)$ = 0.5, ns	$\chi^2(4)$ = 4.4, ns
Employed, No. (%)	$\chi^2(1)$ = 0.4, ns	$\chi^2(1)$ = 0.4, ns	$\chi^2(1)$ = 0.0, ns	$\chi^2(1)$ = 0.2, ns
Abandoned homes or apartments, no (%)	$\chi^2(1)$ = 2.4, ns	$\chi^2(1)$ = 1.6, ns	$\chi^2(1)$ = 0.0, ns	$\chi^2(1)$ = 0.5, ns
Buildings with broken windows, no (%)	$\chi^2(1)$ = 0.86, ns	$\chi^2(1)$ = 1.3, ns	$\chi^2(1)$ = 0.6, ns	$\chi^2(1)$ = 0.7, ns
Homes with bars on the windows & doors, no (%)	$\chi^2(1)$ = 1.1, ns	$\chi^2(1)$ = 1.8, ns	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 0.0, ns
Relationship				

	Current boyfriend, No. (%)	$\chi^2(1) = 1.7$, ns	$\chi^2(1) = 0.4$, ns	$\chi^2(1) = 5.9$, **p=0.02**	$\chi^2(1) = 0.8$, ns
	Current relationship duration, mean (SD), mo	KW $\chi^2(1) = 2.5$, ns	KW $\chi^2(1) = 0.7$, ns	KW $\chi^2(1) = 0.3$, ns	KW $\chi^2(1) = 0.5$, ns
	Perceived partner concurrency, No. (%)	$\chi^2(1) = 0.0$, ns	$\chi^2(1) = 0.3$, ns	$\chi^2(1) = 0.5$, ns	$\chi^2(1) = 0.1$, ns
Relative age of sex partners		$\chi^2(2) = 0.6$, ns	$\chi^2(2) = 0.4$, ns	$\chi^2(2) = 0.8$, ns	$\chi^2(2) = 0.4$, ns
Psychosocial mediator, mean (SD)					
	Condom use self-efficacy (9-45)	KW $\chi^2(1) = 2.5$, ns	KW $\chi^2(1) = 0.4$, ns	KW $\chi^2(1) = 3.0$, p=0.08	KW $\chi^2(1) = 3.4$, p=0.06
	Communication self-efficacy (6-28)	KW $\chi^2(1) = 2.8$, p=0.1	KW $\chi^2(1) = 1.1$, ns	KW $\chi^2(1) = 0.9$, ns	KW $\chi^2(1) = 0.2$, ns
	Communication frequency (5-20)	KW $\chi^2(1) = 0.1$, ns	KW $\chi^2(1) = 0.0$, ns	KW $\chi^2(1) = 2.5$, ns	KW $\chi^2(1) = 0.7$, ns
	Sex refusal self-efficacy (7-28)	KW $\chi^2(1) = 1.1$, ns	KW $\chi^2(1) = 0.1$, ns	KW $\chi^2(1) = 2.3$, ns	KW $\chi^2(1) = 3.5$, p=0.06
	Fear of condom negotiation (7-40)	KW $\chi^2(1) = 0.2$, ns	KW $\chi^2(1) = 0.0$, ns	KW $\chi^2(1) = 0.1$, ns	KW $\chi^2(1) = 0.1$, ns

Sexual behavior				
Condom use past 90 days[b], mean (SD)	7.5% vs. 33.3% KW $\chi^2(1) = 5.2$, **p=0.02**	KW $\chi^2(1) = 0.3$, ns	KW $\chi^2(1) = 1.0$, ns	KW $\chi^2(1) = 0.3$, ns
Positive result for sexually transmitted infection, No. (%)				
Chlamydia	$\chi^2(1) = 0.0$, ns	$\chi^2(1) = 1.2$, ns	$\chi^2(1) = 3.4$, p=0.06	$\chi^2(1) = 1.9$, ns
Gonorrhea	$\chi^2(1) = 2.8$, p=0.09	$\chi^2(1) = 1.3$, ns	$\chi^2(1) = 0.5$, ns	$\chi^2(1) = 1.0$, ns
Trichomonas	$\chi^2(1) = 0.2$, ns	$\chi^2(1) = 1.9$, ns	$\chi^2(1) = 0.7$, ns	$\chi^2(1) = 0.1$, ns
Other factor				
Ever douched, No. (%)	$\chi^2(1) = 1.2$, ns	$\chi^2(1) = 4.8$, **p=0.03**	$\chi^2(1) = 1.6$, ns	$\chi^2(1) = 6.7$, **p=0.01**
Douched in past 3 months	$\chi^2(1) = 0.0$, ns	$\chi^2(1) = 2.3$, ns	$\chi^2(1) = 0.6$, ns	$\chi^2(1) = 1.5$, ns

	Depression, mean (SD)	KW $\chi^2(1)$ = 0.1, ns	KW $\chi^2(1)$ = 0.0, ns	KW $\chi^2(1)$ = 0.1, ns	KW $\chi^2(1)$ = 0.0, ns
	Impulsivity, mean (SD)	KW $\chi^2(1)$ = 0.0, ns	KW $\chi^2(1)$ = 0.5, ns	KW $\chi^2(1)$ = 0.8, ns	KW $\chi^2(1)$ = 0.8, ns
History of abuse, No. (%)					
	Emotional	$\chi^2(1)$ = 0.8, ns	$\chi^2(1)$ = 1.2, ns	$\chi^2(1)$ = 0.0, ns	$\chi^2(1)$ = 0.3, ns
	Physical	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 1.1, ns	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 0.0, ns
	Reproductive coercion	$\chi^2(1)$ = 0.5, ns	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 0.0, ns	$\chi^2(1)$ = 0.0, ns
	Reproductive coercion, past 3m	$\chi^2(1)$ = 0.0, ns	$\chi^2(1)$ = 0.6, ns	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 1.1, ns
Ever used marijuana, No. (%)		$\chi^2(1)$ = 0.3, ns	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 0.1, ns	$\chi^2(1)$ = 0.3, ns
AUDIT score (0-40), mean (SD)		KW $\chi^2(1)$ = 0.5, ns	KW $\chi^2(1)$ = 0.0, ns	KW $\chi^2(1)$ = 0.0, ns	KW $\chi^2(1)$ = 0.0, ns
AUDIT risk zone		$\chi^2(3)$ =0.06, ns	$\chi^2(3)$ =0.5, ns	$\chi^2(3)$ =2.1, ns	$\chi^2(3)$ =0.2, ns

Binge frequency	$\chi^2(4) = 3.4$, ns	$\chi^2(4) = 2.1$, ns	$\chi^2(4) = 2.3$, ns	$\chi^2(4) = 1.5$, ns
Binge weekly	$\chi^2(2) < 0.1$, ns	$\chi^2(2) = 1.4$, ns	$\chi^2(2) < 0.1$, ns	$\chi^2(2) < 0.1$, ns
Drinking context scale	$\chi^2(1) = 0.1$, ns	$\chi^2(1) < 0.1$, ns	$\chi^2(1) < 0.1$, ns	$\chi^2(1) = 0.6$, ns

Note: Boldface indicates statistical significance ($p<0.05$).

Supplementary Table 2. Health educator-delivered counseling phone calls and text messages, in chronological order relative to each assessment and the intervention.

N (%)	Control (n=185)	Horizons (n=190)	Horizons+GMET (n=185)
Baseline assessment			
Intervention	General Health Promotion workshop	Horizons workshop	Horizons+GMET workshop
Call 1	0	138 (72.6)	110 (59.5)
Text 1 response	0	63 (33.2)	136 (73.5)
Call 2	0	152 (80.0)	145 (78.4)
Text 2 response	0	37 (19.5)	111 (60.0)
3 months assessment			
Call 3	0	130 (68.4)	96 (51.9)
Text 3 response	0	12 (6.3)	88 (47.6)
Call 4	0	136 (71.6)	138 (74.6)
Text 4 response	0	1 (0.5)	66 (36.7)
6 months assessment			
Call 5	0	105 (55.3)	82 (44.3)
Text 5 response	0	0	48 (26.0)

Call 6	0	141 (74.2)	120 (64.9)
Text 6 response	0	0	35 (18.9)
9 months assessment			
Call 7	0	117 (61.6)	78 (42.2)
Text 7 response	0	0	30 (16.2)
Call 8	0	137 (72.1)	115 (62.2)
Text 8 response	0	0	22 (11.9)
12 months assessment			

The even-numbered calls for Horizons were retention calls. The odd-numbered calls and all text messages for Horizons and all calls for Horizons+GMET were booster sessions. Text response means that the participant responded to the text message that they received.