HHS Public Access

Author manuscript

AIDS Behav. Author manuscript; available in PMC 2016 October 01.

Published in final edited form as:

AIDS Behav. 2015 October ; 19(10): 1860–1874. doi:10.1007/s10461-015-1009-y.

Acceptability and Preliminary Efficacy of a Tailored Online HIV/STI Testing Intervention for Young Men who have Sex with Men: The Get Connected! Program

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Abstract

Southeast Michigan accounts for over 70 % of all HIV/STI cases in the state, with young men who have sex with men (YMSM) between the ages of 13 and 24 encumbering the largest burden in HIV/STI incidence. Using community-based participatory research principles, we developed and pilot tested a web-based, randomized control trial seeking to promote HIV/STI testing ("Get Connected!") among YMSM (N = 130; ages 15–24). Randomized participants completed a baseline assessment and shown a test-locator condition (control) or a tailored, personalized site (treatment). At 30-day follow-up, we found high acceptability among YMSM in both conditions,

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yet higher credibility of intervention content among YMSM in the treatment group (d = .55). Furthermore, 30 participants reported testing by following, with the majority of these participants (73.3 %; n = 22) completing the treatment condition, a clinically meaningful effect (d = .34) suggesting preliminary efficacy for the intervention. These results demonstrate the potential of the intervention, and suggest that a larger efficacy trial may be warranted.

Keywords

Prevention; eHealth; Youth; Linkage to care

Introduction

Southeast Michigan is the epicenter of the state's HIV epidemic, accounting for over 70 % of all HIV/AIDS cases in the state [1]. Over two thirds of men who have sex with men (MSM) living with HIV reside in Southeast Michigan [1]. Consistent with national trends, Southeast Michigan has seen increases in HIV and STI incidence among young men who have sex with men (YMSM) ages 13–29 [2]. Based on the 2012 Michigan Community Health Department data [3], six of the nine counties included in the greater Detroit–Ann Arbor–Flint combined statistical area account for the majority of new chlamydia, gonorrhea and primary and secondary syphilis cases, respectively. The three counties housing the three major cities in Southeast Michigan (e.g., Detroit, Flint, and Ann Arbor) are ranked among the top 5 Michigan counties with the greatest percentage of new chlamydia, gonorrhea and syphilis infections. Although the state of Michigan does not collect data regarding the route of sexual transmission in their STI reports, men account for 77 % of syphilis cases. Adolescent and young adult men carry nearly 80 % of the burden of syphilis among all adolescents and young adults (135 cases/100,000 adolescents and young adults), and 18 % of the overall syphilis burden. The vast majority of these STI cases are attributable to YMSM between the ages of 15–29, which is hardly surprising given the high comorbidity of STIs and HIV/AIDS [3]. Taken together, these data underscore the existing STI burden experienced by YMSM in Southeast Michigan.

Compared to other at-risk populations, few evidence-based HIV prevention interventions specific to the needs of YMSM and/or YMSM of color exist [4–7]. Innovative strategies to promote HIV/STI awareness among YMSM, particularly among Black and Latino YMSM, will require the creation of interventions that are culturally sensitive to their psychosocial needs and facilitate YMSMs access to and retention in comprehensive sexual health services [8, 9]. Therefore, consistent with the National HIV/AIDS Strategy for the United States' call to reduce new HIV infections by intensifying prevention efforts in highly impacted communities, we sought to develop and pilot test a tailored online HIV/STI testing intervention (Get Connected!) for YMSM in Southeast Michigan.

Researchers have documented that YMSM often seek out sexual health information online [10–13]. As a result, e-based interventions are a promising mode of HIV/STI prevention, given their potential appeal to YMSM and their ability to deliver tailored online content specific to each user's HIV/AIDS risk behaviors/context. Tailoring refers to the use of

individuals' data (e.g., users) to customize intervention content based on variation in their psychological, social, and behavioral profile, and differs from “targeted” interventions, which rely on delivering the same message to a previously identified group of individuals [14, 15]. Tailoring as an intervention strategy is promising and has been used in prior in-person delivered HIV/AIDS intervention studies (e.g., customizing patient-centered care through motivational interviewing during an in-person counseling session [16] or customizing intervention content to different groups within community-based interventions [17]). However, tailoring approaches have not been optimized in HIV e-interventions, despite the fact that they are noted as a strength of technology-based intervention approaches. Furthermore, the use of the term “tailoring” in intervention development/delivery is quite different when employed in-person versus online. In e-interventions, tailoring refers to a programmed computer-based algorithmic process consisting of: (a) an assessment of individual characteristics relevant to participants' behaviors through an assessment (e.g., baseline survey); (b) the deployment of these algorithms based on the assessment data to generate intervention messages relevant to the specific needs of the user; and, (c) a feedback protocol that delivers these messages to the user in a clear, vivid format.

Interventions using tailored messages have reported that participants found the content more persuasive and relevant than targeted intervention approaches [18]. More importantly, tailored interventions have been shown to produce higher rates of behavior change and maintenance than non-tailored programs in a variety of health domains, including exercise, nutrition, and cancer screening [19]. Compared to these other health domains, however, the use of tailoring as a behavioral strategy in HIV/STI prevention has received limited attention, even though a meta-analytic review of 12 computer-based RCT interventions using tailoring [18] found moderate effect sizes in condom use (d = .31 [95 % CI .24–.38]; 10 studies) and number of partners (d = .42 [95 % CI .12–.73]; 2 studies). In addition to the advantages afforded by tailoring, online interventions may be disseminated to large numbers of youth residing in diverse geographic locations, are sustainable, have higher intervention fidelity than person-delivered interventions due to standardized content, allow for material to be presented through interactive features, and are able to be implemented by community-based providers [8, 10, 20]. Consequently, online HIV/AIDS interventions may be a suitable venue to reach and engage YMSM in conversations about HIV/STI testing.

A lack of awareness of one's HIV/STI status is believed to account for a substantial number of new infections due to continued condomless sex during potentially asymptomatic periods of high viral load (e.g., during acute HIV infection) [21, 22]. Researchers and practitioners have sought to encourage timely and repeated HIV/STI testing by creating online tools that provide the location of testing centers in a given area (i.e., test locators). Yet, interventions that integrate test locators may be ineffective for several reasons. First, it is expected that testing agencies are youth and LGBTQ (i.e., lesbian, gay, bisexual, transgender and/or queer) friendly, with little empirical evidence to support this assumption [23, 24]. This expectation is particularly worrisome given evidence that structural barriers (e.g., medical mistrust, lack of insurance or transportation) and cultural insensitivity to YMSMs needs (e.g., racial/ethnic and sexual orientation stigma) contribute to YMSMs decisions to defer or delay utilization of HIV/STI services [23–25]. Second, in our review of the literature, we

found no documentation (peer-reviewed or grey literature) to suggest that YMSM use these test locators or find them to be helpful when seeking to circumvent structural barriers to testing.

For these reasons, we sought to test the feasibility, acceptability and preliminary efficacy of a newly developed test locator that considered each site's cultural sensitivity with YMSM clients, and allowed users to filter sites based on their unique structural needs (e.g., concerns about insurance, transportation, proof of income, or provision of identification). In this manuscript, we detail the intervention development process and present the intervention's feasibility, acceptability and preliminary efficacy.

Methods

Intervention Development Study Procedures

Consistent with community-based participatory research (CBPR) principles [26], we developed an academic-community partnership to design and inform the intervention content. All study procedures were approved by the Institutional Review Board of the University of Michigan, as well as our Community Advisory Board (CAB) and Youth Advisory Board (YAB). Below, we outline the role of our CAB and YAB, respectively.

Community Advisory Board—The CAB consisted of seven community organization members who work with YMSM in Southeast Michigan (Ann Arbor, Detroit, Flint, and Ypsilanti) and/or currently refer the target population to HIV/STI service providers, including employees from AIDS service organizations, a county health department, and a university health center. CAB representatives' age ranged between ages 25–50. They were also diverse with regards to race/ethnicity (three Whites, two Latinos, and two African American), and the number of years working with YMSM, ranging from 5 to 30 years.

The CAB met with the Get Connected! research team four times, providing constructive feedback on most aspects of the study's progression, including the development of the provider checklist, which was used to evaluate the HIV/STI testing sites, and the online tailored website. They were invaluable in helping to assemble critical questions for study participants to ask providers upon getting tested as well as developing the “STI facts” portion of the website.

Youth Advisory Board—The YAB consisted of eight YMSM between the ages of 17 and 24 years from Wayne, Genesee, Oakland, and Washtenaw counties. YAB members were diverse with respect to their race/ethnicity: four African American, two White, one Middle Eastern, and one Mixed Race (African American/White).

YAB members were recruited through flyer advertisements at LGBT and youth agencies across southeast Michigan, as well as on Facebook. Research staff interviewed prospective YAB members about their desire to participate and prior work experiences, if any. YAB members were YMSM themselves and were diverse in terms of racial/ethnic identity, place of residence within Southeast Michigan, and level of educational attainment.

The YAB met with the Get Connected! research team six times throughout the study, providing critical feedback at each stage of the project. As members of the study's target population, their insights were crucial to the success of the study. In collaboration with a graphic designer, the YAB members designed the logo and recruitment materials (e.g., palm cards) for Get Connected! They critiqued each iteration of the website design and gave extensive feedback on both the content presented on each page of the site and the language used in the survey items. YAB members also assisted with study participant recruitment.

Intervention Description

We used self-determination theory [27] principles and constructs from the Integrated Behavioral Model (IBM) [28, 29] as the theoretical underpinnings of our intervention development. Both the intervention and control conditions were built in collaboration with the Center for Health Communications Research (CHCR) at the University of Michigan. To inform the development of the tailored content, we used previously collected quantitative data to identify key risk and protective correlates of HIV/STI testing in Southeast Michigan [9, 24]. As the content (including imagery and messaging) was developed, focus groups consisting of YAB and CAB members evaluated this content for its acceptability and relevance to the target population. The thematic design of the Get Connected! website, including the logo and color pallet, was designed through heavy input from the YAB. CHCR was additionally able to tailor images of young men to user's race/ethnicity and age using data gleaned from the survey. Furthermore, we created a content management system that allowed the system to be modified in real time (e.g., new sites, changes in services and/or hours of operation) as necessary.

The Non-tailored, Attention Control Condition

Participants in the control condition completed the baseline and only received access to the online provider directory page (see Fig. 1; i.e., they did not receive any personalized tailored content). Participants were then allowed to sort providers based on their geographic area, hours of operation, ability to test without an appointment, access to public transportation, and insurance or personal identification requirements. Sorted testing sites were rank ordered using an algorithm that accounted for our evaluation of each site. Sites were scored based on their LGBTQ inclusivity and confidentiality during the testing process, providers' LGBTQ friendliness, discussion of sex and relationship goals, ability to discuss motivations for testing, sex positive tone, avoidance of making assumptions about the client, assessment of potential intimate partner violence, and pressure to adopt risk reduction strategies. Finally, to facilitate YMSMs utilization of HIV/STI services, participants were provided with a list of questions they could ask the provider during a testing visit. Participants could choose to print their customized clinic list or have it emailed or texted to them.

Tailored Condition

The tailored intervention condition was developed by customizing content based on YMSMs baseline assessment. Specifically, we used several key characteristics to tailor personalized content within the intervention using YMSMs psychosocial data (i.e., age, race/ethnicity, sexual identity, relationship status, HIV/STI testing history and testing motivations, recent sexual behavior, sources of support, structural barriers, and self-reported values). Based on

these data, our tailoring algorithm matched content within the tailored condition and promoted personalization of key characteristics by including images that mirrored participants' sociodemographic characteristics (e.g., a Black YMSM saw images of other Black men, whereas Latino YMSM saw images of other Latino young men; YMSM in a relationship saw images of men with their partners). Similarly, intervention content (e.g., text content) was customized based on prior testing experiences and motivations, barriers and resources to testing, and important values. Based on their answers, YMSM received messaging that reflected their lived experiences (e.g., a young man who had never tested for HIV or STIs received messages to promote testing, whereas YMSM who had tested for HIV and/or STIs in the past received messages that reinforced their testing behavior and reminded them of the importance of repeat testing). These personalized messages were included in all four pages of the intervention (a full description of algorithms and content may be requested from the first author).

The first page of the Get Connected! (see Fig. 2) tailored website exhibits a four-by-four grid of STI facts in randomized positioning. Purple boxes contain the names of specific STIs. Once clicked, pop-up boxes would present information specific to that STI including what kind of infection it is, how it can be contracted, possible symptoms, testing options (e.g., oral swab vs. urine sample), and treatment options (if applicable). Teal boxes contain general (i.e., not tailored) STI facts (e.g., “Anyone can get an STI,” and “You won't always know if someone has an STI”) relevant to this population.

The second page of content encourages participants to assess their motivations, values, and strengths regarding STI testing (see Fig. 3). Reasons for getting tested are tailored to participants' testing history (e.g., “Never been tested” vs. “Tested for HIV, but not STIs”). The values section is adapted to the values participants expressed as important to them with respect to testing (e.g., being “sexy, successful, and strong”) in the baseline assessment. In the strengths box, aspects of testing about which participants expressed the most confidence and comfort (e.g., “talking about sex with a doctor” and “asking a partner to get tested before having sex”) in the baseline assessment were reinforced.

The third page of Get Connected! explores barriers (e.g., financial costs, social norms, and prioritization) to participants' desire to get tested for HIV/STIs, as well as how their strengths and social support systems can help them make a choice about testing (see Fig. 4). The barriers page was tailored by providing suggestions on how to overcome the barriers that a participant reported in the baseline assessment.

The final page that participants viewed offered a listing of providers (including contact and location information) identical to the attention control condition.

Recruitment of Participants

We recruited participants from several different sources, including in-person recruitment at Southeast Michigan LGBTQ pride celebrations, distributing palm cards with information about the intervention at various Southeast Michigan bars and clubs that cater to YMSM, Facebook ads inviting men who identified in their profiles as being interested in men to contact research staff and verify eligibility, and print and online ads in a Michigan-based

LGBTQ social magazine. Participants were asked to forward information about Get Connected! to friends and peers. All study materials noted that eligible YMSM could earn up to $30 as VISA e-gift cards ($20 for completing the baseline and intervention; $10 for completing the 30-day follow-up).

Eligibility and Screener

To be eligible for the study, participants had to report being between the ages of 15–24 (inclusive), self-identify as cismale (i.e., assigned sex at birth as male and self-identifies as male), reside in the five counties included in the larger Southeast Michigan region, and report having had sex with a male partner in the prior 6 months. Potential participants were asked to call a toll free number to verify their eligibility. This strategy allowed us to ensure that we could answer YMSM's questions, address concerns that the study was a hoax, and ensure that each participant was a unique case (i.e., reduce the likelihood of fraudulent and duplicate cases).

Study staff gave a quick overview of the study and asked participants a series of demographic and behavioral questions over the phone. We defined sexual experiences as any oral/anal sex or mutual masturbation with a male partner. Of the 382 individuals screened for inclusion, 180 were eligible and invited to the study. Fifty eligible participants did not complete the intervention (36 were given an access code but never entered the site; 14 stopped participation at consent). The remaining 130 participants completed the intervention for a 72.2 % participation rate; we retained 104 participants at our 30-day follow-up (80 % retention rate).

Study Procedures

Eligible participants were given a unique identifier code to enter the Get Connected! website and were then prompted to create a question that only they would be able to answer and then provide the response. Upon subsequent re-entry to the site, participants were given their personalized question; their correct response to the question served as their password and allowed them to return to the section they had most recently visited. After logging into the system, eligible participants consented, received information on the study's logistics (including study confidentiality procedures, the overall goals of the Get Connected! project, and incentive payment procedures), and completed the baseline assessment. Next, participants were randomized into either the tailored experimental condition or the non-tailored control condition. Immediately after completing either intervention condition, participants were asked to rate the overall feasibility and acceptability of the intervention. All study procedures were approved by the University of Michigan Institutional Review Board.

Measures

Demographic Characteristics—Participants were asked to report their age (in years) and highest level of educational attainment. We measured race/ethnicity using the following categories: Black/African American, White/Caucasian, Hispanic/Latino, American Indian/Alaskan Native, Asian, Native Hawaiian/Pacific Islander, and Other Race. Sexual orientation identity was assessed with the following categories: Gay/Homosexual, Bisexual,

Straight/Heterosexual, Same Gender Loving, MSM, or Other. Participants also indicated whether they went to school, worked, lived alone, had any medical insurance, and had previously been incarcerated.

HIV/STI Testing and Diagnoses—We asked participants to disclose their HIV status and indicate the date of their most recent HIV test. We used these two questions to categorize our sample of YMSM into HIV-positive, HIV-negative, and HIV-unknown status (i.e., never had tested for HIV or had tested but not picked up results). Subsequently, we asked participants to report if they had ever tested for one or more STIs, the date of their most recent STI test (if available), and whether they had ever been diagnosed with a STI by a medical provider.

At follow-up, we asked participants whether they had tested for HIV and/or STIs in the past 30 days, separately. If tested, participants were asked to indicate what tests they had received and whether they had been medically diagnosed with HIV or a STI.

Intervention Acceptability—Participants were asked a series of questions regarding their overall satisfaction with the intervention. Across both conditions, we ascertained participants' satisfaction with the intervention, perceived ease of use, and perceived accuracy of information. We also asked participants to note whether they would continue using the intervention were it available publicly and whether they would recommend it to their friends.

Sexual Behavior—Respondents reported their sexual behavior with men in the past 30 days using a previously validated assessment for YMSM [30]. Items included the total number of male sexual partners with whom they had sex (oral or anal), and number of partners with whom they had receptive or insertive anal sex, as well as the number of partners with whom they did not use a condom when engaging in receptive or insertive anal sex. Questions were posed both in formal language and vernacular (in *italics*) to increase comprehension.

Self-efficacy—We measured how easy/difficult YMSM felt it would be to discuss HIV/STI testing with sexual partners on a five-point scale (1 = very difficult; 5 = very easy). Using three items each for HIV and STI testing, participants reported how difficult it would be to tell a partner to get tested, convince a sexual partner to get tested prior to starting to have anal sex, and persuade a partner to get tested with the participant.

Perceived Barriers—We asked participants 19 items regarding potential barriers to HIV and STI testing. At baseline and 30-day follow-up, participants responded to these items using a 1–7 scale (1 = strongly disagree; 7 = strongly agree).

Retention and Follow-Up

Participants were contacted 30 days post-intervention and asked to complete a brief 15-min evaluation online. The brief survey included our primary outcomes: whether they made an appointment to get tested for HIV/STIs, whether they had tested for HIV/STIs, and whether they had received treatment if necessary. As secondary outcomes, we also measured

YMSMs sexual behaviors in the prior 30 days and perceived barriers to getting tested, and self-efficacy related to testing.

Data Analytic Strategy

We first conducted descriptive analyses on our study variables in order to characterize the sample. Using these variables, we then examined whether randomization had been implemented adequately in our pilot RCT. The absence of statistical differences across treatment arms across baseline demographic information suggests no violations to the assumption of random assignment.

The sample size for this pilot trial provided 80 % power to detect an odds ratio of 2.5 or greater between the conditions using a one-sided test of $p < .05$. Consistent with the pilot nature of our RCT, however, we sought to estimate the critical parameters required to establish whether one or both of the intervention conditions had sufficient feasibility, acceptability and preliminary efficacy [31] in preparation for a larger efficacy trial. To test the intervention's acceptability, we computed the mean acceptability scores across both treatment conditions and examined whether there were any statistical differences between the tailored condition and the test-locator only condition. Next, we examined our preliminary efficacy outcomes (i.e., scheduled a HIV/STI appointment, received HIV/STI testing) across treatment conditions using Chi squares.

We also examined the secondary efficacy outcomes (i.e., sexual behavior, self-efficacy, perceived barriers). In these analyses, we examined the overall change from baseline to follow-up in the sample using paired samples *t*-tests as a way of examining participants' change over time. We then computed mean difference scores (i.e., net gains from baseline to follow-up) and used *t*-tests to estimate whether the changes over time were better for the tailoring condition versus the test-locator only condition; these analyses are noted as "Differential gain *t* test" in our tables. In sensitivity analyses, the observed relationships did not change when we excluded HIV-positive participants from our sample.

Given the exploratory nature of our study, we present the observed effect sizes (i.e., Cohen's *d*); meaningful effect sizes were estimated as small ($d < .20$), moderate ($.20 \geq d \leq .45$), and large ($d > .45$). These critical parameters may inform the potential of our intervention in a larger trial, as large sample sizes are not required to locate these parameters adequately when planning for a subsequent trial. Given the exploratory nature of our study, we report findings when a marginal association was observed ($p < .10$).

Results

Sample Characteristics

Overall, our sample had a mean age of 21 years (SD = 2.23, median = 21). Race/ethnicity resembled the demographic composition of Southeast Michigan (65.6 % White, 19.5 % Black, 9.4 % Latino, 7.8 % Middle Eastern, and 6.3 % Asian/Pacific Islander). The majority ($N = 120$; 92.3 %) reported having completed high school or obtained a GED. Seventy percent of the sample reported being either a full-time ($N = 78$; 60.0 %) or part-time ($N = 13$; 10.0 %) student. Twenty-four participants reported living alone (18.5 %). The majority

of participants reported either working full-time (more than 30 h a week; *N* = 43 or 33.1 %) or part-time (less than 30 h per week; *N* = 52 or 40.0 %). Another 15 % (*N* = 20) reported being unemployed yet looking for a job. The majority of the sample self-identified as gay (83.8 %) or bisexual (14.6 %), with a few respondents identifying as heterosexual, queer or same-gender loving. Nearly half of all participants reported being in a relationship (45.6 %). Eighty percent of the sample reported having some kind of health insurance. Ten percent of our sample (*N* = 14) reported prior incarceration.

The majority of participants reported being HIV-negative (*N* = 92; 70.8 %); the median time since their last HIV test was 6 months. A quarter of the sample reported never having tested for HIV (*N* = 34; 26.2 %). Four participants (3.0 %) identified as HIV-positive at baseline. Among participants who reported ever having been tested for STIs (*N* = 81; 62.3 % of the sample), 49 (60.5 % of those tested) reported having been diagnosed with one or more STIs. Overall, the median time since participants' most recent STI test was 5.5 months (gonorrhea: 5.34 months, *N* = 62; syphilis: 5.67 months, *N* = 64; and chlamydia: 5.55 months, *N* = 61).

With regard to baseline sexual behavior, participants reported an average of two male partners in the prior 30 days (*M* = 1.88; SD = 2.02; median = 1). Most sexually active participants reported having given (98.2 %) or received (95.6 %) oral sex in the prior 30 days. More than half of the sample (56.9 %) reported having engaged in receptive anal intercourse (*M* = .83, SD = 1.05) or insertive anal intercourse (*M* = .85, SD = 1.20) with at least one male partner in the prior 30 days. Less than half of the sample (41.5 %) reported engaging in condomless receptive (*M* = .47; SD = .63) or condomless insertive anal intercourse (*M* = .54, SD = .94) with at least one partner.

The median number of days between baseline and follow-up was 38 (*M* = 51; SD = 32.67); we observed no mean differences between treatment conditions in number of days between baseline and follow-up. We observed no differences across intervention conditions (tailored: *N* = 86; non-tailored control: *N* = 44) on any of the key sociodemographic, testing, or sexual behavior variables at baseline, indicating no bias in the randomization process. We also did not observe any statistically significant baseline differences between those who were lost to follow-up and those who completed the 30-day follow-up.

Intervention Acceptability

As noted in Table 1, participants perceived both Get Connected! conditions as being highly acceptable. Given the pilot nature of the study, we did not anticipate having statistical power to detect differences in intervention acceptability across conditions. Nevertheless, we note that participants in the tailored condition felt that the information was more accurate than those in the test locator-only condition. For all other acceptability items, we observed a trend suggesting that the tailored intervention was equally or slightly better received than, the test locator-only condition.

Preliminary Efficacy

Primary Outcome: HIV/STI Testing Behaviors—Of the 104 participants who answered the 30-day follow-up assessment, one-third of the men (*N* = 32, 31.0 %) reported

making an appointment to get tested for HIV or STIs (32.4 % of those in the full intervention condition vs. 27.8 % of those in the test locator-only condition; $\chi^2_{(1)}=.23$; *n.s.*). Thirty participants reported having tested for HIV/STIs at the follow-up assessment, with the majority of these participants (32.4 %; *n* = 22) having been assigned to the tailored condition as compared to the test locator-only condition (22.2 %; *n* = 8). Although not statistically significant ($\chi^2_{(1)}=1.18$; *n.s.*), this proportion is clinically meaningful with Cohen's *d* effect size of .34— suggesting preliminary efficacy for the intervention.

In exploratory sub-analyses, we sought to examine whether the HIV/STI testing proportions would vary across participants' prior HIV testing behaviors. Among HIV-negative participants (*N* = 81), those in the tailored condition (*N* = 17; 31.5 %) reported slightly higher HIV testing rates in the prior 30 days than their counterparts in the test locator-only condition (*N* = 7; 25.9 %; $\chi^2_{(1)}=.27$; *n.s.*). Among participants who had never previously tested for HIV (*N* = 21), we found that more participants in the tailored condition had been tested (*N* = 3; 25 %) than men in the test locator-only condition, although this difference was not statistically significant (*N* = 1; 11.1 %; $\chi^2_{(1)}=.64$; *n.s.*). All four HIV-positive participants reported seeing a HIV/STI provider in the past 30 days.

When asked what HIV/STI tests they had undergone in the past 30 days, the majority of the sample who went to get tested by a provider reported having had a HIV test (*N* = 22; 80 %), with 18 (82 %) of these participants belonging to the tailored condition. One participant was newly diagnosed as HIV-positive.

Across the different STI tests, participants reported having had a gonorrhea test (*N* = 11; 36.7 %), a chlamydia test (*N* = 14; 46.7 %), and a syphilis test (*N* = 16; 53.3 %). No participants reported getting a vaccination for hepatitis A or B, HPV, or meningococcal meningitis. When compared across conditions, participants in the tailored condition reported more STI testing than those in the test locator-only condition: gonorrhea (40.9 vs. 25.0 %; $\chi^2_{(1)}=.64$; n.s.), chlamydia (54.5 vs. 25.0 %; $\chi^2_{(1)}=2.06$; *n.s.*), and syphilis (63.6 vs. 25.9 %; $\chi^2_{(1)}=3.52$; *p* = .06), although again these differences were not statistically significant. Two YMSM reported having been medically diagnosed with a STI in the prior 30 days.

Among the participants who went to get tested during the follow-up window, more than 90 % reported that Get Connected! had been useful to identify a HIV or STI clinic that met their needs. When asked how often (1 = never, 4 = most of the time) they had used the sexual health information in the intervention to make decisions about their sexual health, YMSM in the tailored condition were more likely than those in the test locator-only condition to state that the intervention's content had helped them to ask a casual sex partner to get tested for HIV (2.27 vs. 1.75; *t* = 2.59, *p* < .05), to ask a casual sex partner to get tested for STIs (2.22 vs. 1.81; *t* = 1.95, *p* < .05), and to use the information received to educate others about HIV/STIs (2.72 vs. 2.14; *t* = 2.63, *p* <.01). We also noted YMSM in the tailored condition being more likely than those in the control group to note that the intervention had helped them decide to get tested for STIs (2.58 vs. 2.17; *t* = 1.83, *p* = .07).

Finally, we examined whether there were changes in perceived barriers to HIV/STI testing in the sub-sample who had not tested by the 30-day follow-up (N = 78). As noted in Table 2, we saw changes in some of YMSMs perceived barriers to testing. YMSM in both conditions were more likely at follow-up to perceive that their peers were getting tested, were more likely to note that testing had urgency, and expressed less fear about findings out their results.

Secondary Outcomes—As secondary outcomes, we examined changes in sexual behavior and self-efficacy to test for HIV and STI. As noted in Table 3, we observed decreases in the overall number of sexual partners and receptive anal intercourse partners at 30-day follow-up across the entire sample. These differences, however, did not statistically vary across treatment conditions; however, we include Cohen's *d* effect sizes given the pilot nature of our study.

We then examined whether there were changes in YMSMs self-efficacy to discuss both HIV and STI testing with partners. As noted in Table 4, we observed increases in YMSMs self-efficacy to discuss HIV and STI testing with partners across both conditions, with the exception of how easy it would be for them to persuade their partner to get an HIV test. We then examined whether these net gains in self-efficacy were comparable across conditions, and found that YMSM in the tailored condition reported greater self-efficacy to delay sex until a partner got tested for HIV, tell a partner to get tested for HIV, and to persuade a partner to get tested together. We found a similar trend with regard to self-efficacy towards STI testing being greater in the tailored condition than in the test locator-only group.

Discussion

Our study aimed to assess the feasibility, acceptability and preliminary efficacy of Get Connected!, an online intervention focused on encouraging HIV/STI testing among YMSM. The intervention was developed using CBPR principles through the participation and guidance of an advisory board comprised of HIV/STI testing providers and an advisory board comprised of YMSM living in Southeast Michigan. In seeking to promote HIV/STI testing among YMSM in our region, we began with the premise that HIV and STI testing locations may have varying cultural sensitivity and experience with the target population. Thus, the intervention sought to link YMSM with sites that were identified and ranked as being most culturally appropriate to the needs of YMSM. This approach builds on the findings from the Project Connect Health Systems intervention [32], a school-based intervention focused on heterosexual adolescents. In their trial, Dittus et al. [32] found that female adolescents referred to high-quality providers were more likely to report greater HIV and STI testing over time, as well as increased access to birth control. Given the challenges of developing a school-based program for YMSM [11, 33] and the fact that the age range of our target population extended well beyond high school age, we adapted the approach developed by Dittus and colleagues to create an online referral tool for YMSM in Southeast Michigan.

We were able to recruit and retain a diverse sample of YMSM between the ages of 15 and 24 years old living in Southeast Michigan to participate in our online intervention,

highlighting the feasibility of our intervention. This is particularly noteworthy as YMSM in this age group are at greatest risk for HIV and STI infections [2], yet there are currently few HIV and STI prevention interventions specifically geared towards YMSM [4]. Furthermore, school-based sex education and ongoing testing initiatives for adolescents and young adults may not address the specific psychosocial needs of YMSM during this developmental period and YMSM may be reticent to disclose details about their sexuality within these contexts [12, 33, 34]. Consequently, an intervention delivered online may provide opportunities for YMSM to learn about their sexual health when it is convenient in terms of time, privacy, and location.

Participants in both the tailored condition and the test locator-only condition reported high acceptability of both intervention conditions, including high satisfaction with the testing experience, low frustration with the intervention, and high endorsement to use the intervention in the future, as well as to recommend it to their friends. Compared to YMSM in the test locator-only condition, YMSM in the tailored condition perceived the intervention's content as more accurate. We attribute this difference between conditions to the fact that YMSM in the tailored condition received personalized information regarding their HIV and STI testing history, barriers to testing, and sources of support to minimize these barriers. Thus, consistent with Noar's meta-analysis [18] this finding supports the inclusion of tailoring technology when developing online behavior change interventions.

Preliminary efficacy data indicated that our intervention was associated with YMSMs testing behaviors for both HIV and STIs. A third of our sample reported seeking HIV and STI testing in our 30-day follow-up, with the large majority of recently tested participants having gone through the Get Connected! tailored condition. These data suggest that our tailored intervention is highly promising for promoting HIV/STI testing in a future larger trial. Although we did not have an opportunity to follow participants for a longer period of time, our ability to detect a moderate effect size after a one-time intervention with 30-day follow-up is noteworthy. Furthermore, among non-testers, we noted reductions in perceived barriers to STI testing and to changes in their perceived peer norms regarding STI testing, fear of getting STI tested and expressed urgency about getting STI tested. These perceived barriers have been reported as discouraging HIV and STI testing in prior research [35]. Based on the assumptions of traditional behavior change theories (e.g., Health Belief Model; Theory of Planned Behavior), we would expect that non-testing YMSM who reported reductions in these perceived barriers may be more likely to test had we been able to follow them in a longer follow-up period. Taken together, these findings are consistent with a recent meta-analysis by Eaton et al. [36] that noted how one-time interventions may be a useful strategy for HIV and STI prevention, and underscore the potential for Get Connected! to be implemented and evaluated in a large scale randomized control trial.

Beyond our primary outcome, we also noted improvements in secondary outcomes (e.g., reductions in sexual risk behaviors) and theoretical mediators of interest (e.g., self-efficacy to discuss HIV/STI testing with partners) between baseline and follow-up assessments. We noted reductions in YMSMs number of sexual partners at 30-day follow-up, even though we did not include content regarding partner reduction as a risk reduction strategy in our intervention. We offer three plausible explanations for this finding. First, the reduction in

number of sexual partners may be attributable to participants' reflection on their sexual practices as they completed their sexual history assessments [37]. Second, the reduction in mean number of partners may be attributable to the subsample that received risk reduction counseling once they went to get HIV and STI tested. Finally, the reductions in sexual behavior may be a result of the observed increases in participants' self-efficacy to encourage partners to delay sexual onset until partner gets tested—particularly among YMSM in the tailored condition. Given the small sample size, however, we are unable to tease out these potential mechanisms. Future research with a large sample may allow us to examine these processes in greater depth.

Limitations, Strengths, and Future Research

Several limitations are worth noting. Across primary and secondary outcomes, we noted that intervention effects moved in favor of our tailored condition; however, given the pilot nature of our trial, our ability to detect these effects with statistical precision was limited by our small sample size and short follow-up period. In future scaled-up versions of the intervention, we intend to have a larger sample size, as well as a greater number of follow-up periods, in order to examine efficacy and effectiveness more precisely. Furthermore, it is important to note that we evaluated two competing interventions in our study design (e.g., tailored vs. test locator only) without a no-treatment control group. Although the inclusion of a no-treatment control group could have allowed us to test whether both intervention conditions are efficacious, we felt that withholding referrals to care to our population would be unethical given their vulnerability to HIV and STIs. Consequently, although it is possible that both intervention conditions could be efficacious when compared to a no-treatment group, we chose to test whether the tailored condition could increase behavior change above and beyond the test locator-only condition. Although this evaluation design is more conservative and makes it harder to detect intervention effects, our findings suggest that the tailored condition may be more promising than the test-locator only condition. Finally, we wish to evaluate the intervention in other sites across the United States and examine whether the intervention may be adapted and sustained. Evidence of success across these different sites may provide opportunities to streamline Get Connected! if proven efficacious in other regions around the country.

Young men who have sex with men are at increased risk for HIV/STIs, both in Southeast Michigan and across the United States. With the development and implementation of the Get Connected! intervention, we took the first step towards designing a program that links young men to HIV/STI testing services that are sensitive to their experiences, within their geographic reach, and designed to meet their needs. Given the intervention's acceptability and preliminary efficacy, we anticipate that the scale-up of Get Connected! will enable greater numbers of YMSM to access comfortable and healthy testing environments that encourage those who have never tested to walk through the door as well as those who have previously tested to return regularly as needed.

Acknowledgments

This research was supported by an award from the National Association of County and City Health Officials (NACHHO) and the MAC AIDS Fund to Dr. Bauermeister. Dr. Bauermeister was supported through a NIH Career

Development Award (K01-MH087242). We thank our CAB and YAB for their contributions during the development and implementation of the intervention.

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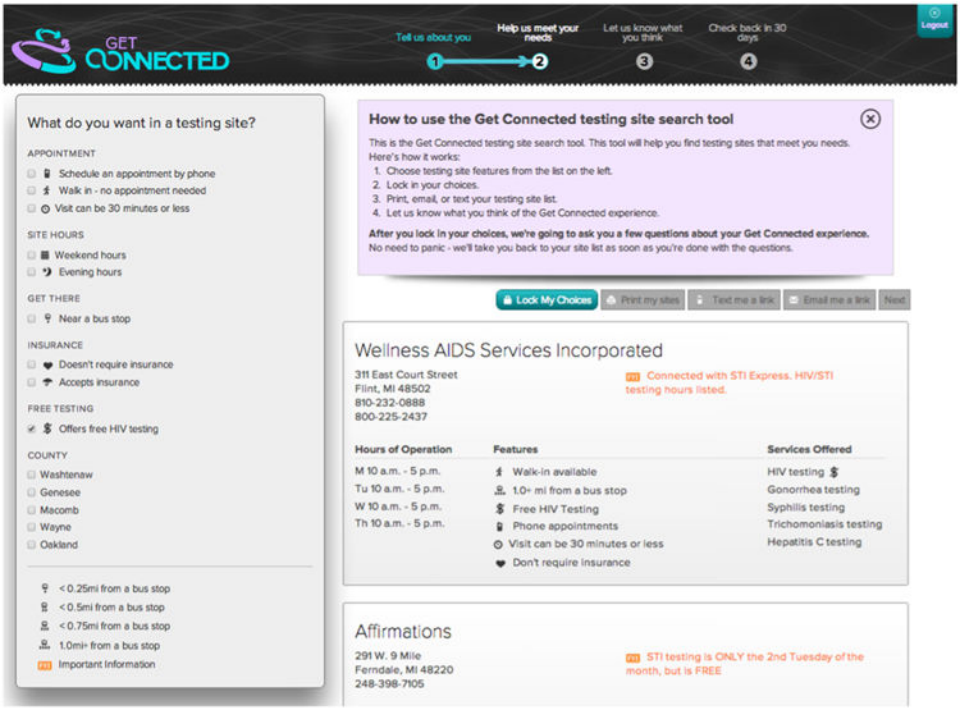

Fig. 1. Customized HIV/STI site test locator

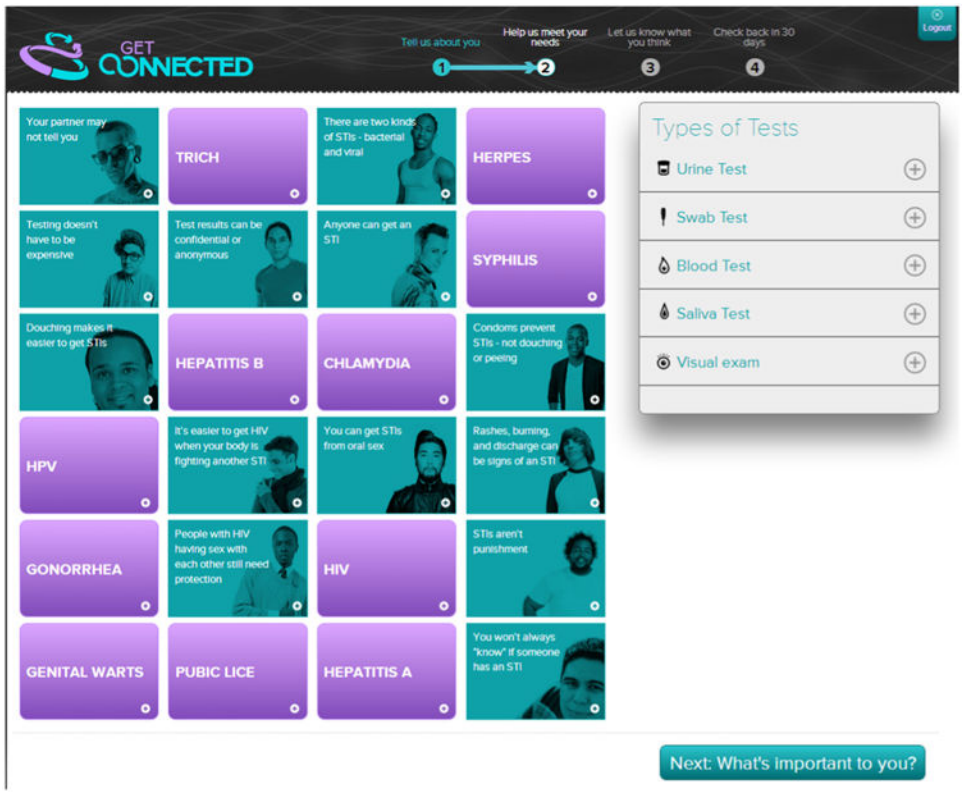

Fig. 2. Facts and truths about HIV/STI testing

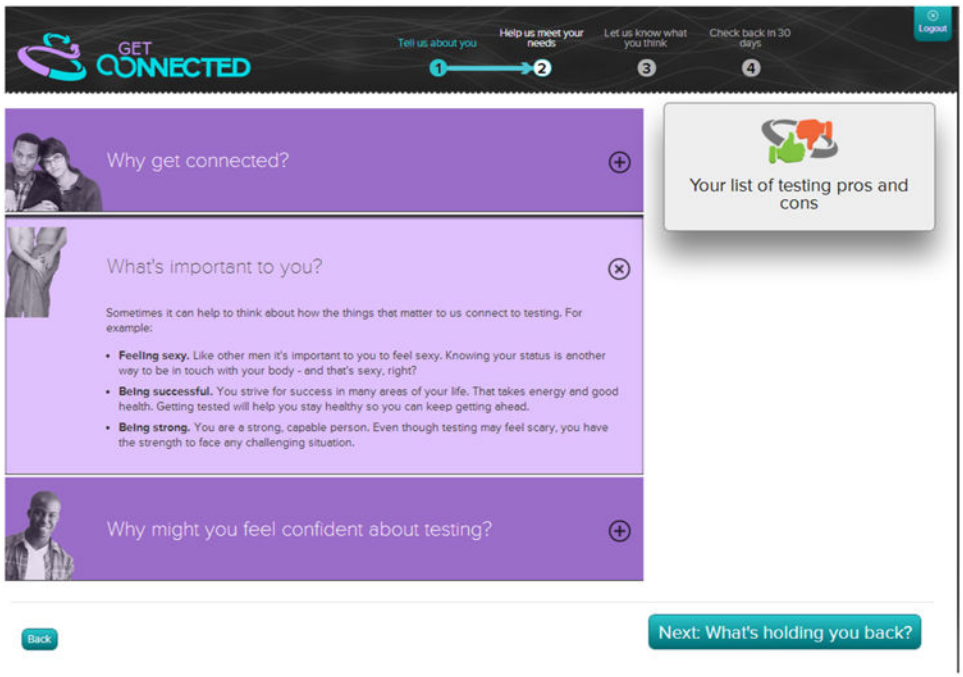

Fig. 3. Motivations and pros/cons of HIV/STI testing

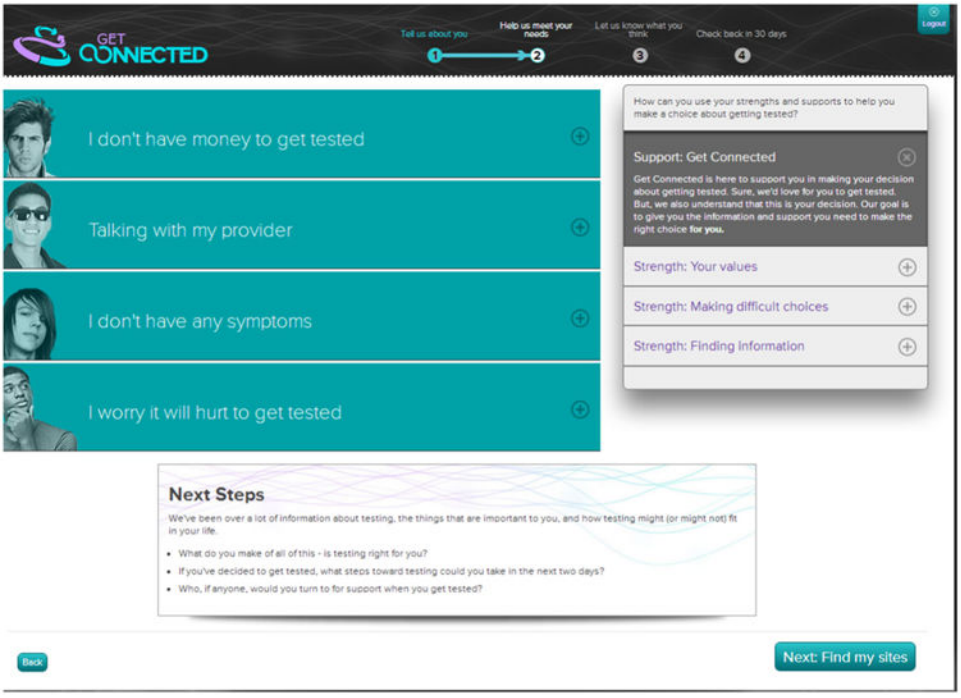

Fig. 4. Strategies to overcome barriers and rely on support

Table 1
User acceptability scores across conditions (*N* = 130)

	Tailored intervention (*n* = 86)	Test locator (*n* = 44)	*t* test	Cohen's *d*
Overall, I am very satisfied with Get Connected![a]	6.16 (1.08)	6.00 (.77)	.97	.18
Using Get Connected! is very frustrating[a]	2.09 (1.27)	2.19 (1.44)	−.40	−.07
I would recommend Get Connected! to my friends[a]	6.00 (1.21)	5.74 (.99)	1.21	.22
Get Connected! is easy to use[a]	6.29 (.96)	6.24 (1.01)	.28	.06
Get Connected! provided me accurate information[a]	6.35 (.88)	5.74 (1.15)	2.99**	.55
How likely would you be to continue using Get Connected! if it were available?[b]	5.77 (1.30)	5.79 (.93)	−.06	−.06

** $p < .01$

[a] Items are scored on a 1–7 scale (1 = strongly disagree; 7 = strongly agree)

[b] Item is scored on a 1–7 scale (1 = very unlikely; 7 = very likely)

Table 2

Changes in HIV/STI testing barriers from baseline to follow-up among non-testers (*N* = 78)

	Baseline	Follow-up	*t* test	Differential gain *t* test	Cohen's *d*
My friends don't get tested for STIs	3.82 (1.85)	2.86 (1.73)	3.96***	−.004	−.001
I haven't had sex with anyone who has an STI	5.29 (1.85)	5.53 (1.75)	−0.91	−.09	−.04
I've just been putting it off	3.87 (2.13)	4.09 (2.08)	−0.92	−.28	−.13
I don't need to get tested for STIs because I feel fine/don't have any symptoms	3.96 (1.95)	4.41 (1.82)	−1.66	−.36	.13
Getting tested for STIs feels urgent	3.78 (1.81)	4.37 (1.58)	−2.76**	.64	.30
Getting tested for STIs isn't a priority for me	3.59 (1.81)	3.81 (1.78)	−1.03	.05	.03
I don't have the money to pay for an STI test	3.09 (1.98)	3.15 (2.02)	−0.30	.46	.21
I don't know where I can go to get an STI test	2.86 (2.26)	2.51 (1.78)	1.42	−.18	−.07
There isn't a place close to where I live/stay that offers STI testing	2.31 (1.62)	2.29 (1.55)	.07	.47	.24
Places that offer STI testing aren't open during hours that are convenient for me	2.99 (1.86)	3.13 (1.87)	−0.66	.50	.23
I'm scared/nervous about finding out that I have an STI	3.92 (2.18)	3.31 (2.16)	2.88**	−.10	−.04
I'm afraid my parent(s)/guardian(s) will find out if I get tested for STIs	2.81 (2.04)	2.50 (1.94)	1.37	.31	.14
I'm afraid my friend(s) will find out if I get tested for STIs	2.44 (1.87)	2.14 (1.69)	1.39	.08	.04
I don't know how STI testing works/what to expect	2.71 (2.12)	2.51 (1.89)	1.02	.02	.01
I'm embarrassed to get tested for STIs	2.51 (1.90)	2.49 (1.77)	0.07	−.65	−.34
I'm worried that the person providing the STI test will treat me poorly	2.60 (1.89)	2.63 (1.88)	−0.13	.63	.33
I'm concerned that the person providing the STI test will judge me because I have sex with men	3.06 (2.21)	3.01 (2.22)	0.26	.69	.35
I had a bad experience with STI testing in the past	1.79 (1.55)	2.21 (1.80)	−2.66	.08	.05

Items are scored on a seven-point scale (1 = strongly disagree; 7 = strongly agree). We noted no differences between treatment conditions. *N* = 50 in intervention and *N* = 28 in test locator conditions

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 3

Changes in sexual behavior (past 30 days) from baseline to follow-up (*N* = 104)

	Baseline	Follow-up	*t* test	Differential gain *t* test	Cohen's *d* between conditions
Number of male sexual partners	1.84 (2.02)	1.39 (1.44)	2.26*	.41	.21
Number of RAI partners	.80 (1.00)	.56 (.80)	2.43*	.08	.08
Number of URAI partners	.46 (.59)	.29 (.48)	2.90*	.01	.02
Number of IAI partners	.72 (.87)	.55 (.78)	1.99*	1.51	.31
Number or UIAI partners	.46 (.66)	.36 (.54)	1.68	1.25	.26

No mean differences over time were observed across treatment conditions

RAI receptive anal intercourse, *URAI* unprotected receptive anal intercourse, *IAI* insertive anal intercourse, *UIAI* unprotected insertive anal intercourse

* $p < .05$

Table 4

Changes in self-efficacy over time and across intervention conditions (*N* = 104)

	Baseline	Follow-up	*t* test	Differential gain[b] *t* test	Cohen's *d* between conditions
Tell your partner that you want him to get tested for HIV[a]	3.39 (1.22)	3.70 (1.07)	2.73**	.03**	.50
Convince your partner to get an HIV test before you start having anal sex with each other[a]	3.29 (1.24)	3.59 (1.09)	2.63**	.71**	.64
Persuade your partner to go with you to get an HIV test[a]	3.59 (1.12)	3.75 (1.04)	1.51	.67**	.63
Tell your partner that you want him to get tested for STIs[a]	3.39 (1.22)	3.66 (1.13)	2.44*	.38	.33
Convince your partner to get a STI test before you start having anal sex with each other[a]	3.19 (1.23)	3.63 (1.00)	4.59***	.32‡	.37
Persuade your partner to go with you to get a STI test[a]	3.54 (1.14)	3.74 (1.03)	2.01*	.39‡	.39

‡ $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$

[a] Items are scored on a five-point scale (1 = very difficult; 5 = very easy)

[b] Net gains compare changes in self-efficacy across tailored intervention relative to the test locator only condition