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## Use of a custom testing center locator tool to improve STI and HIV testing rates in adolescent men who have sex with men as part of an online sexual health program

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### Abstract

Adolescent men who have sex with men (AMSM) experience high rates of HIV diagnoses and low utilization of HIV testing and prevention services. Meta-analyses and literature reviews have reported significant effects of online programs at reducing HIV and STI risk and improving use of protective behaviors. SMART is a stepped care package of eHealth interventions that comprehensively address the sexual health and HIV prevention needs of diverse 13–18 year old AMSM nationwide. As part of the online curriculum, educational tools were created to promote specific learning objectives, including the importance of STI and HIV testing. This study describes the use of an HIV and STI testing center locator custom designed for the SMART intervention to promote STI and HIV testing in AMSM. Data were collected between April 2018 and July 2020 as part of the SMART trial assessing the impact of the first intervention of the SMART program, titled SMART Sex Ed, on 13–18 year old AMSM. Measures included AMSM interaction data with the locator tool, history of HIV and STI testing, and confidence to get tested at baseline and 3 months post intervention. Upon entering the SMART program, most participants (69.3%) had never received an HIV or STI test in their lifetime. From those who were enrolled in SMART Sex Ed (n=1075), 82.6% used the custom developed HIV and STI testing center locator tool and those who used the tool were significantly more confident to receive an HIV test and STI test ( $p < 0.01$ ). Qualitative feedback from SMART participants described the tool as interactive, useful, and easy to use. Preliminary data analysis suggests that our custom developed HIV and STI testing center locator is an acceptable and useful tool with potential for implementation outside the SMART Program. Future analysis should examine if the testing center locator is an acceptable and effective tool outside of the SMART intervention package. Given these results, providing AMSMs easy to use and acceptable online tools with comprehensive, culturally relevant didactic content can significantly improve AMSM's utilization of HIV testing and prevention services.

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## Keywords

eHealth tools; HIV prevention; HIV and STI testing; sexual health programs; smartphone app

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## 1. Introduction

Adolescent men who have sex with men (AMSM) continue to experience disproportionately high rates of HIV diagnoses [1–2] yet utilize HIV and STI testing services at low rates [3]. Despite the Center for Disease Control’s (CDC) recommendation for annual HIV testing among adolescents [4], AMSMs are the least likely of any age group to be aware of their status [5–6]. Improving HIV testing rates among AMSM is a critical component in reducing new infections and provides a necessary opportunity to link youth to HIV and STI care. However, engagement in these services requires adolescents to overcome multiple barriers, including maintaining privacy surrounding HIV testing and a lack of knowledge of the closest testing site [7]. Online health programs offer a solution to these barriers, as this population is already familiar with using the internet to find information about HIV/AIDS, STIs, and testing locations [8]. Additionally, online HIV prevention programs have the added benefit of providing sexual health information to a large number of AMSM experiencing these barriers in a consistent and potentially low-cost format [9–10]. To that end, the SMART program package of interventions were developed to comprehensively address the sexual health and HIV prevention needs of diverse 13–18 year old AMSM in the United States and Puerto Rico.

SMART is a stepped care package of online eHealth interventions that comprehensively address needs of diverse 13–18 year old AMSM in the United States and Puerto Rico. The first step of the intervention, SMART Sex Ed, was delivered to all participants and is a comprehensive LGBTQ-inclusive sex education program developmentally adapted from the “Queer Sex Ed” intervention [11]. The goal of SMART Sex Ed is to convey information on sexual health, gender identity, relationships, and HIV/STI prevention via engaging videos, interactive quizzes, and static pages. As part of the interventions, educational tools were created to promote specific learning objectives, including STI and HIV testing via a customized testing center geolocation tool that allowed participants to search for HIV and STI testing locations within their area of choice. Participants entered their zip code, distance parameters, and testing options into the tool, which retrieves clinic data (name, address, and phone number) from the CDC’s testing locator API and populated results. Participants had the option to favorite testing locations within the application or have their favorited testing locations emailed to them. This paper describes participant engagement and acceptability of the custom designed SMART STI and HIV testing center locator tool.

## 2. Methods

### 2.1. Research Design

Data were collected between April 2018 and July 2020 as part of a pragmatic trial to test the efficacy and acceptability of SMART, which is a suite of HIV and STI prevention interventions for adolescent gay, bisexual, and other AMSM. SMART used a sequential

multiple assignment randomized trial design [12] to assess the effects of delivering increasingly intensive HIV and STI prevention programs on sexual risk behaviours among racially diverse AMSM across the United States and Puerto Rico. Previous studies indicate that cultural factors can lead to varying participant responses to intervention content [13–16]. Therefore, all content was linguistically and culturally adapted for monolingual Spanish speaking AMSM.

Eligibility criteria for SMART included: 1) aged 13–18 years; 2) assigned male at birth; 3) identified as gay, bisexual, queer or attracted to cisgender men; 4) reported some sexual experience (i.e., prior contact with another individual’s genitals); 5) ability to speak and read English or Spanish; 6) consistent Internet access; 7) self-reported an HIV negative or HIV unknown status; and 8) resided in the United States and its territories. Participants were also required to complete at least five minutes of SMART Sex Ed once granted access to the program content to be considered enrolled in the trial. Participants were recruited via free and paid social media campaigns on Facebook, Instagram, Snapchat, and Twitter, and participant registries from previous studies. Those who met eligibility criteria were automatically routed to an online consent form. Afterwards, participants were asked to complete four capacity to consent questions that assessed their understanding of the research procedures [17]. To complete enrollment, a brief video interview was scheduled with research staff to confirm participant eligibility and consent capacity. Those who were confirmed to be eligible were emailed a link to the baseline survey hosted on REDCap [18].

Participants who completed all SMART Sex Ed intervention content received a post-intervention survey three months after content completion. Participants who did not complete all intervention content received the post-intervention survey three months and 30 days after initial program access. All participants had 21 days to complete the post-intervention survey. Participants were paid \$25 for their time spent completing the baseline and 3-month follow-up surveys (up to \$50 total). All procedures were approved by the institutional review board with waivers of parental permission [17]. The clinical trial was registered at <https://clinicaltrials.gov/ct2/show/NCT03511131>.

## 2.2. SMART Program Overview

The SMART Program package of interventions follows the Institute of Medicine’s prevention model [19], which suggests increasing intensity of prevention interventions according to risk factors, including low-cost universal interventions that can be delivered to everyone, more intensive interventions selected for those with some increased risk, and finally the most costly and intensive interventions for those with indicators of highest risk/need. All tiers of SMART were informed by the information-motivation-behavioral skills (IMB) model for HIV prevention [20]. The intervention, including content and trial design, has been described in more detail elsewhere [21].

SMART Sex Ed emphasized sexual health as more than just the absence of disease [22], and included information on healthy romantic relationships, having pleasurable sexual experiences, and acceptance of one’s sexual orientation and gender identity. Intervention content also explained HIV/STI transmission and how to acquire and use condoms. Information about PrEP was consistently provided, and after FDA approval for adolescents,

content was updated to explain adolescent access requirements. SMART Sex Ed was divided into four sections that participants navigated in any order they chose. Media assets that were used across sections included scroll screen (resembling social media feeds), slideshows with narration recorded using near-peer voice actors, videos, games, quizzes, and GIFs. Emojis were liberally used to make topics and lessons more relatable to participants. SMART Sex Ed was available in either English or Spanish, depending on participant preference. Within the “Sex Ed In The Real World” section of SMART Sex Ed the STI testing locator was delivered to study participants in their selected language preference as a reusable tool. In addition to the tool, section content included information about STIs, substance use, and condoms, and a tool that allowed participants to calculate HIV risk based on specified factors.

### 2.3. STI and HIV Testing Center Locator Tool Description

To use the STI and HIV Testing Center Locator Tool, participants inputted either an address or ZIP Code for the area of their search and indicated the radial distance from the address or ZIP Code that they wished to search. Participants were able to filter results by availability of HIV testing, STI testing, or both. The interactive map updated with data from the CDC HIV/STI testing location database and participants viewed their results both as pins on the interactive map and in a list view below, sorted by distance from the target address or ZIP code. Participants had the option to “favorite” results by clicking a corresponding icon for each result. Favorited results appeared in a list they were able to refer to later or to email themselves using an “email favorites” button. A record of each search, favorite, and email action was collected by the SMART application. After interacting with the STI testing locator tool as part of the sequential didactic content of the intervention, participants were able to access the tool again via the Tools section in the site navigation menu at any time.

### 2.4. Research Instruments

Pre-test and post-tests were administered to SMART participants to analyze the effectiveness of SMART Sex Ed on various sexual health and HIV-related outcomes, including lifetime HIV and STI testing history. In response to the following questions: “Have you ever been tested for HIV?”; and “In your entire life, have you ever been tested for STIs such as gonorrhea, chlamydia, syphilis, etc.?”; participants reported if they had ever received HIV testing or STI testing at both baseline and 3-month follow-up. All measures were administered via REDCap survey at both baseline and 3-month follow-up, unless otherwise indicated. Feedback pages were also provided at the end of each module that consisted of a required thumbs up/thumbs down rating and an optional open text box response. English versions of measures were translated into Spanish by bilingual research staff with expertise in sexual health research and translation.

### 2.5. Research Analysis

For this paper, we explored the relationship between pre- and post-intervention testing rates and the HIV and STI testing center locator tool. To determine if using the locator played a significant role in testing behaviours within our sample, we used paired t-tests to compare pre-test post-test differences in HIV and STI testing rates and participant confidence to get tested. Additionally, chi-square tests were used to compare search tool usage by rurality,

sexual experience prior to baseline, primary language spoken, and age to assess the potential impact demographic characteristics may have on testing locator tool utilization. Responses to optional open-ended feedback question, located at the end of the end of the “Sex Ed In The Real World” section of SMART Sex Ed, were reviewed and a list of themes was generated by noting patterns of topics in the data.

### 3. Results

Table 1 shows the baseline demographic and behavioral characteristics of all participants enrolled in the SMART study ( $n = 1075$ ). Participant usage of the HIV and STI testing center locator tool during their enrollment in the SMART Sex Ed intervention is reported in Table 2.

As shown in Table 2, a majority of participants enrolled in the SMART Sex Ed Intervention of the SMART study used the HIV and STI testing center locator tool at least once (82.6%;  $n = 888$ ). Of all those who used the locator tool, 36.4% ( $n = 323$ ) used the tool multiple times, 18.0% ( $n = 160$ ) participants favorited locations that they can refer to later, and 10.9% ( $n = 97$ ) emailed themselves a copy of their favorited locations. A higher percentage of participants who never tested for HIV prior to enrolling in the study engaged with the HIV and STI testing center locator tool during their enrollment in the SMART Sex Ed intervention. Engagement was defined as searching for locations of clinics, favoriting locations, and emailing favorited locations to themselves.

As shown in Table 3, participants who used the HIV and STI testing center locator tool during SMART Sex Ed showed a significant increase in HIV testing ( $p < .001$ ), STI testing ( $p < .001$ ), and confidence to get an HIV test ( $p < 0.01$ ) as reported during the 3-month follow-up survey. Participants who did not use the locator experienced significantly higher HIV and STI testing rates post-treatment ( $p < .001$ ) but did not experience a significant increase in their confidence to get an HIV test ( $p = 0.71$ ).

The demographic and behavioral characteristics of participants who used the HIV and STI testing center locator tool are listed in Table 4. There was a significant relationship between age and HIV and STI testing center locator tool usage ( $p = <0.05$ ); however, there was no significant relationship between language preference ( $p = 0.07$ ), living in urban or rural areas ( $p = 0.21$ ), or sexual experience ( $p = 0.11$ ) and HIV and STI testing center locator tool usage.

The HIV and STI testing center locator was embedded within the “Sex Ed In The Real World” section of SMART Sex Ed wherein participants were provided a tool that allowed participants to calculate HIV risk based on specific behaviors and information about STIs, substance use, and condoms. At the end of this section, participants were provided a feedback page that consisted of a thumbs up/thumbs down rating selection and an optional open text box. Feedback was provided for the entire section of the intervention that included the STI testing locator tool.

Themes and relevant sample feedback are listed in Table 6. Of the 1075 participants enrolled in the study, 861 provided feedback with an approval rating of 97.2%. Eighty-

one participants provided feedback about the tool: 74 were positive (91.4%), 5 provided constructive feedback (6.2%), 2 reported technical difficulties (2.5%), and 0 participants provided negative feedback.

#### 4. Discussion

Our findings indicate that participants who had not previously undergone HIV and STI testing were more likely to use the custom-built tool, and those who used the tool showed a significant increase in confidence to get an HIV test. Given these preliminary results, the custom-built HIV and STI testing clinical locator in the SMART program is an acceptable tool to improve HIV and STI testing rates in AMSMs. Additionally, tool usage did not differ across demographics, except for age. Further analysis is necessary to determine the specific participant demographic and behavioral characteristics that are most likely to influence tool usage and subsequent HIV and STI testing. In addition, a comprehensive thematic analysis of the qualitative data provided by participants is necessary, the lack of which is a limitation of this study. It is also important to note that the HIV and STI testing clinic locator is delivered as part of an intervention package with additional didactic and interactive material that may influence the locator tool's effectiveness and acceptability. Therefore, it is important to test its acceptability and effectiveness of the HIV and STI testing clinic locator outside of the SMART intervention package delivery if it is also to be deployed that way in the future.

#### 5. Conclusion

Providing AMSMs easy to use and acceptable online tools with comprehensive, culturally relevant didactic content can significantly improve AMSM's utilization of HIV testing and prevention services. Increasing HIV testing efforts is critical to ensure linkage to HIV prevention and care, and to avert additional HIV infections in AMSMs, a group that is severely undertested and negatively impacted by the HIV epidemic. Our preliminary data analysis suggests that the custom developed HIV and STI testing clinic locator embedded within the SMART program is an acceptable and useful tool with potential for implementation outside of SMART.

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**Table 1.**

Baseline demographic and behavioral characteristics of all participants enrolled in the SMART study (n=1075).

	n	%
Age, years (M=16.6; SD=1.3)		
13	11	1.0
14	66	6.1
15	160	14.9
16	229	21.3
17	258	24.0
18	351	32.7
Race/ethnicity <sup>a</sup>		
Black	229	21.3
Latinx	387	36.0
White	685	63.7
Other	320	29.8
Language		
English	1029	95.7
Spanish	46	4.3
Rurality		
Urban	895	83.3
Rural	180	16.7
Sexual experience <sup>b</sup>		
Lifetime, but not in the last 3 months	238	22.1
In the last 3 months	486	45.2
Never	351	32.7
HIV testing		
Lifetime, but not in the last 3 months	117	10.9
In the last 3 months	213	19.8
Never	745	69.3
STI testing		
Lifetime, but not in the last 3 months	145	13.5
In the last 3 months	156	14.5
Never	774	72.0
Sexual orientation		
Gay	729	67.8
Bisexual	255	23.7
Pansexual	43	4.0
Unsure/Questioning	25	2.3
Queer	16	1.5
Lesbian	2	0.2

	n	%
Not listed	4	0.4
Asexual	1	0.1

<sup>a</sup>Race/ethnicity was not treated as mutually exclusive, which allowed participants to endorse one or more race/ethnicity identities.

<sup>b</sup>Sexual experience was defined as a participant reporting having engaged in anal sex.

M=mean; SD=standard deviation

**Table 2.**

Engagement of participants with the HIV and STI testing center locator tool (n=1075).

	Total Participants		Those who <u>did not</u> receive prior HIV test		Those who received a prior HIV test	
	n	%	n	%	n	%
Used tool at least once <sup>a</sup>	888	82.6	644	86.4	244	73.9
Used tool more than once <sup>b</sup>	323	36.4	238	37.0	85	34.8
Favorited locations <sup>b</sup>	160	18.0	120	18.6	40	16.4
Emailed favorited locations <sup>b</sup>	97	10.9	78	12.1	19	7.8

<sup>a</sup>Percentages were calculated by dividing the n by the total of those who enrolled in the study (n=1075), who received (n = 330) and did not receive (n = 745) an HIV test prior to enrolling in the study.

<sup>b</sup>Percentages were calculated by dividing the n by the number of participants who used the tool (n=888), who received (n = 244) and did not receive (n = 644) an HIV test prior to enrolling in the study.

**Table 3.**

Rate of lifetime HIV testing, lifetime STI testing, and confidence to get an HIV test at 3-Month Follow-Up among SMART Sex Ed Participants who used the HIV and STI testing center locator tool.

	n	Pre-treatment mean	Post-treatment mean	p-value
Used Tool at least once	888			
Lifetime HIV Test <sup>a</sup>		27.5%	37.6%	< 0.001
Lifetime STI Test <sup>a</sup>		24.7%	33.7%	< 0.001
Confidence to get an HIV Test <sup>b</sup>		2.8	2.9	< 0.01
Never used Tool	187			
Lifetime HIV Test <sup>a</sup>		46.0%	53.5%	< 0.001
Lifetime STI Test <sup>a</sup>		43.9%	51.9%	< 0.001
Confidence to get an HIV Test <sup>b</sup>		3.1	3.0	0.71

<sup>a</sup> Binary response scale: 0=No, 1=Yes

<sup>b</sup> Likert response scale: 1=Not at all confident, 2=Somewhat confident, 3=Confident, 4=Very confident

**Table 4.**

Demographic and behavioral characteristics of participants who used the HIV and STI testing center locator tool (n=888).

	n	%	p-value
Age, years			< 0.05
13	10	90.9	
14	60	90.9	
15	135	84.4	
16	200	87.3	
17	209	81.0	
18	374	78.1	
Language			0.07
English	855	83.1	
Spanish	33	71.7	
Rurality			0.21
Urban	733	81.9	
Rural	155	86.1	
Sexual experience <sup>a</sup>			0.11
Lifetime, but not in the last 3 months	196	82.4	
In the last 3 months	397	81.7	
Never	295	84.0	

<sup>a</sup>Sexual experience was defined as a participant reporting having engaged in anal sex.

**Table 5.**

Overview of feedback from participants who used the HIV and STI testing center locator tool and provided a feedback rating (n=861).

	n	%
Positive Module Rating	837	97.2
Provided feedback related to tool	81	9.7
Positive feedback	74	91.4
Constructive feedback	5	6.2
Negative feedback	0	0.0
Technical difficulties	2	2.5

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**Table 6.**

Sample feedback from participants who used the HIV and STI testing center locator tool organized by theme.

Theme	Sample Feedback
The STI/HIV testing locator was helpful	“The tool for locating clinics was very helpful” “It helped me find an HIV STI testing center near me”
Makes finding HIV/STI testing centers easy	“I really genuinely appreciated how I was able to easily see HIV and STI testing centers near me because that simplifies the whole process of searching for testing centers.”
I learned something new about HIV/STI testing centers near me	“I learned that there’s a county clinic nearby that does free, confidential, rapid HIV tests. Very good to know.” “I also had no idea CVS Minute Clinics tested for HIV, and I know thanks to your tool. :)”
Mentioned the HIV/STI testing locator and plans/intentions to get tested	“I liked the map of where I could get tested as I’m actually now thinking about getting tested.” “It showed the process of getting a test and showed locations. It reassured me about getting a test when I become sexually active.”
Mentioned liking specific features of the tool (infrequent)	“I liked how it let me look up testing centers near me and let me send it to myself if I wanted to.”
It did not work for me (infrequent)	“It was good but when I tried to search where is a good clinic it would not load”
Suggestions for improvement (infrequent)	“I didn’t understand how to find places to get tested near me. There needs to be a legend. I didn’t see any places near me which is highly unlikely but I also didn’t know what to look for.” “I really liked that they showed us places where we could find a clinic to be tested for HIV and STIs. I think they could have added places where we could meet doctors to get Prep. Overall really good” “I liked that there were maps the only thing I will say is that it would be beneficial to point out that stores like CVS actually require you to be 18+ to buy at home hiv tests or get tests at their clinics.”
Recommendations to highlight this tool/make it available (infrequent)	“Easy way to find testing centers near me (y’ all should highlight these tools!)” “I would include the test center tool in another place than the singular module; maybe a toolbar or an app of some kind?”