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Acceptability and Feasibility of a Sexual Health Intervention for Young Adult Black Women

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Abstract

Objective: To assess the acceptability and feasibility of S2S, a newly adapted behavior intervention to address high-risk sexual behavior.

Design: Pilot randomized controlled trial.

Setting: The Internet and text messages with no in-person interactions.

Participants: Eighty-eight Black women, ages 18 to 24, were randomly assigned to the intervention or control group and self-enrolled in the respective text message program.

Methods: Participants in the intervention group were sent text messages about sexual health, while those in the control group were sent text messages about diet and/or exercise. Participants in each group received 24 text messages, including text-only messages, memes, and infopics. Participants in the intervention group also received videos links. All text messages were sent three times per week for eight weeks. Quantitative methods were used to analyze data from the message and video platform reports. Quantitative and qualitative methods were used to analyze participants' responses to an acceptability and feasibility survey.

Results: Overall, the delivery of health promotion text messages was viewed as acceptable and feasible by participants in both groups. Most of the short answer responses from participants were

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favorable and responses to the acceptability and feasibility survey yielded a total mean score of 4.01 on a 5-point scale.

Conclusion: This study supports the idea that evidence-based interventions can be adapted for delivery by text message. This delivery modality is acceptable to young adult Black women and may help to decrease barriers that would otherwise prevent them from receiving health promotion messages.

Précis:

Text messages are an acceptable and feasible way to deliver evidence-based interventions.

Keywords

mHealth; sexual health; STDs; text messaging; Black women; health promotion

According to the Centers for Disease Control and Prevention (2017b), Black women, particularly those between the ages of 15 and 24, have the highest rates of sexually transmitted diseases (STDs) among all women in the United States. More specifically, the chlamydia rate of Black teens between the ages of 15 and 19 is 1.67 to 13.8 times higher than their non-Black peers, and their gonorrhea and syphilis rates are 2.6 to 39.9 and 1.3 to 34 times higher than their non-Black peers, respectively (Centers for Disease Control and Prevention, 2017b). Similarly, Black women between the ages of 20 and 24 have chlamydia, gonorrhea, and syphilis rates that are 1.46 to 7.82, 1.8 to 26.8, and 2.5 to 16.8 times higher than their non-Black peers, respectively (Centers for Disease Control and Prevention, 2017b).

High rates of STDs are associated with high-risk sexual behavior, which is defined as participation in receptive anal or vaginal sex without the use of a condom (U.S. Department of Health and Human Services, 2015). Other sexual behaviors, including giving and receiving oral sex, are risky and low-risk behaviors respectively (U.S. Department of Health and Human Services, 2015). Based on this definition, women who engage in heterosexual intercourse are at a greater risk for STDs than those who engage in same-sex intercourse.

In response to the continuing epidemic of high STD rates, the U.S. Department of Health and Human Services (2017) revised specific national health goals and objectives with the aim of decreasing new STD diagnoses. The specific targets of these objectives include a decrease in the prevalence of chlamydia, gonorrhea, and syphilis among U.S. women by 10% from 2010 to 2020. While STD rates have decreased in many subpopulations, they are now at historically high rates among young, adult Black women (Centers for Disease Control and Prevention, 2017b).

Behavioral interventions have shown some efficacy in decreasing STD rates among young adult Black women. Sister to Sister, for example, is a gender-specific, culturally-relevant HIV prevention intervention for use with individual or small groups of Black women (ETR, 2016; Jemmott, Jemmott, & O'Leary, 2007; O'Leary, Jemmott, & Jemmott, 2008). It has been identified by the Centers for Disease Control and Prevention (2017a) as an efficacious,

best-evidence, risk reduction intervention. However, in its current format as a clinic-based intervention, several barriers may limit its scale-up.

Mobile health (mHealth) technology is one widely accepted way to deliver interventions that can help to overcome barriers related to health care access and utilization, costs and training, and threats to fidelity (Bull, 2011). More specifically, text messaging is an optimal method to deliver mHealth interventions to young adult Black women because of its wide use in this population. According to the Pew Research Center (2016), 98% of adults 18 to 29 years of age own mobile phones. Furthermore, text messaging is the most common way that young adults engage with their phones (Duggan, 2013; Smith, 2015), and the highest rate of texting is among those who are at highest risk for STDs: young adults, those of self-identified Black race/ethnicity, and women (Smith, 2011). Text messaging is also an optimal use of mHealth technology because, unlike mobile applications and web-based interventions, they can be sent and received without utilizing a smartphone, an internet connection, or cellular data. As such, the use of text messaging is encouraged to help improve the health of populations known to engage in this form of communication (Centers for Disease Control and Prevention, 2011).

Several text message interventions have been shown to significantly decrease high-risk sexual behavior (Gold, Aitken, et al., 2011; Gold, Lim, et al., 2011; Suffoletto et al., 2013) and increase awareness of risks associated with that behavior (Jamison, Karlan, & Raffler, 2013; Juzang, Fortune, Black, Wright, & Bull, 2011). However, none of these interventions was created for implementation specifically among young adult Black women. While these text message interventions may be appropriate for all men and women, it is recommended that behavior change interventions are gender-specific and culturally appropriate (Alleyne & Gaston, 2010; Centers for Disease Control and Prevention, 2014; Melnyk & Morrison-Beedy, 2012). Consistent with this recommendation, we wanted to implement an intervention that was specific to young adult Black women. Instead of creating a new intervention, we decided to adapt an evidence-based intervention as is often suggested when an established intervention is desired in new settings or among new populations (Castro, Barrera, & Holleran Steiker, 2010; Chen, Reid, Parker, & Pillemer, 2013; McKleroy et al., 2006; Villarruel, Jemmott, & Jemmott., 2005; Wingood & DiClemente, 2008).

With this pilot, randomized controlled trial, we sought to examine the acceptability and feasibility of S2S, a sexual health text message intervention adapted from the Sister to Sister HIV prevention program. The name of the newly adapted intervention, S2S, is not an abbreviation or acronym. It was purposefully selected to honor the original intervention, while making a clear distinction between the original face-to-face method of delivery and the new text message adaptation. In order for an intervention like S2S to be acceptable, users need to find it suitable, satisfying, and attractive (Bowen et al., 2009). Feasibility encompasses acceptability and other areas of focus. For the purposes of this study, we focused on implementation as defined by Bowen et al. (2009): successful delivery of an intervention to the intended participants. If shown to be acceptable and feasible, our S2S intervention can then be tested for efficacy.

Methods

Sample

Eligibility criteria for this study included self-reported female gender, Black race/ethnicity, ages 18 to 24, engagement in heterosexual intercourse in the past three months, and ownership of a mobile phone with text messaging capability. Recent heterosexual intercourse was an important inclusion criterion so as to target those at highest risk for STDs. Young women were excluded if they were married and/or were attempting to become pregnant. These criteria were implemented to target women with the greatest likelihood to begin or increase condom use during sexual encounters. Lastly, to protect their privacy, we also excluded women who shared their mobile phones with another person.

A flyer was designed and distributed via several social media sites: Facebook, Twitter, and Instagram. Paid recruitment advertisements that targeted young adult Black women linked interested individuals to a webpage designed to explain the study. The webpage displayed the recruitment flyer along with a space for interested young women to submit their email contact information to receive further information and screening for participation in the study. The flyer included a picture of a young Black woman who was text messaging, an explanation that participants would receive 24 text messages, information regarding the two study incentives ($25 for completing the first survey and $50 for completing the second survey), and the principle investigator's (PI) contact information. Free advertisements displaying the recruitment information and the recruitment flyer were posted in the community section of the 23 U.S. cities listed on the Craigslist Los Angeles home page.

Recruitment flyers were also posted on Facebook and Twitter using the PI's personal accounts and on new Facebook and Instagram pages created specifically for the study. Messages were sent to several Facebook groups that targeted young adult Black women. Each message solicited group administrators to post the study recruitment flyer on their Facebook group pages. Additionally, the recruitment flyer was emailed to student organizations created for Black women at four-year college/universities in the United States, and they were asked to share with other young adult Black women within their own networks.

Between November 2015 and December 2015, 142 women were screened for eligibility. Of these women, 100 met the eligibility criteria and were invited to participate in the study. Eighty-eight enrolled in the study and were randomized to the intervention group (n = 42) or control group (n = 46). Twelve women were not enrolled because they did not submit the study consent form (n = 4), complete the baseline survey (n = 4), or opt-in to the text message intervention (n = 4). At follow-up, all but one of the participants enrolled in the study reported the ways in which they were recruited to the study. These methods of recruitment included snowballing (n = 35), email (n = 22), Facebook advertisements (n = 20), Facebook posts by friends (n = 9), and Instagram posts (n = 1). Figure 1 shows a detailed recruitment tree for the study.

Procedures

Approval was obtained from the University of California, Los Angeles South General Institutional Review Board. Potential participants were screened over the telephone by the study PI. Electronic consent forms were emailed to all eligible young women. Upon return of a signed consent form, a link to the baseline survey was emailed to the eligible participant. After completing the baseline survey, participants were randomized using a random number generator. Participants with odd numbers were assigned to the control group, and those with even numbers were assigned to the intervention group. Once assigned a study group, participants were required to opt-in to the intervention or control group text message program by texting a specialized keyword to the six-digit mobile platform number. Those who opted-in received a $25 electronic gift card to a popular national retailer. Participants were then sent text messages three times per week, for a total of eight weeks, beginning the Monday after they opted-in to the text message program. Irrespective of their study groups, a link to the follow-up survey was emailed to all study participants the Monday following their last text message. Finally, participants were emailed $50 electronic gift cards for a national retailer upon completion of the follow-up survey.

Text Messages

We adapted the Sister to Sister intervention using a modified version of the ADAPT-ITT model (Wingood & DiClemente, 2008). A research advisory board (RAB) that included seven young adult Black women who met the same inclusion and exclusion criteria as the study participants worked with the study PI to adapt Sister to Sister into a format that was appropriate for delivery via text messages. The RAB met five times over several months. During these meetings they helped to select the content, wording, and multimedia used in the text messages, as well as the frequency of the messages and the duration of the intervention.

A team of topical experts (4 members), a focus group (4 members), and a community advisory board of HIV experts (20 members) also met with the study PI to provide input on the intervention adapted by the RAB. The S2S intervention went through three iterations before it was ready for implementation among study participants. Following adaption of the intervention, the RAB also helped to adapt diet and exercise text messages for the control group. The content for the control group messages was based on information obtained from the CDC, Office of Adolescent Health, and other publicly available health-related websites.

Each study group received 24 text messages in the form of short message service (SMS) and multimedia messaging service (MMS) messages. Participants in the intervention group received seven text-only messages, seven memes (amusing or thought-provoking caption associated with a recognizable person/character in still photos), three infopics (photos paired with a large amount of text for the purpose of relaying information), and seven video links that were adapted from the Sister to Sister curriculum.

The videos included a demonstration of proper application, removal, and disposal of a condom onto a plastic condom model, a young adult Black woman negotiating condom use with her Black male partner, and several young women recounting moments of their lives

before and after their STD diagnoses. All videos were 90 seconds or less and were frontloaded to the intervention in anticipation that participation in the study may decrease over time. Participants in the control group were sent 13 text-only messages, seven memes, and four infopics related to diet and exercise but no videos.

All text messages were one-way messages. As such, participants were not encouraged to reply to the messages, but if they did send unsolicited replies, the study team did not respond. The text messages were sent on Mondays, Wednesdays, and Fridays for eight consecutive weeks. Messages were sent at either 8 am Pacific Time (11 am Eastern Time) or 7 pm Pacific Time (10 pm Eastern Time).

Measures

Demographic information was collected from participants at the beginning of the study. Following the delivery of all text messages, platform-generated data were collected from the text message and video hosting platforms to determine the feasibility of the messages. Feasibility was based on successful message delivery and video views. Quantitative and qualitative respondent-driven data (i.e., subjective data) were collected from the study participants to determine the acceptability and to confirm the feasibility of the messages. Upon the realization that some participants were pregnant while in the study, current pregnancy status was also collected post-intervention.

Demographic and sexual history survey.—Study participants provided information related to age, education level, employment status, pregnancy history, STD history, and last sexual encounter involving heterosexual intercourse through a baseline survey. Participants also provided information on current pregnancy status through a follow-up survey.

Text message and video platforms.—EZ Texting was used to host and deliver the intervention and control group text messages and to determine each participant's mobile service provider. The platform provided reports to confirm text message delivery, frequency of video link clicks, and participant opt-outs. Each message was categorized as delivered (successfully sent to participant) or bounced (delivery attempted but unsuccessful). Message link data were collected in aggregate because the platform did not report the frequency of link clicks per participant.

The intervention videos were hosted on the Vimeo platform. Webpages hosting each video were not searchable on the Vimeo website and thus were only viewable to those who had access to the video link. Aggregate data, including frequency of webpage loads, video plays, and video finishes, were collected.

Acceptability and feasibility instrument.—A 20-item instrument was created to determine the acceptability and feasibility of the text messages. The instrument was developed by the PI because comparable surveys were not available in the literature. Feedback from research experts and review by the study RAB added to the survey's comprehensiveness. Thus, face validity was established for this instrument.

The instrument included a total of 18 quantitative items. Thirteen items were used to assess intervention acceptability with statements such as “I enjoyed receiving the text messages” and “The text messages contained information that was helpful to me.” Four items were used to assess intervention feasibility with statements such as “I was able to read the text messages as soon as I received them” and “I found it difficult to receive the text messages.” One item asked participants to report the number of videos they watched.

Nine of the Likert-type items were rated from 1 *(strongly disagree*) to 5 (*strongly agree*); the remaining eight Likert-type items were reverse scored and subsequently rated from 1 (*strongly agree*) to 5 (*strongly disagree*). Finally, the instrument included two qualitative items to assess general feelings about the text messages and suggestions for improvement: “What other thoughts do you have related to the text messages?” and “How can the text message program be improved?”

Intervention group participants were asked to complete the entire instrument. Control group participants did not complete the three items related to videos because they did not receive any video links in their text messages. Therefore, the highest possible score for the intervention group was 85 and the highest possible score for the control group was 75. When interpreting group mean scores for each instrument item, a score of 4 or 5 was interpreted as agreement or strong agreement with the associated item, respectively. In the same manner, total mean scores of 4 or higher represent greater acceptability and feasibility of the message content and the mode of message delivery. Cronbach’s alpha (α) for the acceptability and feasibility instrument was found to be .76 within both study groups, indicating high internal consistency.

Data Analyses

Quantitative data collected from the text message platform, video platform, and acceptability and feasibility instrument were analyzed using IBM SPSS Statistics, version 23 and SAS Data Management, version 9.4. Descriptive data (frequency, means, and standard deviations) were used to analyze message delivery, number of videos viewed, and the quantitative items on the acceptability and feasibility instrument. As this was the first time this acceptability and feasibility instrument was utilized, Cronbach’s alpha (α) was analyzed to determine the instrument’s internal consistency. Qualitative data collected from the open-ended items of the acceptability and feasibility instrument were grouped into themes.

Results

Sample Description

The mean age of study participants was 21 years. Most of the participants were college educated, employed part-time, and had mobile numbers that originated from the southern United States. No group differences were found related to age, education, employment, or mobile phone number location. However, pregnancy history differed between groups. At baseline, more than twice as many participants in the intervention group participants reported histories of pregnancy ($n = 12$, 28.6%) than participants in the control group ($n = 5$, 10.9%), χ^2 (1, $N = 88$) = 4.41, $p = .04$. At follow-up, four participants in the intervention

group (8.9%) reported being pregnant during the study compared to none in the control group, χ^2 (1, N = 88) = 4.49, p = .03. See Table 1 for detailed socio-demographic information by study group.

All but one of the participants in the control group submitted the follow-up survey. Her data from the baseline survey and message platform reports are included in the aggregate demographics and feasibility data presented in the results section. One participant in the intervention group opted out of the intervention after receiving 22 of the 24 text messages, but she was allowed to complete the follow-up survey; this resulted in 98.9% (n = 87) retention.

Acceptability and Feasibility

The total mean score for the first 15 questions of the acceptability and feasibility instrument was 4.01 (SD = 0.47) among the intervention group and 4.01 (SD = 0.43) among the control group. These scores reflect an overall agreement with the acceptability of the text messages and the feasibility of text messaging as a mode of health education. Total and individual item acceptability and feasibility scores are presented in Table 2.

Although the total mean acceptability and feasibility scores did not differ between the two groups, there was a significant group difference for one of the items on the instrument. The mean score for item #14, *The text messages should have been sent for a longer period of time*, was more than half a point higher among the intervention group than the control group. Hence, intervention group participants were less willing to receive additional text messages than their control group counterparts.

Results of the qualitative responses were consistent with the quantitative results. In general, participants spoke positively of the text messages. However, two participants in the intervention group responded with unfavorable perceptions: “They were irrelevant and not helpful” and “Informative but a nuisance.” One participant in the intervention group saw the messages positively but indicated a preference for new information: “They were great, but I felt like I knew a lot of the information. Maybe some of the facts could be things that are less known.” No responses from participants in the control group implied disapproval of the diet/exercise messages.

Four themes represented the participants’ general comments regarding the text messages: *Convenience, Health Promotion, Message Content,* and *Message Sharing* (Table 3). Six themes represented the participants’ suggestions for improvement: *Interactivity, Message Frequency, Message Tailoring, Message Timing, Program Duration,* and *Videos* (Table 4).

Delivery of Text Messages

At follow-up, 84 study participants (95.5%) reported no mobile phone issues during the study. However, three participants reported issues, including a lapse in mobile phone service, replacement of their phones, and change of mobile phone numbers. One of the participants who changed phone numbers notified the PI of this change. She then opted-in to the intervention using her new number and her previous number was removed from the messaging platform.

Reports from the messaging platform showed that all text messages were successfully delivered to 77 of the 88 participants (78.6%), including 33 intervention group participants (78.5%) and 44 control group participants (95.6%). Message bouncing occurred among seven participants (8%), including five participants in the intervention group (11.9%) and two participants in the control group (4.3%). Four participants (4.5%) received SMS messages only (i.e., no MMS).

Intervention Videos

Participants in the intervention group reported watching more than half of the videos (M = 4.38, SD = 2.49). More specifically, 15 (35.7%) reported watching all seven videos, 11 (26.2%) reported watching four to six videos, three (7.1%) reported watching no videos, and an additional three (7.1%) did not provide any information regarding the number of videos they watched. However, the platform-generated data suggested that only the first three videos were played 15 or more times overall. All other videos were played between 6 and 12 times total. Based on the results of the video platform reports, it is unlikely that more than six participants watched all of the intervention videos. Links to videos #1 - #5 were among the first 10 text messages sent to the intervention group. Video #1 (26 plays) and video #2 (27 plays) were watched most frequently; video #5 (seven plays) and video #7 (six plays) were watched least frequently. The sharpest fall in video plays occurred between video #2 and video #3 (16 plays), resulting in a decrease of 41%. Table 5 shows the frequency of video links clicked, video webpage loads, video plays, and videos watched to completion.

Discussion

The acceptability and feasibility of delivering an adapted, evidence-based intervention to reduce sexual risk is supported by findings of this study. Adapting S2S was an innovative step towards bringing interventions directly to the consumer. This implementation model has the potential to promote public health by reaching large numbers of at-risk young women.

In this study, quantitative and qualitative results suggested that the intervention and control group text messages were acceptable and feasible to the young adult Black women in our sample in terms of the delivery modality, enjoyableness, ease of use technically, convenience, helpfulness, and worthiness to share with friends. The nearly identical mean scores from the acceptability and feasibility instrument among the intervention (sexual health) and control (diet and exercise) group support the use of text messages as an acceptable method of health education, regardless of the content. While qualitative feedback indicated that videos included in the intervention arm were well liked in addition to the text messages, the lack of videos in the control arm did not reduce the acceptability or feasibility of the control group text messages. This finding is consistent with the numerous text message interventions that have been implemented in various areas of health promotion, including chronic disease management (Cole-Lewis & Kershaw, 2010; de Jongh, Gurol-Urganci, Vodopivec-Jamsek, Car, & Atun, 2012; Holtz & Lauckner, 2012), exercise and physical activity (Buchholz, Wilbur, Ingram, & Fogg, 2013; Prestwich, Perugini, & Hurling, 2009, 2010; Stephens & Allen, 2013), and smoking cessation (Haug, Meyer, Dymalski, Lippke, & John, 2012; Haug, Meyer, Schorr, Bauer, & John, 2009; Whittaker et al., 2011).

Videos were an important aspect of the S2S intervention because no verbal communication occurred between the participants and the researchers. Videos showed participants how to appropriately negotiate condom use with their partners and provided compelling personal stories of young women who were diagnosed with STDs while in seemingly committed relationships. The notion that participants may stop watching videos over time was supported by our findings. This may be because they experienced video fatigue or were not able to view videos at the time the message was sent, which was noted specifically by several participants. While time and travel barriers are reduced or eliminated by using text message interventions (Bull, 2011), it remains important that each participant receives the entire intervention, including the videos in their entirety. The lack of video views in the current study should be addressed for a future iteration of the intervention. Inclusion of messages asking intervention participants to respond to questions regarding the video characters in the videos may encourage participants to watch more of the videos.

Responses to the open-ended question regarding general comments about the intervention were largely positive. Participants enjoyed receiving health information in a manner that was convenient. The content was well liked by most participants, but not all participants responded positively to the text message intervention. This feedback is to be expected with any public health intervention because every intervention will not fit the needs of everyone in the target population. This finding underscores the need for many different types of interventions, but for those who prefer text messages to in-person interactions, the intervention was well received.

While there are no best practice recommendations regarding standard format for text message interventions (Hall et al., 2015), the participants' suggestions for improvement will be helpful in further revisions of the S2S intervention. Additional tailoring will help to make the messages more personal and individually suitable. For example, the text messages could provide individualized content based on sexual history (prior pregnancies or STDs), current relationship status (main partner vs. casual partner[s]), and reproductive health plans for the immediate future (desire to become pregnant vs. no desire to have children). Tailored text message interventions also have better efficacy than non-tailored text message interventions, as found by Head et al. (2013). Within reason, tailoring could also allow participants to select the frequency, duration, and timing of intervention messages. The selection of the days and times during which messages are sent may encourage participants to watch more of the intervention videos because they would receive the text messages at a time that is most convenient for them.

Lastly, participants asked to receive more interactive messages. The inclusion of multiple choice, fill-in-the-blank, or short answer items requiring a text response may be beneficial to future participants. These game-like activities may provide a method of formative evaluation (Oermann & Gaberson, 2013) and may increase learner involvement and active participation (Bastable, 2008; Billings & Halstead, 2013; McKeachie & Svinicki, 2013). These updates would move the intervention from one-way to two-way. Advances in two-way messaging can allow for automation, which reduces the need for personnel who must respond to intervention participants.

Even without implementation of the suggested changes, this S2S text message intervention was an acceptable and feasible method to deliver sexual health information. In fact, several participants stated that they wanted to the messages to continue for a longer period of time. It is anticipated that the suggested revisions to the text messages, especially those that allow future participants to tailor the messages to fit their individual needs, will help further increase the acceptability of the intervention.

Limitations

Study limitations include potential contamination across groups, as noted by participants who admitted that they shared text messages. In addition, the higher self-report of videos watched compared to the data obtained from the video streaming platform suggests that some participants watched the videos together in a group. While sharing text messages may be a possible limitation for this research, ultimately it can be seen as a benefit for public health intervention programs because it leads to sharing of the health information. An additional limitation of the current study was the need to send links that required clicking to access videos rather than sending videos directly to the participants' mobile phones. The added step of having to click on a mobile link in order to open the video in a participant's Internet browser may have limited the ability of participants to watch the videos.

As the S2S was adapted specifically for use by young adult Black women ages 18 to 24, the acceptability of the intervention may not be generalizable to men or women from other racial or age groups. Furthermore, as married women and those attempting to become pregnant were excluded from the study, additional research is needed to access the acceptability of the S2S text message intervention among these women.

A final limitation is the inability to successfully deliver all text messages to every study participant. Whether the bounced messages were related to the type of mobile device the participant owned or a poor service connection, four of the study participants solely received text-only messages and video links, but no infopics or memes. This occurrence can be likened to a multi-session intervention participant who misses one or two sessions and thus, does not receive the complete intervention. In future studies, care should be taken at the time of screening and enrollment to ensure mobile health intervention participants have the proper devices and level of mobile service to receive the full intervention. Future researchers may also examine the intensity of intervention, or dose-effect, in relation to study outcomes.

Nurses play an important role in promoting women's sexual and reproductive health and in preventing the spread of STDs. Health promotion and disease prevention may occur through the use of educational resources and behavior change interventions. A variety of diverse resources, including those using mobile technologies, may be used to reach those at highest risk for STDs, as well as those at lower risk. While it is not suggested that women completely avoid face-to-face interactions with health care providers, the adaptation Sister to Sister expands the scope of options for STD prevention. S2S is not intended to replace annual or intermittent clinic visits, but rather to reinforce the counseling and teaching provided by nurses and other health educators during these visits.

Conclusion

Our findings support interventionists in continuing to explore the use of text messages to deliver important health education information. Text message interventions offer an age-appropriate, contemporary approach to the delivery of sexual health information. Pilot testing these and other new mHealth interventions among members of a particular target population can help optimize efficiency of such interventions. While creating an acceptable and feasible mHealth intervention is the first step, the next step is to test the intervention for efficacy. The results of this study, and subsequent revision of the text messages per the study participants' suggestions, provide a strong foundation to test S2S for efficacy.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Callouts

1. Several text message interventions have deceased high-risk sexual behavior, but none were created for implementation among young, adult, Black women.
2. Results reflected an overall agreement with the acceptability of the text messages and the feasibility of text messaging as a mode of health education.
3. Adapting S2S was an innovative step towards bringing interventions directly to the consumer.

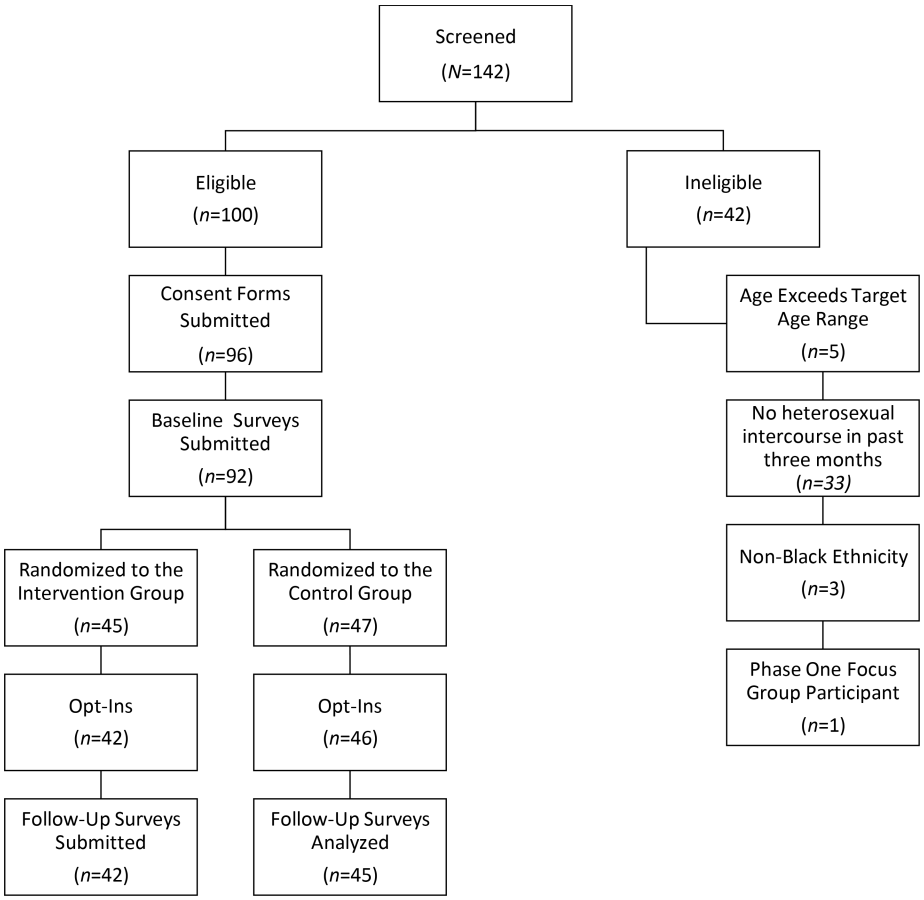

Figure 1.
Recruitment Participants

Table 1

Socio-Demographic Characteristics of Participants by Group

Demographics	Total		Intervention Group (*n* = 42)		Control Group (*n* = 46)		*p value*
	N	**%**	***n***	**%**	***n***	**%**	
Mean Age (Std. Deviation)	21.07 (1.73)		21.43 (1.71)		20.74 (1.78)		.11
18–19 years	19	21.6	6	14.3	13	28.3	
20–24 years	69	78.4	36	85.7	33	71.7	
Total Education Completed							.32
High school degree or equivalent	15	17	6	14.3	9	19.6	
Some college, but no bachelor's degree	52	59.1	23	54.8	29	63.0	
Bachelor's degree completed	21	23.9	13	31.0	8	17.4	
Employment							.07
Working 40 or more hours per week	15	17	11	26.2	4	8.7	
Working 1 – 39 hours per week	58	65.9	26	61.9	32	69.6	
Not employed, looking for work	15	17	5	11.9	10	21.7	
Prior Pregnancy							.04 *
Yes	17	19.3	12	28.6	5	10.9	
No	71	80.7	30	71.4	41	89.1	
Currently Pregnant [a]							.03 *
Yes	4	4.5	4	8.9	-	-	
No	83	94.3	38	91.1	45	100	
Prior STDs							.45
Yes	28	31.8	15	35.7	13	28.3	
No	60	68.2	27	64.3	33	71.7	
Mobile Phone Area Code Location							.33
Midwest U.S.	11	12.5	3	7.1	8	17.4	
Northeast U.S.	12	13.6	6	14.3	6	13.0	
Southern U.S.	45	51.1	25	59.5	20	43.5	
Western U.S.	20	22.7	8	19.0	12	26.1	

[a] Responses provided by participants who completed follow-up survey (*n* = 87).

* p ≤ .05.

Table 2

Acceptability and Feasibility Instrument Scores

Items	Mean (Std. Deviation)		*p value*
	Intervention Group *n* = 42	**Control Group *n* = 44**	
1. I enjoyed receiving the text messages.	4.38 (0.83)	4.36 (0.78)	.92
2. The text messages contained information that was helpful to me.	4.36 (0.96)	4.40 (0.76)	.84
3. The text messages were too frequent.[a]	4.07 (0.81)	4.02 (0.82)	.78
4. I really liked the memes.	3.93 (0.95)	4.14 (0.88)	.29
5. I would share these types of text messages with my friends.	4.07 (1.02)	3.93 (1.04)	.53
6. I was able to read the text messages as soon as I received them.	4.38 (0.94)	4.55 (0.63)	.34
7. Receiving the text messages was an inconvenience for me.[a]	4.26 (0.89)	4.41 (0.76)	.41
8. The text messages should have been sent for a shorter period of time.[a]	3.93 (0.95)	3.98 (1.07)	.82
9. I found it difficult to receive the text messages.[a]	4.43 (0.80)	4.43 (0.79)	.99
10. I looked forward to receiving the text messages.	3.64 (1.06)	4.00 (0.94)	.10
11. I liked the times of day that the text messages were sent.	3.81 (1.13)	3.91 (1.03)	.67
12. I was unable to view the memes.[a]	4.10 (1.10)	4.41 (0.84)	.14
13. I wish there were more text messages.[a]	2.88 (1.17)	2.41 (1.11)	.06
14. The text messages should have been sent for a longer period of time.[a]	3.38 (1.13)	2.82 (1.13)	.02*
15. I know women who would benefit from receiving these types of text messages.	4.48 (0.71)	4.47 (0.63)	.94
16. I really liked the videos.[b]	4.31 (0.69)	-	
17. I was unable to view the videos.[a,b]	4.41 (0.95)	-	
Total Mean Score[c]	4.01 (0.47)	4.01 (0.43)	.95

Note. Range for each item = 1 (strongly disagree) – 5 (strongly agree).

[a] Score reverse-coded.

[b] Item scored for intervention group only, as control group did not receive any videos.

[c] Total score is for items 1 through 15 only.

* $p \leq .05$.

Table 3

General Comments Regarding the Text Messages

Theme	Participant Quotes	
	Intervention Group	**Control Group**
Convenience	*"I really appreciated the convenience in receiving critical information via every day technology."* *"The text messages were great. I was able to read them at my own convenience."*	*"I like how the messages were sent during the late evening when my day was winding down and I wasn't distracted with any activities."* *"I enjoyed the text messages I thought they were very convenient for our generation and our use of technology."*
Health Promotion	*"All in all it was beneficial to me, even if just a reminder every now and then to take care of my health."* *I thought that the messages made me want to live a healthier lifestyle.*	*"I enjoyed them. Reminded me to take care of myself."*
Message Content	*"I learned a lot from the text messages and some of myths I thought were true I learned were not."* *"They were great, but I felt like I knew a lot of the information. Maybe some of the facts could be things that are less known."* *"I like the length and practicality of the videos. The videos were the most informative."* *"The videos were not really watched because I was in public when receiving them."*	*"I though[t] the meme/infographics were nice."* *"My favorite text messages were the myth/fact ones."* *"They contain a lot of good information."*
Message Sharing	*"Every time I received a text I would stop what I was doing and share it with my friends and they became excited to hear what was next when the text came."* *"I showed them to my partner."*	

Table 4

Suggestions for Improvement of the Text Messages

Theme	Participant Quotes	
	Intervention Group	**Control Group**
Interactivity	*"Interactive activities with the text links/videos"* *"Maybe incorporating some type of feedback from participants throughout the study. Not too much. But something to help it be more interactive."*	*"Ways to respond if I wanted to. Some messages I had questions about."* *"Sometimes I had a question in response to the text but I didn't ask because I knew it would not be answered."*
Message Frequency	*"I think one should be sent every other day/more frequent"* *"I would've liked to [receive] a text every single day."*	*"Increase the frequency of the text messages."* *"Increase frequency of texts."*
Message Tailoring	*"More tailoring is necessary."* *"More personable."*	*"I think the women receiving help should be able to choose a level of health information they'd like to receive."* *"There should be various levels of interest… Messages should have tried to have been customized to the individual."*
Message Timing	*"Choosing the time of day that the messages were sent so that they could be read at a convenient time."* *"Being able to choose what time of the day you receive text messages."*	*"Maybe send them at an earlier time of day (mid evening)."* *"Messages should be sent in the morning."*
Program Duration	*"Make it shorter to the point."* *"Keep it going for a longer time maybe."* *"Continue it until the person doesn't want it anymore."*	
Videos	*"Less videos. Texts are quick and easy and you can go back to it, when being sent a video link it was easy to forget to go back and view it."*	*"I think it would be cool if the messages had a more interactive component such as links to at home workout videos."* *"Maybe add videos."*

Table 5

S2S Video Results for the Participants in the Intervention Group (n = 42)

Video/Text Message	Link Clicks	Loads	Plays	Finishes
S2S Video #1/Text Message #2	34	46	26	7
S2S Video #2/Text message #3	39	47	27	5
S2S Video #3/Text Message #5	23	28	16	3
S2S Video #4/Text Message #8	16	16	12	3
S2S Video #5/Text Message #10	8	8	7	1
S2S Video #6/Text Message #15	13	14	10	3
S2S Video #7/Text Message #21	7	8	6	2
Mean (Std. Deviation)	20 (12.54)	23.86 (16.86)	14.86 (8.61)	3.43 (1.99)