

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 years, were randomly assigned to the intervention or control groups and self-enrolled in the respective text message program.

Methods: Participants in the intervention group were sent text messages about sexual health, whereas 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 8 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 favorable, and responses to the acceptability and feasibility survey yielded a total mean score of 4.01 on a 5-point scale.

Conclusion: Results from this study support 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 decrease barriers that would otherwise prevent them from receiving health promotion messages.

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

(Centers for Disease Control and Prevention, 2017b).

Greater 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).

In response to the continuing epidemic of greater 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. Although 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 overcome barriers related to health care access and use, 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 ages 18 to 29 years 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 found in those who are at greatest 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, texts can be sent and received without the use of 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

Several text message interventions have been used to decrease high-risk sexual behavior, but none were created for implementation among young adult Black women.

(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. Although these text message interventions may be appropriate for all men and women, it is recommended that behavior change interventions be 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. Rather than create 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. For an intervention such as 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, age 18 to 24 years, engagement in heterosexual

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intercourse in the past 3 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 greatest 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. Finally, 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 Web page designed to explain the study. The Web page displayed the recruitment flyer along with a space for interested young women to submit their e-mail 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 about the two study incentives (\$25 for completion of the first survey and \$50 for completion of the second survey), and the contact information of the principal investigator (PI). Free advertisements that displayed 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 homepage.

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. In addition, the recruitment flyer was e-mailed to student organizations created for Black women at 4-year colleges/universities in the United States, and they were asked to share it 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 ($n = 35$), e-mail ($n = 22$), Facebook advertisements ($n = 20$), Facebook posts by friends ($n = 9$), and Instagram posts ($n = 1$). A detailed recruitment tree for the study is shown in Figure 1.

Procedures

Approval was obtained from the University of California–Los Angeles South General Institutional Review Board. Potential participants were screened during a telephone call with the study PI. Electronic consent forms were e-mailed to all eligible young women. Upon return of a signed consent form, a link to the baseline survey was e-mailed to the eligible participant. After completion of the baseline survey, a random number generator was used to randomize the participants. Participants with odd numbers were assigned to the control group, and those with even numbers were assigned to the intervention group. After they were assigned to 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 8 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 e-mailed to all study participants the Monday after their last text message. Finally, participants were e-mailed \$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 select the content, wording, and multimedia

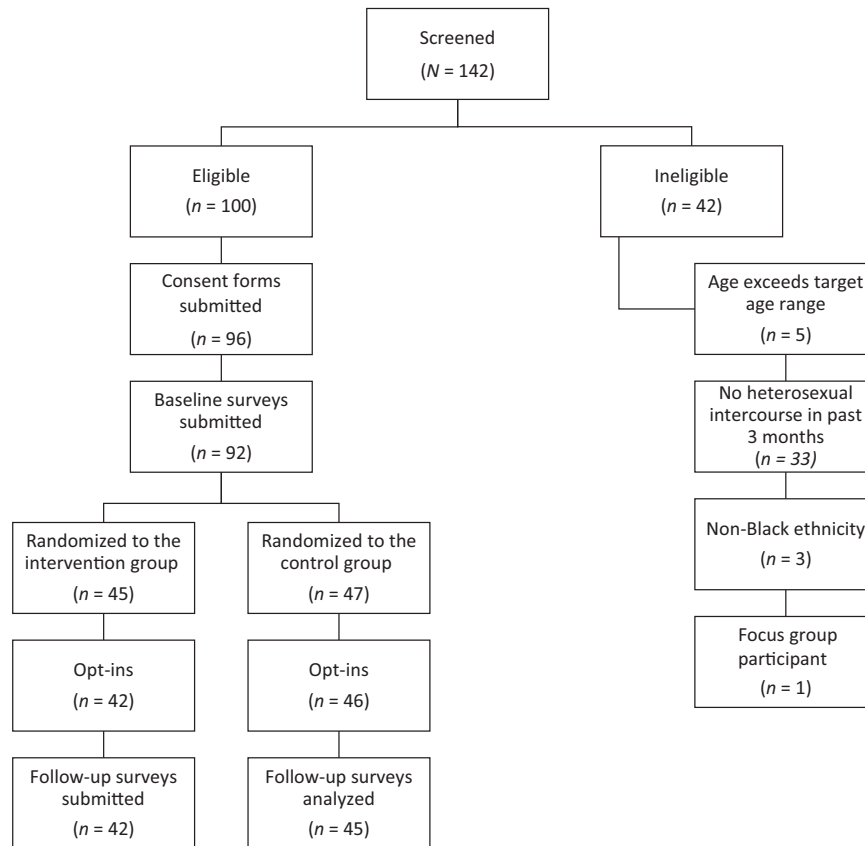


Figure 1. Recruitment of participants.

used in the text messages; 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. After adaptation of the intervention, the RAB also helped adapt diet and exercise text messages for the control group. The content for the control group messages was based on information obtained from the Centers for Disease Control and Prevention, Office of Adolescent Health, and other publicly available health-related Web sites.

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 captions

associated with a recognizable person/character in still photographs), three infopics (photographs 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 shorter 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

Results reflected an overall agreement with the acceptability of the text messages and the feasibility of text messaging as a mode of health education.

replies, the study team did not respond. The text messages were sent on Mondays, Wednesdays, and Fridays for 8 consecutive weeks. Messages were sent at 8 a.m. Pacific Time (11 a.m. Eastern Time) or 7 p.m. Pacific Time (10 p.m. Eastern Time).

Measures

Demographic information was collected from participants at the start of the study. After 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 after the intervention.

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

Text message and video platforms. EZ Texting (Santa Monica, CA) was used to host and deliver the intervention and control group text messages and to determine each participant's mobile phone number location. 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 (Vimeo, New York, NY). The Web pages that hosted each video were not searchable on the

Vimeo Web site and thus were only viewable to those who had access to the video link. Aggregate data, including frequency of Web page 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, respectively, with the associated item. In the same manner, total mean scores of 4 or higher represented greater acceptability and feasibility of the message content and the mode of message delivery.

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, mean, and standard deviation [*SD*]) were used to analyze message delivery, number of videos viewed, and the quantitative items on the acceptability and feasibility instrument. Because this was the first time this acceptability and feasibility instrument was used, Cronbach's alpha 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 reported histories of pregnancy ($n = 12$, 28.6%) than participants in the control group ($n = 5$, 10.9%; $\chi^2_{(1, N = 88)} = 4.41$; $p = .04$). At follow-up, four (8.9%) participants in the intervention group reported being pregnant during the study compared with none in the control group ($\chi^2_{(1, N = 88)} = 4.49$, $p = .03$). See [Table 1](#) for detailed sociodemographic 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 receipt of 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

Cronbach's alpha for the acceptability and feasibility instrument was found to be .76 within both study groups, which indicated high internal consistency. The total mean score from the first 15 questions of the acceptability and feasibility instrument was 4.01 ($SD = 0.47$) for the intervention

group and 4.01 ($SD = 0.43$) for 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 for the intervention group than for 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 about the text messages: *Convenience*, *Health Promotion*, *Message Content*, and *Message Sharing* (see [Supplemental Table S1](#)). Six themes represented the participants' suggestions for improvement: *Interactivity*, *Message Frequency*, *Message Tailoring*, *Message Timing*, *Program Duration*, and *Videos* (see [Supplemental Table S2](#)).

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 used her new number to opt in to the intervention, and her previous number was removed from the messaging platform.

Table 1: Sociodemographic Characteristics of Participants by Group

Characteristic	Total		Intervention Group (n = 42)		Control Group (n = 46)		p
	n	%	n	%	n	%	
Mean age in years (SD)	21.07 (1.73)		21.43 (1.71)		20.74 (1.78)		.11
18–19	19	21.6	6	14.3	13	28.3	
20–24	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 [‡]							.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
Midwestern United States	11	12.5	3	7.1	8	17.4	
Northeastern United States	12	13.6	6	14.3	6	13.0	
Southern United States	45	51.1	25	59.5	20	43.5	
Western United States	20	22.7	8	19.0	12	26.1	

Note. SD = standard deviation; STD = sexually transmitted disease.
[†]Responses provided by participants who completed follow-up survey (n = 87).
[‡]p ≤ .05.

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 for 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 that they watched more than half of the videos (mean = 4.38, SD = 2.49). More specifically, 15 (35.7%) reported that they watched all seven videos, 11 (26.2%) reported that they watched four to six videos, 3 (7.1%) reported that they watched no videos, and an additional 3 (7.1%) did not provide any information regarding the number of videos they watched. However, the platform-generated data suggested that only the

Table 2: Acceptability and Feasibility Instrument Scores

Item	Mean (SD)		p
	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*) to 5 (*strongly agree*). SD = standard deviation.

^aScore reverse coded. ^bItem scored for intervention group only, because control group did not receive any videos. ^cTotal score is for items 1 through 15 only.

[†]p ≤ .05.

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 through 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 (7 plays) and Video 7 (6 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%. [Supplemental Table S3](#) shows the frequency of video links clicked, video Web page loads, video plays, and videos watched to completion.

Discussion

The acceptability and feasibility of the delivery of an adapted, evidence-based intervention to reduce sexual risk is supported by findings of this study. The adaptation of *Sister to Sister* was an innovative step toward bringing interventions directly to consumers. This implementation model has the potential to promote public health by reaching large numbers of young women at risk for STDs.

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, technical ease of use, convenience, helpfulness,

and worthiness to share with friends. The nearly identical mean scores from the acceptability and feasibility instrument for 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. Although qualitative feedback from participants 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, GuroI-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 participants and 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 is 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. Although time and travel barriers are reduced or eliminated through the use of text message interventions (Bull, 2011), it remains important that each participant receive 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 in which intervention participants are asked to respond to questions about the 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.

Although there are no best practice recommendations with regard to standard format for text message interventions (Hall, Cole-Lewis, & Bernhardt, 2015), participants' suggestions for improvement will be helpful in further revisions of the S2S intervention. Additional tailoring will help 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). Head et al. (2013) found that tailored text message interventions had better efficacy than nontailored text message interventions. 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.

Finally, participants asked to receive more interactive messages. The inclusion of multiple choice, fill-in-the-blank, or short answer items that require 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 a one-way text message model to a two-way model. 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 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 greater self-report of videos watched compared with the data obtained from the video streaming platform indicates that some participants may have watched the videos together in a group. Although 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 the ability to send videos directly to the participants' mobile phones. The added step of having to click on a mobile link to open the video in a participant's Internet browser may have limited the ability of participants to watch the videos.

Because the S2S was adapted specifically for use by young adult Black women ages 18 to 24 years, the acceptability of the intervention may not be generalizable to men or women from other racial or age groups. Furthermore, because married women and those attempting to become pregnant were excluded from the study, additional research is needed to assess the acceptability of the S2S text message intervention for 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 received text-only messages and video links but no infopics or memes. This occurrence can be likened to a multisession 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

The adaptation of S2S was an innovative step toward bringing interventions directly to the consumer.

to ensure that mHealth 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.

Conclusion

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 that use mobile technologies, may be used to reach individuals at greatest risk for STDs, as well as those at lower risk. Although it is not suggested that women completely avoid face-to-face interactions with health care providers, the adaptation of 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.

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 with members of a particular target population can help optimize the efficiency of such interventions. Although the creation of 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 suggestions of the study participants, provide a strong foundation to test S2S for efficacy.

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Supplementary Material

Note: To access the supplementary material that accompanies this article, visit the online version of the *Journal of Obstetric, Gynecologic, & Neonatal Nursing* at <http://jognn.org> and at <https://doi.org/10.1016/j.jogn.2018.04.136>.



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