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Text-Messaging-Enhanced HIV Intervention for African American Adolescents: A Feasibility Study

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Abstract

We examined the feasibility and acceptability of an HIV prevention intervention for African American adolescents delivered via mobile cell phones and looked at intervention-related changes in beliefs and sexual behaviors. We used a longitudinal one-group comparison design with data collected at three points. Forty adolescents, 13–18 years old, participated in the Becoming a Responsible Teen intervention followed by the delivery of daily multimedia messages for 3 months. The mobile-cell-phone enhanced intervention was feasible and acceptable to the participants. Greater HIV knowledge, improved attitudes toward condoms, and increased perceived HIV risk scores were observed with older adolescents (16–18 years old). Behavior trends showed a decrease in the number of times participants reported engaging in unprotected sexual intercourse over the previous 2 months. Mobile-cell-phone multimedia-text-messaging boosters tested in this study provided preliminary evidence of efficacy of the enhanced HIV prevention intervention for African American youth.

Keywords

African American youth; feasibility study; HIV prevention; mobile cell phones; text messaging; multimedia

Disclosures

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Although the overall prevalence of AIDS is declining, there has not been a comparable decline in new sexually transmitted infections (STIs), including HIV, among young people, especially African Americans 13–29 years old (Centers for Disease Control and Prevention, [CDC], 2010). In 2007, rates for chlamydia, gonorrhea, and syphilis were highest among non-Hispanic Blacks; among adolescents, the highest rates of chlamydia and gonorrhea occurred among non-Hispanic Black females (CDC, 2009, 2010). In the southern region of the United States, HIV is a particularly significant health problem for African American adolescents (Southern AIDS Coalition, 2008).

STI and HIV prevention information delivered in face-to-face sessions has been effective in reaching people in small groups, but given the continued high rates of HIV infection among African American teenagers, innovative approaches to delivering prevention information are needed. More people may be reachable with safer sex and HIV prevention information using technology, which requires fewer personnel and also may be more cost effective (Gold et al., 2011). In addition, the multimedia features of mobile cell phone (MCP) technology make it suitable for delivering STI and HIV prevention information to individuals, groups, and communities of people (Cole-Lewis & Kershaw, 2010; Cornelius & St. Lawrence, 2009; Jones, 2010; Swendeman & Rotheram-Borus, 2010).

MCP communication devices have become an important part of adolescent culture and are a vital part of the communication process, with 88% of teen cell phone users using text messaging. Both girls and boys own mobile phones (Lenhart, 2012), although older teens (14–17 years old) are more likely to own phones than younger teens (12–13 years old). Text messaging, a feature of MCP technology, has been referred to as the note passing of the new century, with adolescents using this feature for immediate contact with friends (Lenhart, 2012). Cellular phone use is not limited by socioeconomic class or ethnicity, and recent data suggest that cellular phone users are more likely to be African American, younger, and less educated, and to belong to a low socioeconomic group (Mobile Marketing Forum, 2007). African Americans also show stronger interest in mobile marketing than Whites (Mobile Marketing Forum, 2007). As a result, community-based organizations, such as SEXINFO, have engaged African American teens with the delivery of safer sex information through their mobile devices (Levine, McCright, Dobkin, Woodruff, & Klausner, 2008). Thirty percent of African American teens have cell phones that are Internet enabled; 37.9% have cell phones with a camera; and 54% have phones with text messaging capabilities (Mobile Marketing Forum, 2007). African American and Latino youth spend the most time using their phones for music, games, and videos (88 minutes a day for African Americans, 64 minutes for Hispanics, and 26 minutes for Whites; Kaiser Family Foundation Study, 2010).

Adolescent interest in dating and sexuality presents opportunities to use MCPs to provide educational messages about safer-sex behaviors (Cubbin, Santelli, Brindis, & Braveman, 2005; Patrick, Griswold, Raab, & Intille, 2008; Skinner, Biscope, Poland, & Goldberg, 2003), particularly because adolescents already use MCPs for sexual and relationship communications. In one study, 44% of adolescents used MCPs for flirting and dating and 10% said that they had broken up with a boyfriend orgirlfriend using MCP technology (Mobile Marketing Forum, 2007). In another study, a school nurse received numerous MCP messages related to sexual health from a sample of 147 students (Utting, 2004). In a pilot study with 14 adolescents, Cornelius and St. Lawrence (2009) found that adolescents were receptive to the idea of sending and receiving safer sex text messages to their MCPs. The findings from these studies suggest that MCPs might be an appropriate vehicle for delivering safer sex messages to adolescents in a language and medium they are familiar with through a device that is always in their hands.

Drawing on these findings, we used the multimedia features of MCP technology (pictures, videos, and text messages) to enhance the Becoming a Responsible Teen (BART) HIV prevention curriculum. Designed for African American adolescents 14–18 years of age, BART is a community-based HIV prevention curriculum, which consists of interactive group discussions and role plays that allow participants to practice behavioral skills for safer sex. Our approach differed from the standard face-to-face BART sessions because the curriculum was enhanced by delivering one multimedia MCP text message per day for 3 months. The pilot study reported here was carried out to examine the feasibility and acceptability of the multimedia MCP approach as an adjunct to a face-to-face prevention curriculum and to determine whether there was suggestive evidence of intervention-related changes in the outcome variables.

Methods

Sample and Setting

The study used a longitudinal one-group comparison design with data collected at three time points: baseline (T1), post-BART at 7 weeks (T2), and at 3-month follow-up post BART (T3). The sample for the study included 40 African American adolescents, 13–18 years of age, who provided verbal and written consent, had parental consent to participate, and had knowledge of MCP text messaging technology. After obtaining university institutional review board approval, the study was conducted at a university in the southeast region of the United States.

Procedure

In January 2009, we conducted a pretest of the text messaging delivery process. Using an interactive learning approach, text messages were designed so that the teens would respond to a text message and then receive a response from the facilitator based on their response. By responding to the participants' messages, we were able to determine if the teens read the messages with understanding and comprehension. Development, pretesting, and delivery of the text messages have been described in detail elsewhere (Cornelius, Cato, St. Lawrence, Boyer, & Lightfoot, 2011). In brief, the multimedia text messages reinforced content from the BART curriculum.

In April 2009, flyers describing the BART text messaging project were posted or distributed at recruitment sites, which included a variety of community-based organizations. We recruited participants by personal contacts and flyers at these organizations and at churches and schools. If a prospective participant called the office, the recruitment and retention coordinator provided information about the study and requirements for participation, and assessed the eligibility and willingness of the parents and adolescents to come to an information session. Prospective participants were told that we were examining the feasibility of delivering multimedia text messages as an adjunct to a face-to-face method of delivering information about safer sex practices. Seventy-seven prospective participants were approached and screened and 40 were enrolled in the study. Once parental consents and adolescent assents were obtained, the 40 adolescents completed the baseline pretest. Beginning 1 week later, they attended seven weekly face-to-face sessions of the BART curriculum.

Beginning in June 2009, weekly sessions of the BART curriculum were conducted at 10 AM for seven Saturdays; each session was 90 to 120 minutes in length. The final BART session (graduation) was at the 3-month follow-up. Information sessions covered the topics of understanding HIV, sexual decision making, developing condom skills, learning and practicing assertiveness communication skills, personalizing risks, and spreading the word

about BART (St. Lawrence et al., 1995). All the sessions were conducted at the university. At the end of the seventh week, 36 participants (four lost to attrition) took post-BART surveys on the computer. The day after completion of BART, participants began receiving daily multi-media MCP boosters (text messages, pictures, and videos). Consistent with the literature, the messages were delivered at 3 PM daily (Cornelius & St. Lawrence, 2009; Cornelius et al., 2011) for 3 months (Newton, Wiltshire, & Elley, 2009; Rami, Popow, Horn, Waldhoer, & Schober, 2006). Participants were required to respond to each message and the assigned facilitator sent tailored responses to each reply (see Table 1).

Two trained master facilitators were responsible for training other facilitators and sending daily text messages to participants. Six additional facilitators were hired to deliver the face-to-face information and to respond to participants' text messaging responses. The facilitators were required to be African American, have some college education or experience working with adolescents, and have effective communication skills. They were trained to deliver the BART curriculum and to respond to participants' text message responses via smart phones.

Costs of delivering multimedia text messages have been reported as a major barrier to the adoption of text messaging interventions with prepaid phones (Whittaker et al., 2008). Therefore, to eliminate variability with the text messaging delivery process, we provided a smart phone with unlimited text messaging and Web access for 90 days to each participant.

Participants were also allowed to text their assigned facilitators with additional questions about the process or any topic related to safer sex practices. At the end of 3 months of texting, the 36 participants returned for a follow-up session, completed follow-up surveys on the computer, and attended a graduation ceremony (session 8 of the BART curriculum). Eleven of the adolescents were then randomly selected to participate in a process evaluation focus group. Findings from that focus group have been reported elsewhere (Cornelius et al., 2012). Participants were compensated $20 for each weekly session and $50 for the 3-month follow-up session (Cornelius, LeGrand, & Jemmott, 2009).

Study Measures

Feasibility and acceptability of the text messaging boosters—Feasibility was measured by the number of youth who were recruited and the number who completed the MCP intervention. We also measured the response rate to the text messaging boosters by month and by days and minutes. Response rate was measured by the number of times a participant responded to text messages. Acceptability was measured by the number of participants who found the delivery method acceptable. Specifically, we asked whether the daily dosage was too long or too short, whether the process interfered with daily activities, and whether staff answered questions in a timely manner. Answers were rated on a four-point Likert scale from 1 (*strongly disagree*) to 4 (*strongly agree*). A fourth question asked participants to comment on the multimedia MCP text messaging intervention.

Longitudinal evaluation of impact—HIV knowledge was measured using a 24-item AIDS risk knowledge survey (Kelly, St. Lawrence, Hood, & Brasfield, 1989). Higher scores reflect greater knowledge of HIV risk. The Cronbach's alpha 20 estimate of internal consistency was 0.75 (St. Lawrence, 1993).

Perceived HIV risk was measured by the Perceptions of HIV Infection Risk survey (St. Lawrence et al., 1995). This survey consists of three questions. One question asked the respondents if they had taken an HIV test; another question asked about self-efficacy in preventing risk of HIV, rated on a 10-point scale from 1(*not much*) to 10 (*a lot*); the third question asked respondents about their perceptions of personal risk from 1 (*not at risk*) to 10

(*at high risk*). The survey had been validated with African American adolescents (St. Lawrence, 1993) and had a fifth-grade readability level.

Attitudes toward condom use were measured using the 23-item Condom Attitude Scale (Sacco, Levine, Reed & Thompson, 1991), on which higher scores are associated with more positive attitudes. The scale has been used to measure attitude change related to the BART intervention. It has a Cronbach's alpha of 0.80 (St. Lawrence, 1993). Acceptable convergent validity was demonstrated with a sample of 312 African American adolescents (St. Lawrence et al., 1995).

HIV risk behaviors were measured with the Risk Behavior Survey (Darrow, 1983). This survey asked participants to provide detailed information about their sexual behaviors and substance use over the previous 2 months; the frequency of unprotected and condom-protected vaginal, oral, and anal intercourse; sexual activities; and number of sexual partners. Participants responded to items on the survey using binary (*yes* or *no*) responses; there were also questions about the frequency of use of drugs and alcohol. This instrument has been validated with African American adolescents (Butts & Hartman, 2002).

Data Analysis

Descriptive statistics were used to examine demographic variables at study entry for all participants and for major outcome measures at each data collection time point. HIV knowledge was expressed as the fraction of questions answered correctly and attitudes toward condoms were expressed as the average (1–5) value of the 23 Likert items on the scale (with appropriate items reverse scored). Risky behaviors were summarized into two variables: risk 1, the sum of eight binary questions (question 7–question 15), representing the teen's number of risky sexual behaviors (0–8); and risk 2, the sum of the frequencies of alcohol or drug use during the previous 2 months (sum of 9 questions). A larger total number of times has been related to more risky behaviors. For both risk variables, the logarithmic transformation, "transformed value" = l n (1+ score) was used in statistical modeling. Perceived risks were measured by two survey questions, each with values between 1 and 10. An additional risk question, asking if the participant had ever had an HIV test, was not used. All outcome variables used in the analyses were treated as continuous.

Change in outcome measures between data collection points was the main variable of interest. Age at entry to the study and gender were selected as covariates because older adolescents could have had many more experiences, and there could potentially have been differences in behaviors between genders. The same participants were observed on three occasions, so outcome measures from the same person were potentially correlated; thus linear multiple regression alone could not be used. A linear mixed model represents a modeling tool that can be thought of as a regression but with adjustments for potentially correlated outcomes. The simplest model assumes that observations from the same person are correlated in the same way. This is called compound symmetry. This model allowed for use of the all-available information from each visit; thus, participants missing any visits still contributed baseline data to the model. The Bayesian Information Criterion was used as the model selection tool. Only significant potential confounders were retained in the model. The importance of potential interaction effects was also assessed. If longitudinal change in an outcome measure was detected, pairwise comparisons with a Bonferroni adjustment were used to determine the nature of change over time. Residual diagnostics were performed for all of the final models. A randomization test (with 1,000 sets of random within-person permutations) was used to test whether there was an intervention effect (time) on the number of times of unprotected intercourse. Statistical software SAS 9.2 was used in modeling, and $p < .05$ was considered the criterion for significance.

Results

Sample

Forty participants were enrolled in the study. Approximately half of the participants were female (52.5%). The participants were 13–18 years of age (mean = 15.4 years; SD ± 1.7 years) and enrolled in the tenth grade of high school (36.5%). More than half (57.5%) lived in single-parent households (mother only; see Table 2).

Feasibility and Acceptability of the Text Messaging Booster

All participants (n = 40) were present at T1 (pretest); 36 (90%) were present for data collection visit 2 (immediate posttest, T2); and 36 (90%) were present for the 3-month follow-up post-BART (T3). Although all 36 participants attended the graduation ceremony and provided data for the text messaging response rate, one survey was incomplete; therefore, usable data on the study measures (HIV knowledge, attitudes toward condoms, perceived risk, and HIV risk behaviors) were collected on only 35 participants at the 3-month follow-up.

The text messaging response rate indicated that the majority of adolescents found the mobile cell phone approach acceptable and they responded to a high percentage of the messages. The text messaging delivery process began in the last week in July and ended in the third week in October, for a total of 91 delivery days. Participants responded 100% of the time on 20 days, 91%–99% on 46 days, 81%–90% on 18 days, and ≤ 80% on only 7 of the 91 days (Table 3).

We delivered a total of 3,276 text messages over the 3-month period. Once participants received a message, we recorded their response times and the facilitators' response times in minutes. Participants responded to the text message boosters within a range of 33.7 to 79.9 minutes. Facilitators responded to participants' messages within a range of 29.81 to 76.78 minutes. The average response time was comparable for adolescents (52.2 minutes) and facilitators (59.01 minutes; Table 3). Facilitators received an average of two additional text messages per week. Content of the messages pertained to response clarification and MCP issues. Two additional text messages pertained to modes of HIV transmission.

Thirty-five (97%) participants said that the number of text messages was "just right." Thirty-one participants (89%) said that the research team answered their text message questions in a timely manner. Thirty adolescents (86%) indicated that the text messages did not interfere with their daily activities.

Participants were very positive about the text messaging process, which was reflected in their spontaneous comments. One wrote, "I love this program and hope that it can continue. We need to continue educating youth about HIV. I hope that I can be a teacher on the advisory board next time." Another wrote, "I really did enjoy this program and if another program came around like this one, I would really love to be a part of it because I learned a lot. I've learned that it is okay to be around somebody with AIDS." One teen wrote, "Good job with the text messages and the project. Keep up the good work."

Issues in the Delivery of Text Messaging Boosters

Participants reported a total of 20 issues with the text messaging process to their assigned facilitator during the 3 months in which boosters were delivered. They reported issues such as loss and damaged equipment (i.e., the MCP or charger [n = 9]) and problems downloading videos or viewing URL links to the text messaging pictures (n = 11). Problems were immediately resolved by the lead text facilitator by providing replacement equipment

(phone or charger) and by having participants troubleshoot reinserting the battery back into the phone. There were no problems with service interruption because text messaging service costs were covered by the grant.

Longitudinal Evaluation of Impact

HIV knowledge—Knowledge of HIV was associated with age ($p = .05$; Table 4). Older participants (16–18 years of age) had higher HIV knowledge scores than younger participants over time. Overall, there was a small increase in HIV knowledge from baseline to visit 2, and then scores essentially remained the same (see Table 5). The reliability coefficient was 0.72, similar to the Cronbach's alpha for internal consistency of 0.75 in the original BART study.

Attitudes toward condoms—As depicted in Table 5, attitudes toward condoms were associated with both gender and age, and gender interacted with time. Older participants (16–18 years of age) had more positive attitudes toward condoms than younger participants ($p = .007$; Table 4). Males and females had similar attitudes. Attitude scores increased for both genders at immediate posttest, but females continued to increase to the 3-month follow-up, whereas males did not. The reliability coefficient was 0.75, comparable to the 0.80 alpha coefficient for this measure in the original BART study.

Perceived HIV risk—At pretest (T1), seven participants reported having been tested for HIV; at T2 (post-BART 7 weeks) and T3 (post-BART text messaging) only six participants reported having been tested for HIV. All participants at each data collection point reported being uninfected with HIV. Perceived HIV risk (Perceived 1) was associated with age ($p = .03$) and time ($p = .009$; Table 4). Participant confidence in avoiding infection dropped after the intervention and then increased at the 3-month follow-up. Older participants (16–18 years of age) had more confidence that they could keep themselves from becoming infected with HIV (Table 4). There was no association of perceived risk of getting HIVor AIDS (Perceived 2) with time (Table 5) or any demographic confounder, although there was a slight indication that males thought their risks were less than females ($p = .07$; data not shown).

HIV risk behaviors—The sexually experienced adolescents in our sample were 15 years of age at the time of first sexual intercourse. None of the HIV risk behavior variables showed significant longitudinal change or association with potential cofounders. Table 5 provides a description of study measures over time. However, trends were seen toward fewer unprotected sexual intercourse experiences (vaginal, oral, and/or rectal) over time. At baseline, 31 incidents of unprotected sexual intercourse were reported. Immediately posttest, unprotected sexual intercourse was reported 19 times. At the 3-month follow-up, unprotected sexual intercourse was reported only 9 times. Based on the results of the randomization test ($p = .328$), this decline in the number of unprotected sexual intercourse experiences was not significant. With a larger sample, however, the decline might have been significant.

Discussion

This pilot feasibility study examined an MCP-enhanced curriculum for HIV prevention with African American adolescents. The multimedia text-messaging format reinforced content from weekly face-to-face sessions of the BART curriculum. Findings showed promise in terms of the feasibility and acceptability of this approach. One surprising finding was the high retention rate at the 3-month follow-up. Participants were in frequent contact with the research staff, which may have resulted in this high rate. The high retention rate also

reflected the careful work that the research team did in providing feedback and responding to text messages from participants. This study is one of a very few to compare participant and facilitator response rates, and the response rates for both were comparable. The range of response time for teen participants was 33.7 to 79.9 minutes, and for facilitators it was 29.81 to 76.78 minutes (when school reopened and participants became more involved with school activities, it took them longer to respond).

Positive changes in HIV knowledge, attitudes toward condom use, perceived HIV risk, and decreased HIV risk behaviors were indicative of intervention-related changes. Although the lack of a significant positive impact on HIV risk behaviors was unexpected, one study found that changes in sexual behavior, frequency of unprotected sexual intercourse (vaginal, oral, and anal), sexual activities, and the number of sexual partners are sometimes delayed 6–12 months after an intervention (Jemmott, Jemmott, Braverman, & Fong, 2005). Certainly the reduction in the number of participants reporting unprotected sexual intercourse from 31 times at baseline to 19 times post-intervention and then only 9 times at the 3-month follow-up post-BART text messaging is encouraging.

We found that age was a primary factor in change, with greater increases in knowledge, more improved attitudes toward condoms, more perceived HIV risk, and more reduction in HIV risk behaviors among older participants (16–18 years of age). The differential findings by age suggest that even when presented with the same program, younger adolescents may take away different messages and enact different behaviors. Researchers may need to examine reasons why the text messaging approach may not have resonated with younger participants. Nevertheless, high priority should be placed on testing MCP interventions for adolescents of all ages, given the fact that MCPs are readily in the hands of youth. MCP interventions must be engaging, interactive, and appealing to facilitate response and retention.

Our pilot feasibility study was limited to short-term follow-up (3 months) and lacked a control group, so we were unable to examine longer-term maintenance of outcomes or definitively say that the positive changes were caused by the intervention. Also, our sample consisted of a small group from one geographic location, and the results cannot be generalized to other geographic areas. The small sample size of this feasibility study may have prevented detection of longitudinal changes and associations with covariates or interactive effects. Thus, the results of this study have to be interpreted with caution. Finally, we provided study participants with project smart phones and, therefore, the acceptability of this approach is limited to the specific MCP used in this project. Despite its limitations, this feasibility study adds to an emerging body of literature on MCPs and sexual health and provides a new platform for intervening with youth who may not be inclined to participate in more involved, time-intensive programs.

A text-messaging-enhanced approach may be attractive to community-based organizations making decisions on how to reinforce information provided in group sessions. Community-based organizations can deliver text messages to reinforce content from face-to-face curricula or even deliver the messages alone to improve knowledge of safer sex behaviors. Programs such as SexInfo have been successful in using this approach (Levine et al., 2008). The potential problems we identified with the delivery of the text messages were quickly resolved by the research staff (Cornelius et al., 2011). Also, given the convenience of this approach, adolescents can be reached at times when they need to access information for safer sex behaviors. The high follow-up response rate obtained by the current study points to the acceptability of the approach.

Taken together, our findings add to the emerging evidence of the potential impact of using MCP text messaging technology as an adjunct to face-to-face interventions. Continued adaptation of evidence-based interventions with text-messaging-enhanced content will expand our knowledge of the potential of this approach when the luxury of extended contact is not possible. Recent studies have noted that MCP text messages can be effective in promoting positive behavior change (Cornelius et al., 2011, 2012 Gold et al., 2011; Wright, Fortune, Juzang, & Bull, 2011), and studies have shown the acceptability of text messaging for promoting sexual health among adolescents (Currie et al., 2010; Gold et al., 2011; Levine et al., 2008; Wright et al., 2011). Yet none of these studies examined the feasibility of the text messaging delivery approach in relation to response time. Based on the findings from our exit focus group, the participants preferred having someone respond to their responses and questions (Cornelius et al., 2012).

Also, if health care providers are to be successful in reducing HIV risks among high-risk populations, then the concerns and questions raised by these populations may need to be answered beyond clinic settings. We allowed the participants to contact their assigned facilitators if they had additional questions about the text messaging content or needed additional information about sexual risks. Finally, longitudinal assessment and reinforcement of content must continually occur to prevent degrading of the effects of the face-to-face approach in delivering information and practicing skills in clinic settings. Tailored messages can be delivered as videos or pictures to remind an adolescent who is not sexually active how to practice safer sex behaviors. Text messages can also be sent to remind adolescents about which condoms are most effective in preventing the spread of the virus and what to do if someone has a latex allergy. Additional research might focus on the development of an MCP parent–child intervention because MCP text messages may enhance communication about sexual topics between parents and their children and serve as a protective factor for both. Lastly, we should examine the cost effectiveness of this approach and technical parameters of MCPs for the delivery of text messages.

Conclusions

Overall, the results from this pilot trial were encouraging and suggest that it would be appropriate to conduct a more rigorous longitudinal (12 months or longer) evaluation of the MCP supplemented intervention in a randomized controlled trial. Researchers should target other high-risk groups — men who have sex with men, women, and Hispanic youth — who, like African American adolescents, have high usage patterns of MCP technology.

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Clinical Considerations

- Adolescents are receptive to mobile cell phone (MCP) text messaging boosters.
- Tailored messages can be delivered to adolescents to reinforce safer sex practices.
- Health care providers can use MCP technology to reach adolescents with health promotion messages beyond clinic settings.
- Community-based organizations may be able to reinforce information from multiple group sessions using MCP text messaging boosters.

Table 1

Sample Text Messages and Responses

Session	Sample Message	Participant Text Response	Facilitator Response/Feedback
1- Understanding HIV	Fact or Myth: Ppl who get HIV get sick fast. TXT UR ANSWER	Fact or Myth	Correct Response 5 Correct-Myth U R Awesome! Incorrect Response 5 Incorrect ppl do not get sick fast from having HIV.
2- Sexual decisions	Click on this link: http://bart.uncc.edu/images/wt/money.jpg TXT UR Answer. Yes or No: Can HIV be transmitted by doing this?	Yes or No	Correct Response 5 Correct- No. Way to go. Incorrect Response 5 Incorrect. HIV cannot be transmitted by handling money.
3- Condom skills	Where is 1 place u can go 2 get or buy rubbers? TXT UR ANSWER!	2 places where you can buy condoms	Correct Response 5 Correct. - drug stores, health department I hear ya! Incorrect Response 5Incorrect. Places to go and get or buy rubbers are the Health Department, drug stores, Wal-Mart
4- Learning assertiveness communication	Give 1 reason why passive communication DOES NOT work in a relationship. TXT UR Answer by hitting reply.	Reason why passive communication is not effective in a sexual relationship	Correct response 5 Correct. - U do not get to express your true feelings U R 4 REAL! Incorrect response 5 Incorrect. U get forced into doing something you don't want to do, UR viewed as weak, U can't think 4 yourself.
5- Practicing assertiveness communication	Click on this link http://bart.uncc.edu/chris.html TXT UR Answer by hitting reply.	Passive communication	Correct response 5 Passive. Correct. U Rock. Incorrect response 5 Incorrect. She uses passive communication.
6- Personalizing risks	FACT or MYTH: To B at risk 4 HIV, U need to have a lot of sex partners. TXT UR Answer by hitting reply.	Fact or Myth	Correct response 5 MYTH. Correct - Congratulations. U R Correct. Incorrect response 5 Incorrect. U can B at risk for HIV with just 1 sex partner.
7- Spreading the word	Click on this link http://bart.uncc.edu/role04.html TXT UR Answer by hitting reply	Reason why she wants to wait to have sexual relations	Correct response 5 Correct. UR on a roll now! Incorrect response 5 Incorrect. She lets him know how she really feels about having sex.

Table 2

Demographic Characteristics (n = 40)

Demographic Characteristic	*N* (%)	Mean (SD)
Ages		
13–15	22 (55%)	15.4 (±1.7)
16–18	18 (45%)	
Gender		
Female	21(52.5%)	
Male	19 (47.5%)	
Grade		
7th	3 (7.5%)	
8th	4 (10.0%)	
9th	8 (20.0%)	
10th	15 (37.5%)	
11th	5 (12.5%)	
12th	3 (7.5%)	
Freshman	2 (5.0%)	
Lived with		
Mother only	23 (57.5%)	
Mother and Father	14 (35.0%)	
Other	3 (7.5%)	

Note: SD = standard deviation.

Table 3

Text Messaging Response Rate by Month, Days, and Minutes

Response Rate	July (*n* = 6 Days)	August (*n* = 31 Days)	September (*n* = 30 Days)	October (*n* = 24 Days)	Total Days (*n* = 91 Days)	Total Average Response Time
100%	4 days	11 days	5 days	0 days	20 days	
91%–99%	2 days	15 days	17 days	12 days	46 days	
81%–90%	0 days	5 days	6 days	7 days	18 days	
≤80%	0 days	0 days	2 days	5 days	7 days	
Teen (average minutes)	33.7 minutes	44.1 minutes	51.2 minutes	79.9 minutes		52.2 minutes
Facilitator (average minutes)	29.8 minutes	57.13 minutes	76.7 minutes	72.3 minutes		59.0 minutes

Table 4

Associations of Outcome Measures With Age, Gender, and Time

	β	Standard Error of β	*t*	*df*	*p* Value	Block *p* Value
HIV knowledge						
Intercept	0.554	0.131	4.22	42	.0001	
Age	0.017	0.008	2.10	63	.040	
$Time_1$	−0.042	0.021	−2.01	63	.049	.054
$Time_2$	0.004	0.021	0.17	63	.86	
Attitudes toward condoms						
Intercept	2.707	0.467	5.79	42	<.0001	
Age	0.010	0.028	3.49	60	.001	
Males	−0.426	0.128	−3.33	5	.021	
$Time_1$	−0.174	0.103	−1.69	60	.096	.007
$Time_2$	0.106	0.107	0.99	60	.324	
$Time_1$×Males	0.422	0.148	2.85	60	.006	.022
$Time_2$×Males	0.237	0.149	1.59	60	.116	
Perceived risk 1[a] (PERCEIVED 1)						
Intercept	0.755	0.227	3.32	42	.002	
Age	0.079	0.036	2.21	49	.032	
$Time_1$	−0.069	0.103	−0.67	49	.51	.009
$Time_2$	−0.313	0.104	−3.01	49	.004	

[a]How much do you think you can do to keep yourself from getting AIDS?

Table 5

Outcome Measures Over Time (Means and Standard Deviations) and Correlations

Outcome Measure	Time 1	Time 2	Time 3	Correlations (1,2), (2,3), (1,3)	Effect Sizes (1,2), (2,3), (1,3)
HIV knowledge[a]	.78 (.13)	.83 (.10)	.83 (11)	.41, .56, .43	.37, .004, .37
Attitudes toward condoms	4.07 (.40)	4.27 (.42)	4.11 (.59)	.66, .70, .59	.49, .37, .03
Perceived risk 1[b] (PERCEIVED 1)	2.50 (2.05)	1.90 (1.94)	3.14 (3.17)	.72, .63, .61	.43, .33, .46
Perceived risk 2[b] (PERCEIVED 2)	8.95 (2.41)	8.58 (2.80)	8.03 (3.35)	.25, −.02, .37	.08, .16, .29
Risk 1[c]	.29 (.65)	.22 (.72)	.20 (.41)	.76, .25, .11	.13, .04, .08
Risk 2[c]	.92 (2.11)	.88 (2.23)	.26 (.82)	.58, .04, −.17	.05, .26, .29

[a] Fraction of correct answers.

[b] Answers on the scale 1–10: 1 *(How much do you think you can do to keep yourself from getting AIDS?),* 2 *(Based on the things you do, how much do you think you are at risk of getting HIV or AIDS?).*

[c] Sum of frequencies of risky behaviors over different categories: 1 (*intercourse*), 2 (*illegal drugs*).