Understanding Adolescent Nonresponsiveness to Text Messages: Lessons from the DepoText Trial

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ABSTRACT *Urban adolescents face economic, social, and behavioral challenges in adhering to long-term contraceptive use. Use of text messaging reminders has the potential to increase adherence to family planning appointments and to educate patients about safe sexual health practices; however, nonresponsiveness to messages is difficult to interpret and may jeopardize programmatic success. We aimed to understand why adolescent girls enrolled in a randomized, controlled pilot trial (DepoText) designed to increase attendance at family planning visits were periodically nonresponsive to text messages through conducting structured interviews with participants whose text reply rates were less than 100 % during the trial period. Qualitative and quantitative data were collected and classified using descriptive data analysis. Reasons for nonresponsiveness, barriers to continuous cell phone coverage, cell phone plan characteristics, and attitudes toward the DepoText program were the primary endpoints of interest. Most participants (78 %) attributed instances of nonresponsiveness to being away from the phone or due to a personal conflict such as school or work. Service interruption due to bill nonpayment (44 %), phone loss (28 %), and cell phone number change (28 %) were significant barriers to continuous coverage during the trial period, and many respondents indicated that the downturn in the economy made it more difficult to maintain their cell phone plan. Almost a third reported having to choose between cell phone and other payments, but the vast majority (88 %) considered their cell phone a “need” rather than a “want.” Participants universally expressed satisfaction with the text messaging program and reported feeling more connected to the clinic (96 %) through the messages serving as reminders (64 %), encouragement to assume personal responsibility for their health care (12 %), and enhanced personal connection with the clinic staff (4 %). Our study suggests that a text messaging program can be used in an urban clinical setting to communicate with adolescent girls about family planning services. While economic barriers to continuous cell phone coverage do exist, adolescents indicate that the text message reminder system can be a valuable tool for enhancing clinic connectedness and promoting autonomy in care-seeking behavior.*

KEYWORDS *Text messaging, Urban, Low-Income, Adolescent*

INTRODUCTION

Although pregnancy rates among adolescents have decreased in recent years, urban adolescents continue to be at increased risk for pregnancy during adolescence due to

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poverty, psychosocial stressors, and complicated family dynamics.¹ Teenage populations in urban areas throughout the country demonstrate a higher rate of pregnancy than their suburban counterparts, and Baltimore serves as a striking example of this phenomenon, with a 2013 teen pregnancy rate of 43.4 births per 1000 girls² as compared to 19.4 per 1000 girls in the state of Maryland as a whole.³ Chicago exhibits a similar phenomenon, with a teen birth rate of 60.7 per 1000 girls compared to 38.6 per 1000 girls in the state of Illinois as a whole.⁴ While moderately long-acting contraceptive use (e.g., Depo-Provera[®]) has contributed to the decline in adolescent pregnancy rates, urban adolescents face economic, social, and behavioral challenges to consistent adherence.¹ A text messaging reminder program may be a helpful tool in clinical practice to encourage attendance at family planning visits and educate adolescent patients about safe sexual health practices. However, nonresponsiveness to text messages when prompted to reply is difficult to interpret and may jeopardize programmatic success.

Today's urban adolescents have access to cell phone technology and internet service: it has previously been determined that 93 % of youths use the internet, 87 % use email, 75 % have their own cell phone, 73 % use social networking services, and 68 % use instant messaging.⁵ Adolescents report that the ease and convenience of sending and receiving text messages via cell phone makes it a preferred method of communication.⁵ As such, youth-friendly text message communication is a potentially effective method to promote safe sexual health behavior and practices.

Recent studies supporting health care providers' use of cell phone text message interventions with youth suggest improved fidelity to scheduled clinic appointments⁶ and positive health outcomes including HIV viral control through closer adherence to medication regimens.⁷ A systematic review (2009) of 14 RCTs using text message interventions showed positive preventative health and clinical care behavioral outcomes.⁸ Moreover, access to technology does not appear to be a limiting factor in the implementation of such a program: in a focus group of urban minority and low-income youth, participants denied the existence of a "digital divide" or that a technology-based intervention would fail due to access difficulties.⁵ However, participants in these focus groups did not report universal acceptance or willingness to use technology-based interventions offered by health care providers. Therefore, the success or failure of a technology-based youth intervention appears to be dependent on the acceptability of the intervention rather than on the access to that technology.

Despite these findings, few studies have focused on how to interpret nonresponsiveness of urban youth participating in text message interventions: nonresponsiveness to text messaging among older patients has been explored primarily in the context of HAART adherence,⁹ but to our knowledge, this is the first study to specifically examine nonresponsiveness among urban adolescent patients. The objective of this study is to understand the factors that influence adolescents' nonresponsiveness to text messaging to determine the viability of using such a program to communicate with adolescent patients in an urban family planning clinical practice setting.

METHODS

This study is based on the results of structured interviews conducted by phone between October 2011 and February 2012. Participants were recruited from the

DepoText trial, a randomized control trial conducted in an urban academic practice in Baltimore, MD, that evaluated the feasibility, acceptability, and effectiveness of a text messaging reminder system to improve clinic attendance at family planning appointments among young women using Depo-Provera.⁶ For the purposes of this study, we included participants from the intervention arm of the DepoText trial (i.e., those who received text message reminders) whose text message reply rate during the trial period was less than 100 % (see Fig. 1). The text messaging protocol utilized in the DepoText trial, which has been described in detail elsewhere,⁶ consisted of two types of text messages: (i) appointment reminders (e.g., “Will you be going to your appointment on January 12, 2012?”) and (ii) informative health messaging (e.g., tips for living a healthy lifestyle). The teen was prompted to reply with a number to acknowledge receipt of the text message. The nurse case manager could view all messages sent and received by each participant’s cell phone in real-time using a web-based login and was also notified by email if a participant did not respond to a text message after a predetermined amount of time or if she replied “no” to an appointment reminder. Cumulative reply rates were generated by the web-based program and allowed us to examine each participant’s behavior over the DepoText trial period. As our goal in this study was to understand cell phone use among adolescents who are periodically nonresponsive via text, we excluded participants with reply rates of 100 %.

Eligible participants were contacted by phone and asked to complete a 22-question survey as a part of a structured interview. A single interviewer conducted all interviews. The survey instrument was developed through discussions with the DepoText team to identify areas of suboptimal understanding with respect to adolescents’ cell phone behaviors. Survey questions elicited information about why participants were periodically nonresponsive via text during the trial period, how well participants were able to maintain their cell phone coverage during the trial period, and the reasons behind any missed Depo-Provera office appointment(s) during the trial period. In addition, the interviewer collected information on the

FIG. 1 Study design: participant selection.

features of participants' cell phone plans, basic demographic information (including employment status), barriers to care (if applicable), and overall satisfaction with the DepoText text messaging program. Participants were compensated for their participation in the study with a \$5 gift card. The Johns Hopkins Institutional Review Board approved the intervention protocol.

MEASURES

Closed-Ended Survey Questions

Both qualitative and quantitative data were collected via phone call surveys to eligible participants. Nineteen of 22 survey questions had close-ended answer choices, although all questions allowed the interviewer to record the response of the participant verbatim and then select a general category for their response. These categories were predetermined for each question and included an "other" option for responses that did not fit into the preassigned categories. For example, in response to the question "When you did not reply to a text message, what was going on?" if a participant answered "I was at the grocery store," the interviewer would record her response about being at the grocery store and then score the question under the predetermined general category "poorly timed/busy."

Open-Ended Survey Questions

The survey included three questions that were open-ended in nature (Table 1). For these questions, each participant's answer was recorded verbatim and clarified, if necessary, for accuracy. General categories characterizing the responses for open-ended questions were not determined in advance; rather, general themes were identified to classify these responses once all of the data had been collected. These themes, detailed in Table 1, included an other option for responses that did not fit an identified common theme.

Statistical Analysis

Survey data was entered into SPSS version 20 (SPSS Inc., Chicago, Illinois). This program was then used to provide descriptive statistics on urban adolescents' attitudes toward text messaging programs and nonresponsive behaviors.

RESULTS

Sample Characteristics

Participant characteristics are detailed in Table 2. Of the 50 girls in the DepoText intervention group, 41 (82 %) were eligible for phone interview. Of these, 25 (61 %) were interviewed. All participants were African-American girls aged 16–22. The majority (92 %) had health insurance.

A review of cell phone use habits revealed that the overwhelming majority of participants had cell phone plans with unlimited text messaging (92 %), unlimited monthly minutes (84 %), and unlimited internet access (96 %). The average monthly cell phone bill payment was \$73.41 (standard deviation \$34.19, range \$36.00–\$150.00), which most participants paid by themselves (44 %) or by splitting the cost with their parents (28 %). Five cell phone providers supplied service to 88 % of participants: Boost (24 %), Sprint (24 %), Cricket (16 %), T-Mobile (12 %), and AT&T (12 %) (Table 3).

TABLE 1 Categories selected for answers to open-ended questions

Can you tell me why you decided to join the DepoText study?	
Category	<i>n</i> (%)
Reminder function of messages	13 (52)
General interest in study	4 (16)
Personal connection with clinic staff member	2 (8)
Ease of texting	2 (8)
Money	1 (4)
Other	3 (12)
Have the text messages made you feel more connected to the clinic? If so, how?	
Category	<i>n</i> (%)
Reminder function of messages	16 (64)
Encouraged personal responsibility for my health	3 (12)
Informative messaging	2 (8)
Ease of texting	2 (8)
Personal connection with clinic staff member	1 (4)
Other	1 (4)
Are there other ways that you think cell phones or the internet could be used to help you manage your health?	
Category	<i>n</i> (%)
Online appointment scheduling	1 (4)
Email reminders	1 (4)
Smartphone app	1 (4)
Text messaging for all appointments	4 (16)
Other	2 (8)
No suggestion given	17 (65)

TABLE 2 Participant characteristics

Characteristic	Participants (<i>n</i> =25)
Age	Age <i>n</i> (%)
Mean (years (SD))	18.9 (1.6)
16–20	17 (68)
20–22	8 (32)
Race/ethnicity	<i>n</i> (%)
African-American	25 (100)
Employment status	<i>n</i> (%)
Employed	10 (40)
Unemployed	15 (60)
Wage data ^a	\$ (SD)
Hourly wage	8.93 (1.48)
Hours worked per week	25.9 (11.3)
Gross monthly income	1030.79 (541.60)
Health insurance status	<i>n</i> (%)
Insured	23 (92)
Uninsured	2 (8)

^aCalculated only for participants who were employed (*n*=10 participants)

TABLE 3 Participants' cell phone characteristics

Characteristic	Participants (<i>n</i> =25)
Cell phone plan features	<i>n</i> (%)
Unlimited text messaging	23 (92)
Unlimited monthly minutes	21 (84)
Unlimited internet access	24 (96)
Monthly cell phone bill	\$
Average (SD)	73.41 (34.19)
Cell phone payer	<i>n</i> (%)
Self	11 (44)
Parents	4 (16)
Split (self and parent)	7 (28)
Other	3 (12)
Cell phone provider	<i>n</i> (%)
Boost	6 (24)
Cricket	4 (16)
Sprint	6 (24)
T-Mobile	3 (12)
AT&T	3 (12)
Unknown/unidentified	3 (12)

Nonresponsiveness During the Trial Period

Survey respondents' cell phone habits during the DepoText trial period are detailed in Table 4. During the trial period, participants responded to appointment-related messages 76 % of the time and to reproductive health messages 68 % of the time. Most participants (80 %) attributed instances of nonresponse to being away from the phone or to a personal conflict such as school or work. However, survey data demonstrated that service interruption due to bill nonpayment (44 %), phone loss (28 %), and cell phone number change (28 %) were substantial barriers to continued coverage during the trial period. Importantly, 28 % of participants recalled having to choose between paying their cell phone bill and another bill (such as rent) during the trial period, and 24 % changed their cell phone service provider during this time. A smaller number of participants ran out of minutes (12 %) or were low on their allowed text messages (12 %) during the trial period.

Economic Impact

While only the minority (36 %) of participants were employed, most participants (72 %) contributed to monthly cell phone payments. Among those who were employed, the mean number of hours worked per week was 25.9 (SD 11.3), and the mean gross monthly income earned was \$1,030.79 (SD \$541.60). The mean hourly wage was \$8.93 (SD \$1.48).

Many participants stated that the downturn in the economy made it more difficult to maintain their cell phone, and 28 % recalled having to choose between cell phone and other payments during the trial period. Nevertheless, most (88 %) participants considered their cell phone a "need" rather than a "want."

DepoText Text Messaging Program: Patient Satisfaction

Individual interviews and open-ended questions highlighted patient satisfaction with respect to the text messaging program on a more personal level: 100 % of

TABLE 4 Text messaging responsiveness during the DepoText trial period

Characteristic	Participants (<i>n</i> =25)
Text message response rates	% (SD)
Appointment-related messages	76 (0.32)
Other messages	68 (0.24)
Reason for nonresponsiveness	<i>n</i> (%)
Missed message, did not have cell with me	7 (28)
No reason	8 (32)
Poorly timed/busy	5 (20)
Other	5 (20)
Event during the DepoText trial period	<i>n</i> (%)
Ran out of minutes	3 (12)
Low on text messages	3 (12)
Service was cancelled	11 (44)
Had to choose between paying cell phone and other bills (e.g., rent)	7 (28)
Lost my cell phone	7 (28)
Got a new cell phone number	7 (28)
Cell phone was turned off	2 (8)
I changed my plan to calls only	1 (4)
I changed my service provider	6 (24)
Missed office visits	<i>n</i> (%)
Missed at least one visit	9 (36)
Did not miss any visits	16 (64)

participants were satisfied with the program, and 96 % felt more connected to the clinic due to receipt of the text messages. The majority (64 %) attributed this sense of connectedness to the reminder function of the messages, while others felt that the messages encouraged personal responsibility to arrange and attend family planning visits, and many reported forming a stronger personal connection with clinic staff.

DISCUSSION

The objective of our study was to better understand the factors that influence adolescents' nonresponsiveness to text messaging to determine the viability of using a text message-based program to communicate with adolescent patients in an urban pediatric/adolescent medicine practice actively using family planning services. Our findings are based solely on the results of structured interviews conducted between October 2011 and February 2012 with participants selected from the intervention arm of the DepoText Trial who demonstrated less-than-perfect responsiveness to text messaging during the trial period. Through a survey containing open- and closed-choice questions, participants assessed their satisfaction with the program, clarified possible explanations for nonresponsiveness to text messages, and verified that they have access to cell phone technology and use text messaging as a preferred means of communication. Our results indicate that a text messaging program can be a useful tool to promote clinic connectedness and patient satisfaction in an urban pediatric and adolescent practice, despite teens' periodic nonresponsiveness to text messaging.

Access

The potential success of clinical text messaging interventions is inherently limited by adolescents' access to and ownership of cell phones, as well as avid use of cell phone technology. If teens do not own or use their cell phone routinely, a text messaging program is doomed to fail. However, recent reports confirm that today's teens have ample access to cell phones: according to the AT&T Mobile Safety Study, today's American teenager receives her first cell phone at age 12¹¹ and her first smartphone at age 13.8.¹⁰ Other reports have found that 77 % of teens aged 12–17 own a cell phone¹¹ and 51 % of high school students carry a smartphone with them to school daily.¹²

Teens' access to cell phones within our study population was verified during the enrollment phase of the DepoText trial, in which 95 % of the 116 girls ($N=110$) who were approached for the study were deemed eligible (i.e., were using Depo-Provera[®] and had a cell phone for their personal use), and recruitment target/pilot capacity was reached within 3 months of study enrollment.⁶ Furthermore, our study confirmed that teens' cell phones tend to be "fully loaded" with respect to plan details and features: nearly all of the youth in our survey population owned cell phones with unlimited text messaging (92 %), unlimited monthly minutes (84 %), and unlimited internet access (96 %) features. The availability and accessibility of cell phones to adolescents, as well as associated plans and features, render today's teens more connected to technology than any other generation before them.

While today's teenagers are increasingly more connected to cell phone technology, it is true that ownership of cell phones varies by race and socioeconomic status. A recent Pew survey found that among all adolescents, White teens are more likely to own a cell phone than their Black and Latino counterparts (81 vs. 72 and 63 %, respectively). Similarly, children of parents in the highest-income bracket (\$75,000/year) are significantly more likely to have cell phones than those in lower-income households.¹¹ However, below \$75,000/year, there is no significant correlation between decreasing household income and ownership of cell phones, suggesting that these families are able to afford cell phones for their children regardless of annual income, either because families prioritize this expense above others or because parents find an alternate source of cash flow to pay for their teenagers' cell phones.¹¹ Our findings suggest that teens in low-income families may be contributing to the payment of their cell phone bills: of our survey respondents, 72 % stated that they paid their monthly cell phone bill, either on their own (44 %) or by splitting it with a parent (28 %). Moreover, teens' contributions to the payment of their cell phone bills did not depend on their employment status; while our study did not examine the methods of payment for cell phones among unemployed youth, it is important to keep in mind that youths acquire funds from sources other than working (e.g., gifts, allowance, noncustodial parent, SSI) and it may be that today's teens are utilizing these funds to subsidize their cell phone payments. This behavior suggests that cell phones are viewed as essential tools in their lives, a conclusion that is supported by our finding that nearly all of the youths in our survey (88 %) view having a cell phone as a need rather than a want, while only 44 % stated that the downturn in the economy has affected their ability to maintain cell phone ownership.

Despite growing trends in cell phone ownership among today's youth, barriers to cell phone ownership do exist, and these barriers must be recognized when formulating an effective cell phone-based program in clinical practice and research studies. Nearly half of our survey respondents experienced cancellation of their service during the trial period, cutting off their communication with the study team,

and preventing them from receiving trial-related text messages. One in four survey respondents reported having to choose between paying their cell phone bill and another bill (such as rent), losing their cell phone, obtaining a new number/changing service provider, or turning their phone off for an extended period of time during the trial period. Finally, a large portion (40 %) of youth in our study obtained cell phones from pay-as-you-go providers (such as Boost, Cricket) that require payment on an as-needed basis; as a result, survey respondents reported some subjective inconsistency with being able to make these payments in a timely fashion.

Attitudes toward Text Messaging

Having established that today's teenagers have access to cell phone technology and identifying potential barriers that exist, the next step in implementing an effective clinical text messaging program is to determine if teens use the text messaging feature on their cell phones as a primary means of communication. A Pew survey reports that, in fact, text messaging is increasingly becoming the preferred method of communication for teenagers: overall, adolescents are sending many more text messages than they did even 5 years ago.¹¹ The median number of texts sent by teens (aged 12–17) on a typical day rose from 50 in 2009 to 60 in 2011; moreover, older girls remain “the most enthusiastic texters,” with a median 100 texts/day in 2011 (compared with 50 texts/day for age-matched boys). Perhaps of more importance for our purposes, when stratified by text message frequency, African-American, Latino, and low-income teens were among the heaviest texters, sending over 100 texts/day on average.¹¹ Moreover, when questioned about their methods of communicating with others in their lives, teens consistently reported that text messaging was their preferred method: 63 % reported texting every day with others, while only 39 % placed phone calls daily, 35 % socialized face-to-face, and 6 % emailed regularly.¹¹

Understanding Nonresponsiveness

While we have strong data to suggest that teens value cell phones as essential communication tools in their lives and prefer to use text messaging to communicate with their friends and loved ones, we lack an understanding of teens' nonresponsiveness to text messages and the implications of this behavior for developing effective clinical text messaging tools. Our survey aimed to better understand nonresponsiveness as it relates to the efficacy of a text messaging program and to identify reasons for nonresponse. It is worth noting that among our survey responders, overall text message response rates were high: youth responded to appointment-related and health messaging texts 76 % and 68 % of the time, respectively. We found that in general, when youth did not respond to texts, this nonresponsiveness had an explanation: when asked about this behavior, 80 % of the youth could identify a reason for nonresponse. These reasons included, but were not limited to, being away from their cell phone at the time the message was sent, a personal conflict (such as school or work), or “just not responding.” Most importantly, the rate of nonresponsiveness was not correlated with attendance at family planning appointments (i.e., nonresponders were not more likely to miss appointments than perfect responders), and nearly two thirds of participants attended all of their scheduled family planning visits when scheduled. Thus, our findings suggest that when teens are otherwise preoccupied (with work, school, family commitments, or socialization) or away from their cell phones, they may not reliably respond to text messages. However, teens' nonresponsiveness to text

messages does not imply that they are not reading and benefitting from the messages that we are sending, at least with respect to clinic attendance.

Clinic Connectedness

Interviews with our survey respondents revealed an unexpected benefit of a text messaging program in clinical practice: the ability of such a program to enhance youth's sense of connectedness to a family planning clinic and their health care providers. This is an incidental finding of our study yet is encouraging and warrants further exploration. When asked directly if the text messaging program made the youth feel more personally connected to our clinic, an overwhelming 96 % replied "yes." The youths were then given the opportunity to explain this sense of connectedness in their own words, which allowed us to obtain a cursory understanding of this relationship. Many respondents stated that the reminder function of the text messages made them feel more personally connected to the clinic and that the text messaging platform provided them with an easy, user-friendly method of communicating with clinic staff members. One respondent noted that she felt more connected to clinic staff via the text messages, stating "If [the clinic nurse] is taking the time to text me about my appointments, she must care enough about me to make sure I show up for them." Others added that the text messages encouraged a personal sense of responsibility for their family planning appointments, noting that the text message reminders eliminated the need for parental involvement in their appointment planning, and made it easier for the youth to manage their own schedules on their own time.

Limitations

The findings from this study should be considered in light of several general limitations. First, this study was conducted with adolescent and young adult women actively using contraception and enrolled in a randomized texting trial. Participants also derive from a single practice in a low-income urban community, and so findings may not be generalizable to other dissimilar populations or groups. However, the development of novel cost-effective strategies to address high teen pregnancy rates is critical for reducing health disparities in this population, so the narrow focus is warranted. The overall sample was also drawn from the intervention arm of a small feasibility and acceptability trial, and so sample size may have limited our ability to further stratify to identify differences between nonresponders. However, the nonresponders in this arm represented most eligible intervention arm participants (61 %) and are likely representative of the girls within this population. Use of qualitative and descriptive data does not allow for inferences related to causality, but this is the first data, to our knowledge, that specifically explores nonresponsiveness and costs of maintaining cell phone connectivity for low-income urban youth.

CONCLUSIONS

Today's youths are increasingly more connected to technology, including cell phones, social media, and instant messaging. The utility of text messaging programs in clinical practice has been explored elsewhere with respect to clinical outcomes. However, an understanding of youth's text messaging behaviors has yet to be fully understood. Through structured interviews with participants in the DepoText trial, we determined that nonresponsiveness to text messages has reasonable explanations that do not undermine the justification for using technology to reach adolescents in

clinical practice and help us further determine practical applications that are acceptable to youth. Moreover, we confirmed that low-income urban youths have access to cell phones and use text messaging as a preferred method of communication with others in their lives. Further, text messaging programs may provide an added value to clinical service delivery by enhancing a sense of personal connectedness to clinic and encouraging personal responsibility. These findings merit further exploration in larger trials across cultural, economic, and geographic groups for broader application of technology integration.

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