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Feasibility and Acceptability of a Text Messaging Program for Smoking Cessation in Israel

Lorien Abrams, ScD¹, Ronit Hershcovitz, MPH², Ashley Boal, PhD¹, and Hagai Levine, MD, MPH²

¹The George Washington University School of Public Health and Health Services

²Braun School of Public Health and Community Medicine, Hebrew University-Hadassah, Jerusalem, Israel

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INTRODUCTION

Around the world, tobacco use is the leading preventable cause of death and is associated with disability and disease burden (Mokdad, Marks, Stroup, & Gerberding, 2004; World Health Organization (WHO), 2009; Centers for Disease Control, 2008). Despite the health and economic consequences associated with smoking (Max, 2001; Levine et al., 2012), 20.9% of Israeli adults, including 30.1% of Israeli young adults, smoke cigarettes (WHO, 2011).

One novel approach for promoting smoking cessation that has garnered empirical support is the delivery of smoking cessation programs through automated text messages on mobile phones (Free et al., 2011; Free et al., 2013; Whittaker et al., 2012). These programs send text messages (also known as “SMS”, an acronym for Short Message Service) to a user’s cell phone that provide advice, information and encouragement on quitting smoking (Whittaker et al., 2012; Abrams et al., 2012; Free et al., 2011; Free et al., 2013; Ybarra, Holtrop, Prescott, Rahbar, & Strong, 2013a; Ybarra et al., 2013b; Ybarra, Ba ci Bosi, Korchmaros, & Emri, 2012). A recent meta-analysis concluded that such programs almost double a user’s long-term chances of quitting (Whittaker et al., 2012). Additionally, leading guidelines now recommend mobile phone based cessation programs as a tool for smoking cessation (Community Preventive Services Task Force, 2011).

Address for correspondence: Hagai Levine, Braun School of Public Health and Community Medicine, Hebrew University-Hadassah Faculty of Medicine, P.O Box 12272, Kiryat Hadassah, Ein Kerem, Jerusalem, Israel 91120, Tel: +972-2-6777452, Fax: +972-2-6431086, hlevine@hadassah.org.il.

Ethical Standards:

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Conflict of Interest Disclosures:

There are no competing interests for any of the manuscript authors.

While smoking cessation text messaging programs are available nationally to smokers in some countries including Australia, England, and the US and have been studied in additional countries including Turkey (Ybarra et al., 2013b), they are not available in most parts of the world. Given the widespread use of mobile phones globally (International Telecommunication Union (ITU), 2010; 2013), these programs may be useful in other geographic and cultural contexts, including Israel where 91% of adults own a cell phone (Central Bureau of Statistics (CBS), 2012).

Recently, the WHO spearheaded a new effort to disseminate internationally mobile-phone based programs aimed at smoking cessation and other non-communicable diseases (WHO, 2013a; WHO, 2013b). One resource that was made available by the US Department of Health and Human Services as part of this initiative was the message library for QuitNowTXT. QuitNowTXT is a text messaging program that is modeled on the US program SmokefreeTXT which is offered through smokefree.gov (NCI, 2013; Smokefree.gov, 2011). Both programs consist of a series of text messages with tips, motivation, facts, and encouragement about quitting smoking that are timed around the user's quit date.

The current study aimed to adapt QuitNowTXT for Israeli smokers in order to determine the feasibility and acceptability of a text messaging program in Israel. The results of this study—the first study of a QuitNowTXT adaptation—can inform cultural adaptations of the program in other countries and the future scaling up of the program in Israel.

METHODS

The study was approved by the Hadassah Medical Center IRB committee. To recruit participants, an email advertisement was sent to employees at the Hadassah Medical Center in Jerusalem and students at all campus locations of Hebrew University, together approximately 35,000 individuals, in the summer of 2012. In addition, a flyer for the study was posted in the Ein Kerem campus of Hadassah Medical Center and on the Medical Center and Israel Cancer Association website. Two hundred and seventy individuals contacted the research team for more information about the study. The research team screened individuals for eligibility over the phone or by email. Eligibility criteria included being at least 18 years of age, smoking at least five cigarettes per day, having a cell phone to send and receive text messages, speaking Hebrew fluently, reading English at an intermediate or higher level, and reporting a willingness to try to quit smoking in the “near future”. Pregnant women were excluded as participants.

To ensure that a variety of experiences with iStopSmoke were captured, an enrollment target was set at 40 participants. The first 40 participants who were eligible and interested in participating provided informed consent and were enrolled in the study. Participants did not receive any financial compensation for participation and could withdraw from the program and/or the study at any point.

Participants were informed that they would be given a text messaging program developed in the US and adapted for Israelis. Participants were interviewed at baseline and at 2 and 4

weeks post-quit date. A trained interviewer (RH or HL) conducted each assessment in person or over the phone when in-person assessment was not possible ($n = 5$ for second interview, $n = 12$ for third interview). All interviews were conducted in Hebrew.

Procedure for adaptation of QuitNowTXT

The iStopSmoke program was developed by the research team (LA, HL, and RH) with assistance from InField Health, a US text messaging company that had the contract for SmokefreeTXT, the program upon which QuitNowTXT is closely modeled. The research team modified the content of the QuitNowTXT message library (Smokefree.gov 2011). While the content of messages was modified, the program architecture, including message frequency and timing, were not altered from the original QuitNowTXT formulation so that the program could run using the SmokefreeTXT computer architecture. The first round of modifications conducted by the research team consisted of changing factual information to fit the Israeli context. It included changing the program name to iStopSmoke, and substituting resources, recommendations to services, and medication information with Israeli-specific information. A second round of changes were made to improve the cultural fit of messages and included changes in language style and tone and recommendations to likely Israeli activities and practices (e.g., substitution of “Try kick boxing” with “Try taking a walk”). Changes also addressed message clarity (e.g., altering the welcome message to be more descriptive of the program).

While Hebrew is the official language of Israel, English was maintained as the language of iStopSmoke because it saved the project time and eliminated some start-up costs. While the long-term vision for iStopSmoke was a program in Hebrew, the English formulation was considered adequate for the pilot because English is the de-facto second language of Israel and many Israelis have a high level of English fluency. Nonetheless, as part of the cultural adaptation, Hebrew words using English alliteration were occasionally sprinkled throughout messages (e.g., the Hebrew word “B’Hatslacha” was used instead of “Good Luck”).

The revised message library was given to InField Health and within a few days, the iStopSmoke program was up and running in Israel. Once the program was up and running, the program was pretested for 2 weeks by members of the research team and Israeli key informants ($n = 2$) including an Israeli government health official who worked on tobacco control and a colleague at Hebrew University. Each member of the research team in Israel (LA, HL, RH) checked on the technical fidelity of the program. Each member checked and confirmed that every scheduled message was delivered as planned over the 2 week period and that interactive elements of the program were also functioning. Additionally, messages were re-reviewed for clarity. Additional minor revisions were made before beginning the pilot. Pretesting of message content with participants did not occur prior to the pilot test.

As previously noted, the timing, frequency, and message architecture were not altered from the original formulation in QuitNowTXT (Smokefree.gov 2011). As with QuitNowTXT, iStopSmoke participants were sent 2 to 4 text messages per day after enrollment. Also like QuitNowTXT, the iStopSmoke program offered tips, motivation, facts, and encouragement about quitting smoking timed around the quit date. Some messages prompted interaction by asking questions. For example, on the quit date, participants received a text message which

asked whether a participant had quit smoking, and then, depending on his/her reply gave additional advice via SMS. Participants were also able to engage with the program by texting various keywords to gain additional help, and the original keywords from QuitNowTXT were maintained (such as CRAVE, SLIP, MOOD, etc). For example, when participants were experiencing a craving, they could text CRAVE to get help overcoming the craving. Participants were also informed that they could unsubscribe from the program at any time by sending the keyword STOP. For sample messages, see Table 1.

For this feasibility study, participants were required to set a quit date 1 to 7 days after enrollment, with no option to re-schedule their quit date. Text messages were sent to participants for 30 days after their quit date.

Measures

Measures for this study were derived from computer records of use of the iStopSmoke program, and from the baseline survey and 2- and 4-week post-quit date surveys. The baseline survey included the collection of demographic and smoking characteristics of participants. Nicotine dependence was measured on the baseline survey with the Fagerstrom Test for Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). The FTND is a commonly used measure of nicotine dependence that utilizes information such as the time from waking to first cigarette, smoking when ill, and difficulty refraining from smoking in places where smoking is not allowed. These, and other items, are used to develop a nicotine dependence score that can range from 0, indicating no dependence, to 10, indicating high dependence (Heatherton et al., 1991).

The primary outcome measure of interest was self-reported smoking in the past 7 days (Hughes et al., 2003) assessed at the 2- and 4-week follow-ups. Specifically, at each of the follow-up assessments participants were asked if they had smoked, even a drag, over the past seven days. Participants were also asked how many cigarettes they had smoked over the past week and whether they had made a 24-hour quit attempt during the intervention period.

The technical fidelity of the program was assessed by a researcher (RH) observing the in-person enrollment process in order to confirm that each participant was able to receive the enrollment SMS messages on his/her cell phone after enrolling. Additionally, participants were asked on the 2- and 4- week follow-up if they had experienced any technical problems.

Program use was measured on the 2 and 4 week follow-up surveys with an item assessing the proportion of messages a participant read. In addition, computer records were analyzed to measure to what extent participants participated in the interactive elements of the program. The specific keywords and total number of keywords and responses to program queries were assessed over the period of enrollment. One keyword of interest that was analyzed was use of the keyword STOP which indicated that a participant had unsubscribed from the text message service.

Program satisfaction was measured with items that assessed whether participants felt that they received the appropriate number of texts, whether the texts came at appropriate times in the day, and whether they were satisfied with the program as a whole (e.g., "The program

gave me good ideas how to quit”; “I would recommend the texts to a friend.”). Items assessing satisfaction with the program were rated on a 5-point scale ranging from “Strongly Disagree” to “Strongly Agree”.

Participants were also given the opportunity to respond to open-ended items regarding what they liked and disliked about the program, as well as provide suggestions for improvement. Open-ended items assessing liking and disliking were asked at the 2-week follow-up assessment.

Analysis

Baseline characteristics of study participants were explored. The proportion of participants who reported abstinence from smoking in the past 7 days at the 4-week follow-up was evaluated using an Intent-to-Treat analysis (ITT) such that those with missing data were assumed to still be smoking. Change in the number of cigarettes smoked per day was evaluated, as well as a descriptive examination of program use and satisfaction. Responses to closed and open-ended items requesting feedback to improve the iStopSmoke program were categorized based on their content. All analyses were completed with SPSS Version 21.

RESULTS

Forty participants were enrolled in the study. Of these, two participants were excluded immediately after enrollment because it was found that their cell phones could not receive program related texts, which were sent from the US. The final sample consisted of 38 participants. Of the 38 participants, 78.9% ($n = 30$) responded to the 2-week follow-up survey and 59.9% responded to the 4-week follow-up survey ($n = 22$).

Participant Baseline Characteristics

Characteristics of participants were examined ($n = 38$) (see Table 2). The majority of participants were female ($n = 21$, 55.3%). On average participants were 31.8 ($SD = 9.5$) years of age and ranged from 22 to 59 years of age. Most participants were born in Israel ($n = 27$, 71.1%) and were single ($n = 26$, 68.4%). The vast majority of participants ($n = 36$, 94.7 %) indicated they have a high or very high ability to read and understand English. More than half of the participants were students ($n = 21$, 55.3%), followed by Hadassah Medical Center employees ($n = 8$, 21.1%) and other ($n = 9$, 23.7%). Nearly every participant reported having more than a high school education ($n = 36$, 94.7%). The majority of the participants ($n = 28$, 73.7%) owned a smartphone. On average, participants reported 4.0 ($SD = 3.8$) previous quit attempts and smoking 83.9 ($SD = 49.9$) cigarettes per week. The average FTND score among participants at baseline was 3.5 ($SD = 2.3$). The chosen quit date was on average 3.5 days post-enrollment ($SD = 2.8$).

Smoking Outcomes

At the 4-week follow-up, assuming those who were lost-to-follow-up were smoking, nearly one-quarter of participants reported they had not smoked a cigarette in the past 7 days (23.7%; 95% CI = 10.2–37.2%) (see Table 3). Further, of those who completed the 4-week follow-up assessment ($n = 22$), the average number of cigarettes smoked per week decreased

from 83.7 cigarettes per week ($SD = 46.0$) at baseline to 24.4 cigarettes per week ($SD = 40.2$) at follow-up ($p < .001$). The vast majority of participants reported that they made at least one 24-hour quit attempt during the intervention period at 2 (96.7%) and 4 (90.0%) weeks follow-up.

Technical Fidelity and Program Use

One quarter of participants (23.3% at 2 weeks) reported technical problems related to sending in keywords or making responses, but no participants reported difficulties receiving the messages. Based on an analysis of program computer records, participants sent in on average 12.9 keywords (e.g. sending in via SMS the keyword CRAVE) or survey responses (e.g. "Did you quit today?") over the course of program enrollment. The most common keyword used was CRAVE, which was utilized on average 4.5 times per participant, followed by MOOD ($M = 0.9$) and SLIP ($M = 0.8$).

Most participants reported reading most or all of the messages sent. At 2-weeks, 90.0% reported reading most or all of the messages and at 4-weeks, 75% reported reading most or all of the messages. Of the 38 participants, 34.2% ($n = 13$) unsubscribed from the program using the keyword STOP by the time of 4-week follow-up. Top reasons for unsubscribing, in order of prevalence, were failed quit attempt, not being ready to quit, and having already quit smoking.

Program Satisfaction

The majority of participants indicated that they were satisfied with message frequency and timing. Sixty-three percent of participants ($n = 19$) agreed or strongly agreed that they received the appropriate number of text messages each day. Eighty-six percent ($n = 25$) agreed or strongly agreed that the text messages were received during the appropriate time of the day. At 4 weeks, about two-thirds of participants agreed or strongly agreed that they would recommend the program to a friend ($n = 15$, 68.2%), the program helped them quit smoking ($n = 14$, 63.6%), and that the program made them feel that someone cares if they stop smoking ($n = 12$, 60.0%). Additionally, 45.0% ($n = 9$) of participants agreed or strongly agreed that the program gave them good ideas on how to quit.

Participant Suggestions for Program Improvement

At the 2-week follow-up assessment, participants ($n = 30$) volunteered reasons they liked and disliked the program. Participants explained that they liked the program because the messages reminded them that they were trying to quit smoking ($n = 17$, 56.7%), the program gave them a framework for quitting ($n = 15$, 50.0%), the program helped them set a quit day ($n = 8$, 26.7%), and the program made them feel that they were not alone ($n = 4$, 13.3%). Negative aspects of the program offered by participants included that the tips for getting through cravings were impractical ($n = 20$, 66.7%), the content was not always consistent or purposeful ($n = 16$, 53.3%), the messages did not encourage them to stop ($n = 4$, 13.3%), the message content was too repetitive ($n = 4$, 13.3%), the messages themselves reminded them of smoking ($n = 3$, 10.0%), and the messages did not provide them with new information ($n = 3$, 10.0%).

Participants also provided suggestions for program improvement ($n = 30$). The most frequent suggestion for improvement was to add advice from a smoking cessation counselor or expert ($n = 25$, 83.3%). Participants indicated that this could be done through a forum or chat website, through SMS, over the phone, or face-to-face. Another suggestion included adding website support ($n = 19$, 63.3%) such as information on quitting, games, or a social forum to talk with others who are quitting. Additionally, participants suggested increasing customization by sex, age, triggers, and hobbies ($n = 12$, 40.0%), improving the content ($n = 7$, 23.3%), and adding additional interactivity to the texts ($n = 6$, 20.0%). Further, 60.0% ($n = 18$) indicated additional keywords would be valuable. Suggestions for these keywords included SOCIAL for use when experiencing cravings at social gatherings, NERVOUS for use when having cravings related to feeling anxious, and ALCOHOL for use when drinking.

DISCUSSION

These findings provide some support for the feasibility and acceptability of iStopSmoke and, with the suggested improvements and technical improvements, the program may be promising. Overall, program use was mixed and satisfaction moderate. Engagement was high in terms of readership and use of interactive features, but nearly one-third of the participants requested that the text messages be stopped prior to the conclusion of the study. Participant ratings of program satisfaction at the 4-week follow-up indicated that approximately two-thirds of participants agreed that the program was helpful and they would recommend the program to a friend, but less than half agreed that the program gave good ideas on how to quit. Overall, these results strengthen the evidence base that these programs are both feasible and acceptable in Middle Eastern settings (Ybarra et al. 2013b).

Participants reported several aspects of the program that they liked including that the program provided reminders about quitting and a framework for quitting. When asked what they disliked about the program, participants described thinking that some of the tips were impractical, that the content was not always purposeful, and that some of the content from the program was repetitive. These areas should be addressed in future refinement of the iStopSmoke program. Further, participants provided useful suggestions for program improvement, most of which centered on increasing connections to other sources of support, customization, and interactivity.

Although about one-quarter of participants experienced technical problems related to interactive features, most of these were related to having a SMS provider out of the country and could be addressed by contracting a SMS provider within Israel, and/or doing additional testing of the program across cell phone providers.

Strengths of this study include that it makes use of a resource released by the US Department of Health & Human Services in collaboration with the World Health Organization for the dissemination of mHealth smoking cessation programs, QuitNowTXT, and represents the first study of a QuitNowTXT adaptation in a new cultural context (WHO, 2013a). Weaknesses include that the program was offered in English and therefore participants may have had difficulty understanding some of the messages even with moderate to high English proficiency. Another limitation was that technical fidelity was

measured through self-report of technical problems by participants at the 2- and 4-week follow-up surveys. It may have been that some participants did not realize that they were experiencing technical problems and therefore technical problems may be under-reported. While we pretested messages with key informants, we did not pretest with the targeted smokers. However, this pilot was aimed at gathering feedback regarding the content and structure of the iStopSmoke program and this feedback will be incorporated into the future development of the program. Additionally, the sample size was small and largely limited to people affiliated with a large Medical Center or university, reducing generalizability to the Israeli population of smokers as a whole. Future studies should not only evaluate a revised program, but also aim to extend the sample to be more inclusive of diverse individuals in Israel.

This study documents the adaptation of the QuitNowTXT program in Israel and pilot test with a sample of Israeli smokers. Findings suggest that iStopSmoke was feasible and could be, with some additional revisions, acceptable to smokers in Israel. This study served as a proof of concept that contributed to the raising of funds from the Israel Cancer Association and the Israeli Ministry of Health to develop an Israeli SMS smoking cessation program in Hebrew, which is currently underway and planned to launch in the near future. The experience adapting and pilot testing the program can serve a model for others interested in using the QuitNowTXT text messaging library or other SMS program for smoking cessation to develop and implement such programs in other countries.

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Table 1

Sample Messages

Timing of message in relation to quit date (QD)	Message
QD-5 days	iStopSmoke: Reach out for help to overcome your cravings. Call a supportive friend, a quit counselor, or fellow quitter. Reply CRAVE for more tips.
QD-1 day	iStopSmoke: Almost the big day! Toss your pack in the trash before you go to bed tonight, and get plenty of sleep. Tomorrow its ON! “lehairn!”
QD	iStopSmoke: Text your supporters & remind them of your big day. Make sure they have your back. We do! Text back CRAVE, MOOD, or SLIP for more support anytime.
QD+5 days	iStopSmoke: Having a hard time with cravings? Don’t be shy about asking for help. Call your “Kupat Holim” or visit this website: www.cancer.org.il

Table 2

Baseline participant demographics (n = 38)

Gender	
Female	21 (55.3%)
Male	17 (44.7%)
Mean age	31.8
(<i>SD</i>)	(<i>SD</i> = 9.5)
(Range)	(Range = 22–59)
Country of birth	
Israel	27 (71.1%)
Former Soviet Union	8 (21.1%)
Other	3 (7.9%)
Relationship status	
Single	26 (68.4%)
Married	9 (23.7%)
Widowed	2 (5.3%)
Divorced	1 (2.6%)
English language proficiency	
Very High	29 (76.3%)
High	7 (18.4%)
Intermediate	2 (5.3%)
Employment	
Student	21 (55.3%)
Hadassah Medical Center employee	8 (21.1%)
Other	9 (23.7%)
Education	
More than a high school education	36 (94.7%)
Completed high school	2 (5.3%)
Less than a high school education	-
Mean past quit attempts (<i>SD</i>)	4.0 (3.8)
Mean cigarettes per week (<i>SD</i>)	83.9 (49.9)
Mean age of initial smoking (<i>SD</i>)	18.4 (3.4)
Mean Baseline nicotine dependence (FTND) (<i>SD</i>)	3.5 (2.3)
Presence of 1 or more smokers in household	16 (42.1%)
Ave # of texts sent per week (<i>SD</i>)	87.9 (95.1)
Has a data plan for sending SMS (%) ^f	28 (75.7%)

Owens a smartphone (%)	28 (73.7%)
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Notes.

¹Due to missing data $n = 37$.

Table 3

Engagement and rating of the iStopSmoke program

	2 weeks (<i>n</i> = 30)	4 weeks (<i>n</i> = 22)
Smoking outcomes		
Not smoked in past 7 days ¹	11 (28.9%) ¹	9 (23.7%) ¹
Not smoked in past 7 days	11 (36.7%)	9 (40.9%)
Mean cigarettes smoked in last week (<i>SD</i>)	14.2 (24.5)	24.4 (40.2)
Made at least one quit attempt	29 (96.7%)	20 (90.9%)
Technical Fidelity and Program use		
Experienced technical problems in using keywords	7 (23.3%)	3 (15.0%) ²
Read most/all texts	27 (90.0%)	15 (75.0%) ²
Average texts sent by participant to computer system (<i>SD</i>)	-	12.90 (11.02) ³
Unsubscribed from texts	10 (26.3%) ³	3 (7.9%) ³
Program Satisfaction⁴		
Received the appropriate number of texts per day	19 (63.3%)	-
Texts sent at the appropriate time of day	25 (86.2%) ⁵	-
The program helped me quit smoking	13 (43.3%)	14 (63.6%)
The program gave me good ideas how to quit	7 (23.3%)	9 (45.0%) ²
The program made me feel that someone cared if I quit	16 (53.3%)	12 (60.0%) ²
I would recommend the program to a friend	23 (76.7%)	15 (68.2%)
Participants likes about program		
Messages reminded me about quitting smoking	17 (56.7%)	-
The program gave me a framework for quitting	15 (50.0%)	-
Program helped me set a quit date	8 (26.7%)	-
The program provided a feeling that I am not alone in the process	4 (13.3%)	-
I enjoyed the program's helpful messages	3 (10.0%)	-
Participant dislikes about program		
Tips were impractical	20 (66.7%)	-
The content is not purposeful	16 (53.3%)	-
Messages did not encourage me to stop	4 (13.3%)	-
Contents is repetitive	4 (13.3%)	-
Receiving the messages reminded me of smoking	3 (10.0%)	-
The messages did not give me new information	3 (10.0%)	-
Suggestions for Improvement		
Add smoking cessation counselor or expert	25 (83.3%)	-
Add website support	19 (63.3%)	-
Improve text customization	12 (40.0%)	-
Improve text content	7 (23.3%)	-

	2 weeks (<i>n</i> = 30)	4 weeks (<i>n</i> = 22)
Increase interactivity of program	6 (20.0%)	-
Add protocol for those who relapse	2 (6.7%)	-

Notes.

¹*n* = 38; missing assumed to be smoking.

²Due to missing data *n* = 20.

³Based on review of computer records for all enrolled participants (*n* = 38).

⁴% who “agree” or “strongly agree”;

⁵Due to missing data *n* = 29.