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Adolescents' Receptivity to E-Cigarette Harms Messages Delivered Using Text Messaging

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Abstract

Introduction—E-cigarette use among adolescents has dramatically risen since 2011, yet little research has tested e-cigarette harms messages among adolescents. We conducted a pretest-posttest pilot study to examine adolescents' receptivity to e-cigarette health harms messages delivered using text messaging.

Methods—*N*=69 adolescents were enrolled in an 8-day pretest-posttest text messaging study. Participants completed a pretest survey on day one, were texted one of three e-cigarette health harms messages per day on days two through seven, and completed a posttest survey on day eight (88% retention). We assessed message ratings at posttest and knowledge, thoughts, and beliefs about e-cigarette harms at pretest and posttest.

Results—Adolescents rated the three messages favorably, with both the chemical and brain messages scoring higher than the nicotine message on fear arousal and perceived message effectiveness. More than one-third of adolescents showed the messages to others and talked to others about the messages. At posttest, knowledge about the harms of e-cigarettes, thinking about the risks of e-cigarettes, and perceived risks of e-cigarettes were all significantly higher compared to pretest (p<.001). Participants largely adhered to the text messaging protocol and found the study highly acceptable.

Conclusions—This pilot study suggests that adolescents are receptive to e-cigarette health harms messages and that delivering such messages using text messaging is feasible and acceptable. Future research should systematically develop and test a broad set of e-cigarette health harms messages and examine their impact in a randomized controlled trial.

Keywords

E-cigarette; vaping; message; health; warning; text messaging

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1. Introduction

The U.S. Surgeon General has identified the increased use of electronic cigarettes and other vaping devices among adolescents as an urgent public health problem (Office of the Surgeon General, 2016). The percentage of high school students who have ever used e-cigarettes or other vaping devices increased from 4.7% in 2011 to 37.7% in 2015, while past 30-day use increased from 1.5% to 16% (Jamal et al., 2017). Starting in 2014, e-cigarettes became the most commonly used tobacco product by youth, and while past 30-day use declined to 11.3% in 2016, e-cigarettes remain the most used tobacco product among adolescents (Jamal et al., 2017).

Although experts largely agree that e-cigarettes are less harmful than combustible tobacco products (Bhatnagar et al., 2014; Chen, Bullen, & Dirks, 2017), these products still pose harms, especially for youth. These include the potential for respiratory harm (Grana, Benowitz, & Glantz, 2014; Palamidas, 2013), increased blood pressure (Office of the Surgeon General, 2016), and harms to brain development (Kamat & Van Dyke, 2017; Office of the Surgeon General, 2016). A recent meta-analysis demonstrated that adolescents who use e-cigarettes are at least three times more likely to initiate combustible cigarette use (Soneji et al., 2017). E-cigarettes thus have the potential to reverse decades of progress in reducing cigarette smoking among youth.

To date, we know little about whether messages about e-cigarette harms can discourage adolescents' use of e-cigarettes and, if so, what messages and delivery formats may be most effective. Some studies with young adults have examined the impact of text-only warning messages on e-cigarette advertisements (Mays, Smith, Johnson, Tercyak, & Niaura, 2016; Sanders-Jackson, Schleicher, Fortmann, & Henriksen, 2015). One study found that chemical and anti-industry warning messages on television advertisements lower e-cigarette cravings and reduce intention to purchase e-cigarettes (Sanders-Jackson et al., 2015). Another study found addiction warnings increase perceptions that e-cigarettes are harmful and addictive, but only when e-cigarette warnings were presented alone - not on print advertisements (Mays et al., 2016).

While the above studies on young adults show promise, work with adolescents is urgently needed, including harms messages that can be delivered outside the context of e-cigarette advertising or packaging. Text messaging is an effective way to reach adolescents: national data indicate that 90% of teens have a mobile phone, 70% have a smartphone (Pew Internet & American Life Project, 2015a), and texting is one of the most common phone functions used by adolescents (Pew Internet & American Life Project, 2015b). Texting is a promising means for delivering preventive health interventions to adolescents (Badawy & Kuhns, 2017), but little is known about the feasibility or acceptability of this practice for e-cigarette prevention. In this 8-day pilot study, we sought to examine adolescents' receptivity to e-cigarette health harms messages delivered to adolescents using text messaging.

2. Methods

2.1 Participants

Participants were drawn from a registry of adolescents originally developed from a national phone survey conducted by the Center for Regulatory Research on Tobacco Communication in 2014–2015 (Boynton et al., 2016). To draw an at-risk sample for this pilot study, we mailed letters and a $2 bill to a sub-sample of adolescents (n=200) who were susceptible to or had used any tobacco product at the time of the 2014–2015 survey. Those interested in participating went to our website and were screened for eligibility after entering their unique participant code provided in the letter. Inclusion criteria for this pilot study were: currently aged 14–18, had a smartphone, and agreed to send and receive text messages with us.

Two weeks after the original letter was sent, we mailed a second letter (with no cash) to adolescents who had not yet taken the screening survey. These recruitment efforts yielded 88 prospective participants who took the screening survey. Five were ineligible (one no smartphone, four did not want to send and receive text messages) and 14 were eligible but did not enroll. Thus, our final sample enrolled at pretest was N=69. Sixty-one participants completed the posttest survey (88% retention).

2.2 Study design and messages

Participants took a pretest survey online (day 1), were texted one e-cigarette harms message per day for six days (days 2–7), and took an online posttest survey (day 8). Since we used three messages across six days, participants were exposed to each message twice. Messages were randomized without replacement on days 2–4 and again on days 5–7. After each message was sent, we asked participants to text back “Y” to indicate receipt. When participants texted back, they received the following question: How much does this message discourage you from wanting to vape? (1=not at all, 2=a little bit, 3=a lot, 4=very much).

Our research team examined ~10 messages that had been used in prior research (Berry, Burton, & Howlett, 2017; Mays et al., 2016; Sanders-Jackson et al., 2015; Wackowski, Hammond, O’Connor, Strasser, & Delnevo, 2016), and chose three that focused on different health harms. The first message was an adaptation of the nicotine message the Food and Drug Administration (FDA) plans to disseminate on e-cigarette packaging and advertisements nationally in 2018 (“nicotine”). The second message was about harmful chemicals in e-cigarette liquid (“chemical”), and the third message was focused on the potential of nicotine in e-cigarette liquid to harm adolescent brain development (“brain”) (Office of the Surgeon General, 2016). Each message was presented as an image in a square format with white text on a black background (Table 2).

2.3 Measures

Message ratings – fear arousal and perceived message effectiveness (posttest)—Participants were shown the three e-cigarettes harms messages, one at a time, in the posttest survey. They were asked whether each message made them feel afraid of vaping (fear arousal) on a 5-point scale from “not at all” to “extremely.” Participants also answered a 3-item perceived message effectiveness scale which asked participants if they

thought each message: 1) made vaping seem unpleasant, 2) made them concerned about the health effects of vaping, and 3) discouraged them from wanting to vape. These items were all answered on a 5-point scale from “strongly disagree” to “strongly agree” (α=.92). Participants were also asked an open-ended question about how the messages could be made more effective in discouraging teens from vaping.

Message recognition (posttest)—Participants were shown 6 messages – the 3 messages sent throughout the week and 3 foil messages (also about e-cigarette harms) that they had not been exposed to. Participants were asked to select which messages were sent to their cell phone over the past week.

Message sharing (posttest)—Participants were asked who they showed or talked with about the messages sent to their cell phone (from a list of conversation partners), what they talked about (from a list of topics), how many conversations they had, and the valence that characterized most of the conversations - against, neutral, or in favor of using e-cigarettes (Hall et al., 2015).

E-cigarette knowledge (pretest and posttest)—E-cigarette knowledge items assessed content from each of the messages. Participants were asked if they knew e-cigarettes: 1) usually contain nicotine, an addictive chemical, 2) use liquid that contains harmful chemicals, and 3) may harm teen brain development. Participants answered “true,” “false,” or “don’t know.” Responses were dichotomized into correct (True) versus other (False or don’t know) answers.

E-cigarette and cigarette susceptibility (posttest)—E-cigarette susceptibility was assessed using 5 items (Pierce, Choi, Gilpin, Farkas, & Merritt, 1996; Strong et al., 2015); participants were asked, “do you think that…” followed by items such as “if one of your best friends were to offer you an e-cigarette or other vaping device, would you use it?” Cigarette susceptibility was assessed using this ‘best friend’ item only. Responses were on a 4-point scale from “definitely no” to “definitely yes.” Participants were susceptible if they answered anything other than “definitely no” to all of the questions.

Cognitive elaboration (pretest and posttest)—Cognitive elaboration (i.e., thinking about risks) was adapted from a previous measure (Brewer et al., 2016) and consisted of three items assessing how often participants thought about the dangers, harmful effects, and addictiveness of e-cigarettes and other vaping devices. Responses were on a 5-point scale from “not at all” to “very much.” Coefficient alpha was α=.84 (pretest) and α=.88 (posttest).

Perceived risks (pretest and posttest)—Perceived risks was adapted from an existing scale (Noar, Kelley, et al., 2017) and began with the stem, “If I were to use an e-cigarette or other vaping device, I would…” and contained 8 items. Responses were on a 5-point scale from “definitely wouldn’t” to “definitely would.” Three subscales were computed from the item set (Rohde et al., 2018): health worry – “worry about my health” (3 items, α=.89 pretest and α=.86 posttest), health consequences – “damage my brain” (3 items, α=.87 and α=.82), and addiction – “get addicted” (2 items, r=.66 and r=.64).

Relative risk (pretest and posttest)—Relative risk was measured using one item that asked participants to rate the risks of using e-cigarettes compared to regular cigarettes on a 5-point scale ranging from “much less harmful” to “much more harmful.” Responses were coded into correct (much less harmful or less harmful) and incorrect (equally or more harmful) categories.

Willingness to use e-cigarettes (pretest and posttest)—To assess willingness to use e-cigarettes, participants were asked, if offered an e-cigarette, how willing they would be to: 1) take one puff, 2) use one for a while, and 3) take one to try later (Wills, Sargent, Knight, Pagano, & Gibbons, 2016). Items were measured using a 5-point scale from “not at all willing” to “extremely willing.” Coefficient alpha of the scale was α=.87 (pretest) and α=.83 (posttest).

Tobacco product use (pretest only)—E-cigarette use was assessed by asking about use of e-cigarettes or other vaping devices in lifetime and past 30 days. Cigarette smoking was assessed by asking if participants had ever tried cigarettes (lifetime use) and if they now smoked some days or every day (current smoker) (Centers for Disease Control and Prevention, 2012). Other tobacco product use was asked by having participants select other tobacco products that they had ever used from a list.

Acceptability (posttest only)—To assess acceptability, we asked participants the difficultly or ease of being in the study, whether they would enroll again, and whether they would recommend the study to a friend. Responses were on a 5-point scale, with higher scores indicating greater acceptability. We also asked participants whether receiving one message per day was the right frequency (too few, about right, too many); whether receiving three different messages was the right amount (too few, about right, too many), and whether receiving each message at 4pm was the right time (too early, about right, too late). Finally, we asked open-ended questions about acceptability.

2.4 Procedure

Adolescents who were eligible and chose to enroll in the study were automatically directed to an assent form online. Parental informed consent was waived since participants’ parents had already given consent for the earlier phone survey. After assent, participants conducted a mobile phone verification task. Once verified, the website automatically redirected participants to the pretest. Participants were texted a $10 Amazon gift code upon completion of the survey. They then received one e-cigarette health harms message texted to their smartphone at 4pm each day for the subsequent six days. On day 8, participants were texted a link to the posttest. Once the posttest survey was complete, they were texted a $15 Amazon gift code. The University of North Carolina IRB approved all procedures in this study.

2.5 Data analysis

Descriptive statistics were used to characterize adolescents’ responses to the messages, and repeated measures ANOVAs and McNemar tests were used to examine differences on the three messages. McNemar tests were used to measure changes from pretest to posttest for all

nominal variables, and paired samples *t*-tests were used for continuous variables. All analyses were computed using RStudio (R Foundation for Statistical Computing, Vienna, Austria) and SPSS version 24 (SPSS Inc., Chicago, IL, USA).

3. Results

3.1 Participant characteristics

Of the 69 pretest survey participants, 48% were male, 48% female, and 4% gender non-conforming. The mean age was 16.33 (*SD*=.89). The majority of participants were White (81%), followed by African American (11%). Five participants (7%) were Hispanic; of those, two identified as White, two multiple race, and one African American. Most participants were in 11th (29%) or 12th (41%) grade. We classified participants into 4 mutually exclusive e-cigarette categories: seventeen percent were current e-cigarette users (past 30 days), 31% had ever used e-cigarettes but were not current users, 40% were susceptible non-users of e-cigarettes, and 12% were non-susceptible non-users. Thirty-one percent of the sample had ever smoked cigarettes and between 6–23% had ever used other tobacco products (Table 1).

3.2 Responses to e-cigarette messages

Participants rated the messages, on average, above the mid-point for fear arousal and perceived message effectiveness (Table 2). In pairwise comparisons, the chemical and brain messages were rated significantly higher on fear ($p<.05$) and perceived effectiveness ($p<.05$) compared to the nicotine message. Participants recognized the messages at posttest (nicotine: 93%; chemical: 84%; brain: 92%), with the nicotine messaging being more recognized than the chemical message ($p<.05$). The foil messages were much less likely to be recognized (18%-36% recognition).

In open-ended responses, the most common suggestion ($n=9$) to improve the messages was to add information about how e-cigarettes harm the body. For example, one participant suggested, “Tell more about what it does to the body as you continue to use it etc.” while another suggested, “Go more in depth about vaping and its effects on your body when you vape.” Other suggestions included adding more detailed information to the current messages ($n=6$), adding visuals ($n=5$), and adding color ($n=5$).

3.3. Message sharing

A total of 21 participants (34%) showed the e-cigarette messages to others (Table 3). Most showed the messages to friends (62%), followed by parents (38%), while some showed them to boyfriends/girlfriends (24%) or siblings (24%). In addition, 24 participants (39%) talked about the messages with others. Similar to sharing, most chose to talk about the messages with their friends (63%) and parents (46%).

Of those who talked about the messages, most participants talked about being in a study (79%) or e-cigarette health effects (46%). Most (75%) participants tended to have conversations discouraging e-cigarette use, while 25% were neutral. No participants reported

having conversations that encouraged e-cigarette use. Participants talked about the messages between 1 and 10 times during the course of the 8-day study (M=3.13, SD=2.33).

3.4 Pretest to posttest comparisons

At posttest, participants were significantly more knowledgeable that e-cigarettes contain harmful chemicals (89% vs. 66%; p <.001) and that e-cigarettes can harm teen brain development (80% vs. 53%, p<.001). There was also a non-significant increase in knowledge that e-cigarettes contain addictive nicotine (92% vs. 82%, p=.11; Table 4).

Participants at posttest were also significantly more likely to think about the dangers of using e-cigarettes (M=2.56 vs. M=1.70; p<.001) compared to pretest. They were more likely to worry about e-cigarette risks (M=3.79 vs. M=3.52; p=.048), believe e-cigarettes would cause them health consequences (M=3.70 vs. M=3.32; p<.001), and believe that e-cigarette use would lead to addiction (M=2.89 vs. M=2.60; p=.021). There was also a significant increase in e-cigarette relative risk beliefs (51% vs. 31% equally/more harmful than cigarettes; p=.004). Finally, there was no difference in willingness to use e-cigarettes at posttest compared to pretest (M=2.08 vs. M=2.03; p=.638).

3.5 Feasibility and Acceptability

Participants largely adhered to the text-messaging protocol. Fifty-nine participants (86%) responded (i.e., texted back ‘Y’ and a message rating) to all 6 text messages, six responded to between 3 and 5 messages, and four participants did not respond to any messages. Participants rated the harms messages (4-point scale) over text message similarly to how they did in the posttest survey. The nicotine message was rated the lowest on discouraging them from using e-cigarettes (M=2.93, SD=.99), with the chemical (M =3.35, SD=.84) and brain development (M=3.26, SD=.90) messages being rated higher.

Nearly all participants who took the posttest survey said the study was easy to participate in (93%; Table 5). All participants (100%) said they would enroll again, and a majority (97%) said they would recommend the study to friends. Most participants said receiving one message per day was the right frequency (90%), that three different e-cigarette messages was the right number (75%), and that receiving the messages at 4pm each day was the right time (84%).

4. Discussion and Conclusion

The purpose of this study was to examine adolescents’ responses to e-cigarette health harms messages and to examine the acceptability of delivering such messages via text message. Our results suggest that adolescents are receptive to harms messages about e-cigarettes and that delivering them via text message was highly acceptable.

Our three e-cigarette health harms messages were rated above the mid-point on both fear and perceived message effectiveness. The lowest rated message was an adaptation of the nicotine message the FDA plans to disseminate nationally in 2018 (US Food and Drug Administration, 2016). Our results suggest that adolescents view this message as less effective than other messages. One reason for this may be that the majority of adolescents

(>80%) already knew that e-cigarette liquid contains nicotine, so this message does not offer new information. The messages about chemicals in e-cigarette liquid and nicotine's effect on brain development were better received, perhaps because they offer more novel information and describe health consequences. In open-ended responses in the current study, adolescents suggested having more messages about the health impact of e-cigarettes on the body.

More than one-third of adolescents in our study showed or talked about the messages with others, and the valence of these conversations tended to be against e-cigarettes. Moreover, knowledge about e-cigarette harms, thinking about e-cigarette risks, and perceived risks of e-cigarettes were all higher at posttest. Although we cannot attribute these increases directly to our messages given the lack of a control group, the results are nonetheless encouraging. The information environment around e-cigarettes contains much pro-e-cigarette content (Lazard et al., 2016; Yang, Liu, Lochbuehler, & Hornik, 2017), and advertisements often portray e-cigarettes as healthy, safe, and socially desirable (Berg et al., 2015; Farrelly et al., 2015). Given this, effective counter-messaging that reaches adolescents is urgently needed.

We found an increase in perceived relative risk such that at posttest, more adolescents inaccurately believed that e-cigarettes are equally or more harmful than cigarettes compared to pretest. One challenge for e-cigarette harms messages will be to ensure that they do not inadvertently nudge adolescents toward combustible cigarettes. Future work should examine a variety of possible unintended consequences of such messages, including interest in and intentions to switch to or use regular cigarettes.

We found high acceptability among adolescents for our approach of using text messaging to deliver e-cigarette harms messages. The majority of our sample indicated that the study was easy to participate in, they would do it again, and would recommend it to others. Moreover, our frequency and timing of messages – 1 message per day delivered at 4pm local time – was acceptable to most adolescents in our study. A minority of adolescents suggested a differing message schedule, and a future approach could involve individualizing message timing or frequency. Still, our approach seems feasible, acceptable, and one that could be carried out in a larger study.

Our study was limited in several ways. First, although we drew our sample from a nationally representative study, we had a modest sample size for this pilot study. Second, our design was a single group, pretest-posttest design, and we cannot attribute changes in our outcomes solely to the messages given the lack of a control group. Finally, a small proportion of our sample (12%) did not take the posttest survey.

Future research should develop and test additional health harms messages based on the latest science (National Academies of Sciences Engineering and Medicine, 2018). Such work should examine how various message features and formats can increase impact, including through pictures (Noar, Francis, et al., 2017; Noar et al., 2016) and vivid harms portrayals (Duke et al., 2015). The FDA's *The Real Cost* youth prevention mass media campaign has recently expanded to e-cigarettes (US Food and Drug Administration, 2017), presenting an opportunity to disseminate e-cigarette harms messages to adolescents.

In conclusion, our study demonstrates adolescents' receptivity to e-cigarette health harms messages delivered using text messaging. In the context of an 8-day pretest-posttest study, we demonstrated that adolescents will engage with text messages about e-cigarette health harms. Future studies should develop a larger pool of messages, include an expanded set of message topics and formats, and examine impact in a randomized controlled trial over a longer period of time.

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Table 1

Participant Characteristics at Baseline, $N = 69$ adolescents

Variable	*n* (%) or *M* ± *SD*
Gender	
Male	33 (48%)
Female	33 (48%)
Non-conforming	3 (4%)
Age, years	16.33 ± .89
Year in school	
9th grade	7 (10%)
10th grade	10 (14%)
11th grade	20 (29%)
12th grade	28 (41%)
Not currently in school	4 (6%)
Race	
White	61 (81%)
Black or African American	8 (11%)
Asian	4 (5%)
Other	2 (3%)
Hispanic	5 (7%)
E-cigarette use (current status)	
E-cigarette user (past 30 days)	12 (17%)
E-cigarette user (ever use, not past 30 days)	21 (30%)
Susceptible non-user	28 (41%)
Non-susceptible non-user	8 (12%)
Cigarette smoking (current status)	
Cigarette smoker (current)	2 (3%)
Cigarette smoker (ever, not past 30 days)	19 (28%)
Susceptible non-user	9 (13%)
Non-susceptible non-user	39 (56%)
Tobacco product use (lifetime)	
Chewing tobacco	16 (23%)
Cigarillos, filtered cigars, or little cigars	14 (20%)
Hookah	12 (17%)
Dip	11 (16%)
Traditional cigars	8 (12%)
Snus	4 (6%)
Pipe filled with tobacco	4 (6%)

Table 2

Message Ratings at 1-Week Follow-up, $n = 61$

	Nicotine Message	Chemical Message	Brain Message
	E-cigarettes and vaping devices contain nicotine. Nicotine is an addictive chemical.	**The liquid in e-cigarettes and vaping devices contains harmful chemicals. Poisonous if swallowed.**	**Nicotine in e-cigarettes and vaping devices may harm teen brain development.**
Variable	***n* (%) or *M*(*SD*)**	***n* (%) or *M*(*SD*)**	***n* (%) or *M*(*SD*)**
Fear arousal	3.13 ± 1.38[a]	3.75 ± 1.21[b]	3.79 ± 1.07[b]
Perceived effectiveness	3.92 ± .89[a]	4.30 ± .92[b]	4.17 ± .89[b]
Recognition[1]	57 (93%)[a]	51 (84%)[b]	56 (92%)[a,b]

Note. M=mean, SD=standard deviation; means with different subscripts in the same row are significantly different at $p < .05$ by pairwise comparison post-hoc tests.

[1]Participants were also asked if they recognized three foil messages: E-cigarettes and vaping are not risk free. (n=11, 18%); E-cigarette and vaping liquid is made from tobacco (n=14, 23%); The long-term health effects of e-cigarettes and vaping are unknown. (n=22, 36%).

Table 3

Sharing and Conversations about Messages, n=61

	n* (%) or *M* ± *SD
Showed messages to others	21 (34%)
Friend	13 (62%)
Parents	8 (38%)
A boyfriend/girlfriend	5 (24%)
Brother/sister	5 (24%)
Other family member	2 (10%)
Talked about messages with others	24 (39%)
Friend	15 (63%)
Parents	11 (46%)
A boyfriend/girlfriend	6 (25%)
Brother/sister	4 (17%)
Other family member	3 (13%)
How many conversations?[1]	
Conversation valence[1]	3.13 ± 2.33
Against using e-cigarettes and vaping devices	18 (75%)
Neutral about using e-cigarettes and vaping devices	6 (25%)
For using e-cigarettes and vaping devices	0 (0%)
What did you talk about?[1]	
Being in a research study	19 (79%)
The health effects of e-cigarettes and vaping	11 (46%)
Whether messages like this should appear on e-cigarettes	8 (33%)
Messages like this *will* stop people from using e-cigarettes	6 (25%)
Messages like this *will not* stop people from using e-cigarettes	3 (13%)
Other	3 (13%)

Note.

[1]Only those who reported talking about one or more messages (n=24).

Table 4

Changes in Outcomes from Baseline to Follow-up, n=61

	Baseline ***M*** **(*SD*) or *n* (%)**	**1-week follow-up** ***M*** **(*SD*) or *n* (%)**	***p***
E-cigarette knowledge			
Usually contain addictive nicotine	50 (82%)	56 (92%)	0.109
Has harmful chemicals	40 (66%)	54 (89%)	0.001
Harms brain development	32 (53%)	49 (80%)	0.001
Cognitive elaboration	1.70 ± .93	2.56 ± 1.09	0.001
Perceived risks			
Health worry	3.52 ± 1.19	3.79 ± 1.15	0.048
Health consequences	3.32 ± 1.04	3.70 ± .95	0.001
Addiction	2.60 ± 1.22	2.89 ± 1.13	0.021
Perceived relative risk	19 (31%)	31 (51%)	0.004
Willingness to use e-cigarettes	2.08 ± 1.07	2.03 ± 1.02	0.638

Note. Knowledge reported as percent correct response; perceived relative risk reported as percent inaccurate perception (e-cigarettes equally or more harmful than cigarettes); all others on 5-point response scales.

Table 5

Acceptability of Participating in Text-Messaging E-cigarette Study, n=61

	***n* (%)**	**Illustrative Quotes**
Easy to participate in study?	57 (93%)	• It was an easy and alright survey to do. • Very convenient and gets the message through to teens like myself
Enroll in this study again?	61 (100%)	• This study was really interesting and I would love to do another one. • I would love to participate in more
Recommend this study to a friend?	59 (97%)	• More teens should hear about this! Possibly broaden the study to include more teens! • This is an awesome study and I think that more teenagers need to hear about the harmful effects of vaping or usage of e-cigarettes because it's not cool, it's dangerous.
One message per day the right frequency?	55 (90%)	Agree with message frequency/timing: • Everything about it was just right. • Perfect timing and number of messages
Three different messages the right number?	46 (75%)	• I think you should keep it the same, don't change what you did. • The messaging frequency and timing was great.
4pm each day the right time?	51 (84%)	Suggest change to message frequency/timing: • In the morning and every day, maybe even twice a day • I would prefer a message probably twice a week at 4pm • I'd prefer the messages around noon, instead of somewhat in the evening or later in the day. • I'd prefer the messages to be later for me.

Note. For the first three entries in this table, the percentages represent a sum of the 4th and 5th categories on the 5-point Likert scale. For the remaining 3 entries, the percentages indicate participants who selected the "about right" response.