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Testing the Replication and Extension of Why-Quit and How-To-Quit Antismoking Health Messages

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Abstract

Research on health campaigns and interpersonal communication has seldom examined how campaign message exposure can influence the transmission of campaign-relevant information into interpersonal communication. Specifically, an individual exposed to a campaign message may send the message's core argument (replication) or other campaign-consistent information (extension) to additional campaign targets. Replication and extension may enhance campaign effects because they are expected to extend a campaign's reach and produce more campaign-consistent communication. Using a randomized controlled experiment, this study examined how exposure to why-quit and how-to-quit themed antismoking messages influences replication and extension. Study results showed that while both why-quit and how-to-quit messages were successful in increasing replication, only why-quit messages were successful in influencing extension. The study results demonstrate that there is variation in the degree of how messages can successfully be replicated or extended in interpersonal contexts, which can inform campaign development.

Researchers evaluating campaign effects have long examined how interpersonal communication such as conversations can directly affect campaign outcomes (Dunlop, 2011; Hendriks, Bruijn, De, Meehan, Putte, & Van Den, 2016; Southwell, 2013). However, research has seldom focused on how campaign messages can influence the flow of campaign-relevant information into interpersonal communication. Campaign-relevant information is carried over into interpersonal communication when an individual exposed to a campaign message initiates a conversation about or refers message-relevant information to campaign targets within or outside their social network (Katz & Lazarsfeld, 1955; Southwell, 2013). This study examines how exposure to why-quit and how-to-quit themed antismoking messages influences people to replicate (replication) or extend (extension) the core arguments used in messages as they initiate interpersonal communication with additional campaign targets (Cappella, 2002). Replication refers to whether people choose to

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author, S. J. L. upon reasonable request.

deliver the exact arguments targeted in campaign messages to campaign targets. For example, say an individual is exposed to an antismoking campaign message that espouses the argument that “Quitting smoking will improve your sense of taste and smell.” If this individual delivers this same argument to a smoker around her, replication has occurred. Extension refers to whether people choose to deliver arguments that are in the same category as the campaign theme but were not specifically targeted in campaign messages. For example, if the individual above delivers an argument such as, “Quitting smoking will make your clothes smell better,” then this individual has extended the campaign’s theme by sending a nontargeted argument that is still consistent with the campaign theme of highlighting reasons to quit smoking. Replication and extension matter because they are expected to enhance campaign effects by extending the reach of the campaign and generating additional campaign-consistent communication. The present study introduces these outcomes and demonstrates how message exposure can lead to replication and extension, but with variation, in the context of why-quit and how-to-quit themed antismoking messages.

Health Campaign Messages and Interpersonal Communication

Recent evaluations of health campaigns have examined how interpersonal communication behaviors, such as conversations, may mediate or moderate campaign effects (Southwell & Yzer, 2007). Interpersonal communication may mediate campaign effects when campaign exposure might prompt positive or negative conversations about the target behavior and lead campaign targets to change or not change their behavior. For example, research has found that exposure to antismoking campaign messages positively influenced smoking cessation intention and behavior via discussion about campaigns (Van Den Putte, Yzer, Southwell, De Bruijn, & Willemsen, 2011). Similarly, analysis of the Truth Campaign found that campaign exposure led to campaign-related conversation which in turn had a positive effect on youth antismoking beliefs (Hwang, 2012). Interpersonal communication may moderate campaign effects by strengthening or weakening campaign effects. For instance, the effect of exposure to an HIV-prevention campaign on HIV testing was stronger for respondents who had discussed HIV with others (Rimal, Limaye, Roberts, Brown, & Mkandawire, 2013). In an experiment, those who watched an HPV vaccine advertisement and talked about it with their friends subsequently held more positive attitudes toward getting the HPV vaccine compared to those who only watched the advertisement (Dunlop, Kashima, & Wakefield, 2010).

More notably, recent studies have also examined the specific content of interpersonal communication such as conversational valence and conversations about the target behavior (Brennan, Durkin, Wakefield, & Kashima, 2016; e.g., David, Cappella, & Fishbein, 2006; Dunlop, 2011; Hendriks et al., 2016; Hendriks, De Bruijn, & Van Den Putte, 2012; Jeong, Tan, Brennan, Gibson, & Hornik, 2015) that may facilitate campaign effects (Southwell & Yzer, 2009). For instance, Hendriks and colleagues (2012) directed participants to talk about alcohol after exposing them to an anti-alcohol message and found that message exposure led to negative conversations about alcohol consumption, which in turn increased intentions to refrain from binge drinking. Brennan and colleagues (Brennan et al., 2016) asked participants to recall conversations that ensued after exposure to antismoking messages. Results suggested that among those who talked after exposure to messages, conversations

with favorable appraisals of the messages and those with quitting talk had positive effects on intention change.

Replication and Extension in Interpersonal Communication

However, extant studies examining message-stimulated interpersonal communication content have not yet addressed the basic question about whether message-relevant information is carried over into interpersonal communication. For example, people may initiate a conversation with the exact information from messages or they may also modify the information and send it along (Adamic, Lento, Adar, & Ng, 2016; Cappella, 2002; Southwell, 2013). In the context of campaign message exposure, the present study defines and examines two outcomes related to this behavior: replication and extension. Replication refers to whether people choose to transmit the same arguments targeted in campaign messages to campaign targets, while extension means arguments that people choose to diffuse or talk about are in the same category as the campaign theme (e.g., reasons to quit smoking), but were not specifically targeted in campaign messages. The present study is among the first to examine how message exposure can influence these outcomes.

Replication and extension are significant because they are both expected to improve campaign outcomes of intention and behavior change. Replication ensures that core information targeted by campaign messages reaches a larger audience, thereby increasing the potential to move more people in the campaign's intended direction (Southwell & Yzer, 2007). Replication is especially important in situations when conversations occur asynchronously, such as when an individual exposed to a campaign message decides to talk about it afterward to a campaign target he/she knows or forward the information to multiple people on social media platforms like Facebook and Twitter. Extension increases the diversity of campaign-consistent communication which in turn can strengthen campaign effects via mechanisms of repeated exposure and tailoring. For example, while exposure to one argument from a health campaign message may not change intentions and behavior, exposure to a number of different arguments that encourage behavior change from interpersonal contacts could lead to stronger intention and behavior change (Hornik, 2002; Hornik & Yanovitzky, 2003). Or while some arguments targeted by campaign messages may not resonate with campaign targets, other theme-consistent arguments put forth by people around them may influence their attitudes and intentions because the arguments may be specifically tailored to them (Coley et al., 2013; Higgins, 1992). In sum, replication and extension may enhance campaign effects by respectively extending the span of exposure to message-specific information, and by expanding the depth of message-relevant information.

Testing How Different Messages Influence Replication and Extension

Another gap in the literature is that there is a lack of research on how different campaign messages can shape outcomes such as replication or extension (Walther, 2017). From the viewpoint of campaign developers, knowing how certain campaign messages may shape postexposure replication and extension is important because it can predict which message strategies would produce interpersonal communication content that is conducive to campaign outcomes. However, a majority of studies are descriptive in that they document the

role of interpersonal communication in enhancing campaign effects (Dunlop, 2011; Dunlop, Cotter, & Perez, 2014; Dunlop, Wakefield, & Kashima, 2008; Jeong & Bae, 2017) or examine conversation content after conversations have occurred (Brennan et al., 2016; Hendriks et al., 2012; Jeong et al., 2015). While this line of research is helpful in establishing that interpersonal communication and certain types of interpersonal communication content matter for campaign effects, it is less informative about the types of campaign messages that can produce interpersonal communication helpful to campaign goals.

There is some research that examines how emotions and narratives in messages can influence interpersonal communication content such as valence (Dunlop et al., 2010; Hendriks, Van Den Putte, & De Bruijn, 2014). However, these studies do not examine replication or extension, which taps into the delivery of message-specific and message-consistent content. In addition, while some of these studies examine the relationship between exposure to message characteristics and interpersonal communication content, the measurement is typically based on self-reported recall or perceptions after a conversation (Dunlop et al., 2010; Hendriks et al., 2014). This is problematic because postrecall may not be accurate, and perceptions of conversations may reflect other cognitions, such as one's own attitudes or intentions toward behaviors, instead of the objective conversation that occurred.

To address this gap in research, I examined how different message types can influence outcomes of replication and extension by directly measuring how people choose arguments to send to other campaign targets. The current study exposed participants to different antismoking messages, and then asked participants to choose arguments to send to smokers if they were to do so. The benefit of this approach is that the measure can capture replication and extension at the time of when participants are thinking about initiating interpersonal communication, rather than recalling the content after the communication has been carried out. However, an important caveat is that the measure does not capture actual replication and extension since participants are responding to a hypothetical situation. Rather, the measure indicates the potential effectiveness of messages to affect replication and extension, given people have an intent to talk about the messages or deliver message information to others.

Why-Quit and How-To-Quit Themed Antismoking Messages

The current study focuses on the effect of why-quit versus how-to-quit themed antismoking messages on replication and extension. A why-quit theme refers to a theme that focuses on reasons to quit smoking, while a how-to-quit theme refers to a theme that provides ways to quit smoking. These themes were chosen primarily because they are representative of two distinct mental representations: high and low construal levels that have been found to have numerous effects on cognitions and perceptions (see Soderberg, Callahan, Kochersberger, Amit, & Ledgerwood, 2015 for detailed review). According to construal level theory, people represent objects and actions at either an abstract high construal level or concrete low construal level (Trope & Liberman, 2010), and thinking about why-related concerns leads to a high construal level mindset while thinking about how-related aspects induces a low construal level mindset (Freitas, Gollwitzer, & Trope, 2004; Fujita, Trope, Liberman, &

Levin-Sagi, 2006). Thus, it was expected that exposure to why-quit and how-to-quit messages could respectively induce high versus low construal mindsets which would be conducive in influencing people to choose the exact targeted arguments (replication) and arguments in the same class of construal—i.e., why-quit or how-to-quit categories (extension).

In addition, these themes capture distinct contents that are widely used in antismoking campaign strategies. Why-quit themes and how-to-quit themes are aimed at changing attitudes and self-efficacy, respectively, which are known discrete determinants of behavior change (Fishbein & Ajzen, 2010). This is why many antismoking campaign messages commonly utilize these two types of themes (Davis, Nonnemaker, Farrelly, & Niederdeppe, 2011; Durkin, Brennan, & Wakefield, 2012). For example, the Food and Drug Administration's (FDA) "The Real Cost" tobacco prevention campaign (www.hhs.gov/TheRealCost) centers around reasons not to smoke such as addiction, harmful chemicals, and health consequences. The American Legacy Foundation's "Ex Campaign" (<https://www.becomeanex.org/>) focuses on providing methods useful for quitting such as identifying triggers and getting support from family and friends.

Overview of Studies and Hypotheses

Study 1 first examined replication by testing the hypothesis of whether people choose to send smokers the exact same arguments used in the messages they were exposed to. Specifically, Study 1 tested whether those exposed to certain why-quit theme messages will choose to deliver the same why-quit arguments targeted by the messages they were exposed to, compared to those who were not influenced by the messages (H1a); the parallel hypothesis was also tested for how-to-quit messages (H1b). Study 2 tested extension by examining whether participants exposed to why-quit theme messages choose more non-targeted why-quit arguments than those not exposed to any messages (H2a); the parallel hypothesis was also tested for how-to-quit messages (H2b).

Pre-Study: Pilot to Select Arguments

A pilot study to select why-quit and how-to-quit arguments was conducted for two purposes. The first purpose was to ensure sufficient variation and moderate levels of why-quit and how-to-quit arguments' likelihood of selection since health communication campaigns typically address a variety of arguments (Brennan, Gibson, Kybert-Momjian, Liu, & Hornik, 2017; S. J. Lee et al., 2016). The second purpose was to select arguments that were similar in their likelihood of being chosen across why-quit versus how-to-quit themes, so that any observed differences in the tendency to choose arguments across conditions could be attributed only to message exposure (exposure to why-quit or how-to-quit themed messages), and not to arguments' inherent likelihood of being chosen.

Procedure

A range of why-quit and how-to-quit arguments regarding tobacco cessation were garnered from government agency-sponsored smoking cessation webpages such as the Centers for Disease Control and Prevention's (CDC) "Tips From Former Smokers" webpage (<https://www.cdc.gov/tobacco/quittingtips/>)

www.cdc.gov/tobacco/campaign/tips/index.html) and the National Cancer Institute's (NCI) "Smokefree.gov" webpage (<https://www.smokefree.gov>). A total of 19 why-quit arguments and 20 how-to-quit arguments about smoking cessation were collected. Amazon's Mechanical Turk (Mturk: mturk.com) workers ($N = 23$) were invited to rate these arguments on their likelihood to be chosen to send to smokers (Kim & Cappella, 2014). For each argument, workers were asked: "If you had to send arguments to smokers, how likely would you choose this argument about quitting smoking to send to smokers?" Each argument was rated on a scale of 1 (Very unlikely) to 5 (Very likely). The order of all arguments (why-quit and how-to-quit) was randomized.

Analysis to Select Arguments

For each argument (19 why-quit and 20 how-to-quit arguments), raters' individual ratings were averaged to create a rating score for each argument. For Study 1, a set of 10 why-quit arguments and a set of 10 how-to-quit arguments were chosen in a way that minimized the difference between set aggregate average ratings. For example, when ordered by rating scores, the top 10 how-to-quit arguments were chosen (since they tended to have lower scores than why-quit arguments), while why-quit arguments that had a similar range as the top 10 how-to-quit arguments were chosen to minimize set differences. The average rating score for the 10 why-quit arguments ($M = 3.80$, $SD = 0.22$) was not significantly different from that of the 10 how-to-quit arguments ($M = 3.78$, $SD = 0.15$); $t(18) = .21$, $p = .84$. In addition, Study 2 required 15 why-quit and 15 how-to-quit arguments. Similarly selected 15 why-quit ($M = 3.79$, $SD = 0.34$) and 15 how-to-quit arguments ($M = 3.66$, $SD = 0.22$) did not differ significantly in their average scores; $t(28) = 1.25$, $p = .22$. Arguments used for the studies and their respective rating scores are listed in Table 1.

Study 1: The Effect of Exposure to Why-Quit and How-To-Quit Messages on Replication

Study Design

A three condition (why-quit message condition; how-to-quit message condition; control condition) experiment was conducted online using the Qualtrics survey platform (qualtrics.com). Participants ($N = 300$) were randomized to one of three conditions, where participants assigned to the why-quit (how-to-quit) message condition were exposed to five why-quit messages (how-to-quit messages) at random from a pool of 10 why-quit messages (how-to-quit messages), and control group participants did not view any messages. Participants answered argument choice measures after viewing messages (why-quit and how-to-quit conditions) or without viewing any messages (control condition).

Participants

Three hundred participants who had not smoked at least 100 cigarettes in their life (nonsmokers) were recruited from MTurk to participate in this online experiment. Nonsmokers were recruited because they are the majority of the population—only 15.5% of US adults currently smoke (Jamal et al., 2018)—and therefore have a higher potential to influence smokers' thoughts (Ma & Nan, 2017). In addition, they are more motivated to talk

about antismoking messages (Dunlop, 2011) and influence smokers' actions (Bigman, Mello, Sanders-Jackson, & Tan, 2018). Participants' mean age was 34 ($SD = 12$), and 57% of participants were female. The sample was 71% White, 11% African American, and 18% Other. Fewer than 1% had less than a high school education, 7% had completed high school, 29% had some college education, and 64% had a college degree or more.

Stimuli

The pools of 10 why-quit messages and 10 how-to-quit messages were constructed based on the 10 why-quit arguments and 10 how-to-quit arguments chosen through the pilot study. Each message centered on a why-quit argument (how-to-quit argument) that explains reasons to quit smoking (explains ways to quit smoking). Each message stated its argument verbatim and included additional information that explained the argument further. The why-quit messages included the statement: "Why should you quit smoking?" to emphasize the why-quit theme of the messages, while the how-to-quit messages included the statement: "How can you quit smoking?" to highlight the how-to-quit theme of the messages (Han, Duhachek, & Agrawal, 2016; A. Y. Lee, Keller, & Sternthal, 2010). Samples of messages used are included in Figure 1.

Argument Choice Measure

Participants' argument choice was measured by asking participants to choose five arguments they would send to smokers from a pool of 20 arguments. The provided pool of 20 arguments was comprised of the 10 arguments targeted in the 10 why-quit messages and the 10 arguments targeted in the 10 how-to-quit messages. The 20 arguments were presented in five sets of four arguments, where participants were instructed to choose one argument for each set ("If you had to send arguments about quitting smoking to smokers, which argument would you choose to send to them? Please choose 1 argument you would most prefer to send."). Each set presented two why-quit arguments and two how-to-quit arguments from respective pools of why-quit arguments and how-to-quit arguments in random order.

Analysis

To address hypotheses H1a and H1b, the number of targeted arguments (i.e., the same five arguments targeted in the messages each participant saw) chosen in the treatment group (those exposed to why-quit or how-to-quit messages) must be compared to a control condition that produces comparable estimates of targeted arguments chosen. However, with the current control condition where participants are not exposed to any messages, the number of selected targeted arguments cannot be calculated because participants are not exposed to any messages; the number of targeted arguments chosen by participants can only be computed by counting the number of common arguments between those the participant chose and those that were present in the messages the participant was exposed to. This is impossible to do for the current control condition because there is no pool of arguments present in messages since no messages were shown to participants. Instead, the appropriate comparison value would be the expected value of the number of targeted arguments people would have chosen if the messages had no effect at all. This expected value can be estimated from the current control condition where it is half the average number of why-quit (or how-to-quit) arguments participants in the current control condition chose (see proof in Appendix

1). Therefore, two-sample *t* tests comparing the number of targeted why-quit (how-to-quit) arguments chosen by the treatment groups and the expected value of targeted why-quit (how-to-quit) arguments had messages been ineffective were conducted.

Study 1 Results

Table 2 presents means and standard deviations for the number of targeted arguments chosen by condition. Participants exposed to why-quit messages ($n = 91$) significantly chose more targeted why-quit arguments than the expected number of targeted why-quit arguments chosen had messages been ineffective ($n = 95$); $t(168.72) = 5.41, p < .01$. In parallel, those exposed to how-to-quit messages ($n = 114$) chose more targeted how-to-quit arguments than the estimated number of targeted how-to-quit arguments chosen given the messages were ineffective; $t(194.44) = 2.97, p < .01$. Therefore, both H1a and H1b were supported.

Study 2: The Effect of Exposure to Why-Quit and How-To-Quit Messages on Extension

The design, participants, stimuli, and procedure of Study 2 were similar to Study 1 with a few exceptions. Only these exceptions are described below.

Study Design and Participants

The study design was identical to Study 1 where participants ($N = 300$) were randomized to three conditions: why-quit message condition, how-to-quit message condition, and a control condition. Participant characteristics were also comparable to Study 1. However, participants assigned to treatment conditions (why-quit and how-to-quit message conditions) viewed five messages at random from their assigned category (why-quit or how-to-quit) pool of 15 messages based on 15 arguments chosen through the pilot study. Study 2 messages used the same design as Study 1 messages.

Argument Choice Measure

Parallel to Study 1, participants in all conditions were instructed to choose five arguments they would send to smokers after exposure to messages (or no exposure) from a provided list of arguments (10 why-quit and 10 how-to-quit arguments). However, the provided arguments consisted of 10 why-quit arguments and 10 how-to-quit arguments that did *not* overlap with the arguments targeted in the messages participants were exposed to. This way, the measure effectively restricted the arguments to those that participants had not been exposed to but are of the same category (why-quit vs. how-to-quit) of arguments that were addressed in the messages. A nonoverlap was ensured by first constructing a pool of all 15 why-quit arguments and 15 how-to-quit arguments used in Study 2. The survey was programmed so that when participants were exposed to five randomly chosen why-quit (how-to-quit) messages, the argument choice measure would include the 10 remaining why-quit (how-to-quit) arguments from the pool of 15 why-quit (how-to-quit) arguments and 10 how-to-quit (why-quit) arguments randomly chosen from the pool of 15 how-to-quit (why-quit) arguments. Participants in the control condition received 10 randomly chosen why-quit arguments from the pool of 15 why-quit arguments and 10 how-to-quit arguments at random

from the pool of 15 how-to-quit arguments. The presentation of arguments followed the same format as Study 1. When coding argument choice as 1 if it was a why-quit argument and 0 if it was a how-to-quit argument, the Kuder-Richardson alpha for this five-item argument choice measure was .55 for the control condition (Streiner, 2003).

Analysis

To address hypothesis H2a, the number of why-quit arguments chosen by why-quit message condition participants was compared to that of control condition participants. Similarly, the number of how-to-quit arguments chosen by how-to-quit message condition participants was compared to that of control condition participants (H2b).

Study 2 Results

Table 3 presents means and standard deviations for the number of nontargeted why-quit and how-to-quit arguments chosen by condition. Participants exposed to why-quit messages ($n = 117$) significantly chose more why-quit arguments that were not targeted by the messages they were exposed to than participants who were not exposed to any messages ($n = 101$); $t(216) = 3.34, p < .01$. In contrast, the number of how-to-quit arguments chosen was not significantly different across participants exposed to how-to-quit messages ($n = 82$) and those who were not exposed to any messages; $t(181) = 0.54, p = .59$. Results supported H2a, but not H2b.

Discussion

Study 1 examined whether participants exposed to why-quit themed messages and how-to-quit themed messages choose the exact arguments targeted by the messages they saw to send to smokers. Study results showed that participants exposed to why-quit messages and those exposed to how-to-quit messages chose more targeted arguments than the expected value of targeted arguments chosen had the messages been ineffective. These results demonstrated that replication occurred for both why-quit and how-to-quit messages; exposure to these messages influenced people to choose arguments targeted in the messages to send to campaign targets (i.e., smokers). While this seems a simple hypothesis, previous research had not empirically tested this notion of replication, which can be a useful metric for gauging whether message arguments are “sticky” given the opportunity to interpersonally send them to campaign targets. Study 2 found that while participants exposed to why-quit messages chose more nontargeted why-quit arguments than those not exposed to any messages, participants exposed to how-to-quit messages did not choose more nontargeted how-to-quit arguments than those not exposed to any messages. These results demonstrate that while message exposure can influence extension—choosing nontargeted, but theme-consistent arguments to send—there may be variation in the extent to which certain message themes are successful or not in triggering extension.

Study results suggest that while how-to-quit themed messages show promise for replication, they may not be successful in influencing the introduction of further how-to-quit-related information in interpersonal communication. There may be several reasons why extension was only observed for why-quit themed messages, but not for how-to-quit themed messages.

The first may be related to the study population of nonsmokers. Most antismoking communication campaigns focus on reasons to quit smoking or not to smoke (Davis et al., 2011), and these campaigns target a broader audience that involves both smokers and nonsmokers. On the other hand, messages about how to quit smoking are only relevant to those who do smoke. Therefore, the study population of nonsmokers might have been only movable in a why-quit direction because of this familiarity with campaign messages emphasizing reasons to quit smoking and because these themes are more relevant to them. A second reason could be due to perceptions of the nature of smoking behavior. Since tobacco use is an addictive behavior, tips on how to quit smoking may seem rather secondary to reasons to quit smoking; while participants in the study may appreciate sending reasons to quit smoking as helpful because it may affect decisions to quit, noting methods on how to quit smoking may seem largely irrelevant if it is perceived that addiction is taking control of tobacco use behavior (Fishbein & Ajzen, 2010). Finally, the null effects on extension for how-to-quit messages may be because the certain message design features used in the study were simply not convincing enough to drive extension.

The first two possible reasons point out that how-to-quit themed messages may have less potential to be extended across social environments, while the last reason indicates that better message design could lead to extension of how-to-quit themed messages, too. Assuming the first two reasons are true, why-quit messages may be more helpful than how-to-quit messages in furthering an antismoking campaign's goals since they invite both replication and extension. While replication alone may be able to intensify campaign effects if messages are based on formative research that has identified persuasive arguments, extension may still play a complementary role; the potential for extension means more theme-consistent arguments can be introduced into interpersonal communication, which may increase persuasion through mechanisms of multiple exposure and tailoring (Coley et al., 2013; Hornik, 2002; Hornik & Yanovitzky, 2003). This complementary role becomes more important when the arguments addressed by the original campaign messages are less persuasive. Nonetheless, further research is needed to understand the asymmetric results between why-quit and how-to-quit themed messages.

The current study has some limitations that could be addressed in future research. First, the study examined a preference for arguments to send to campaign targets, but not the actual interpersonal content that would manifest given the occurrence of interpersonal communication. Thus, study results should be interpreted as the potential effectiveness of why-quit and how-to-quit messages in influencing replication and extension. Future research can advance this line of research by moving beyond argument choice and examining outcomes in a more realistic context. For example, future research could ask participants to write their own messages to smokers after exposure to antismoking messages. A content analysis of the written messages could reveal a pattern of more or less message-specific (replication) or message-consistent but non-targeted information (extension). This way, it will be able to determine whether a preference for certain arguments to send indeed generalizes to interpersonal communication content itself. In addition, while the present study was interested in interpersonal communication content given its occurrence after message exposure, it is important to acknowledge that content can only be examined once someone has an intention to initiate a conversation or intention to share information.

Message characteristics that drive this intention (Brennan, Durkin, Wakefield, & Kashima, 2017; Cappella, Kim, & Albarracin, 2015; Kim, 2015) may differ from those that affect replication and extension. Thus, future research may examine replication and extension more comprehensively by considering both the likelihood of messages prompting intentions to initiate interpersonal communication and the likelihood of messages influencing replication and extension.

Second, the study focused on the context of sending arguments to an abstract group of “smokers” instead of smokers or a smoker that participants personally know. Since audience considerations may also influence participants’ choice of arguments (Joshi & Wakslak, 2014; Joshi, Wakslak, Raj, & Trope, 2016), future studies could vary the audience type and examine the interactive effect of audience type and message exposure on replication and extension. For example, future research could examine whether the audience’s readiness to quit smoking or audience closeness (e.g., close smoker friend vs. anonymous smoker) could moderate the effects of message exposure on replication and extension.

In conclusion, the current study demonstrated that exposure to why-quit and how-to-quit messages influences people to prefer targeted arguments (replication) to deliver to message targets, while only why-quit messages (but not how-to-quit messages) were successful in increasing a preference for nontargeted theme-consistent arguments (extension) to send to message targets. Study results have implications for campaign developers considering why-quit and how-to-quit antismoking themes. In addition, the study proposed methods to measure the potential of replication and extension for certain message themes, which can be useful for campaign development and planning. The study calls for further attention to the outcomes of replication and extension, and deeper investigation of how different message characteristics may contribute to the flow of campaign-relevant information in the social environment.

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Appendix 1.

Overview of problem

	Treated	Control
Targeted argument score	O_T	O_C

- O_C is technically not observable because there is no way by design we can know the number of targeted arguments participants in the observed control condition will choose because we do not provide control condition participants with any messages.
- However, the expected value for O_C can be estimated by conceptualizing it to be the score (number of targeted arguments chosen) people would have gotten if the messages had no effect at all. This can be calculated by using the tendency of people in the observed control condition to choose why-quit arguments over how-to-quit arguments.

Calculation

- Let p = select why-quit arguments; $1-p$ = select how-to-quit arguments.
- In the treatment conditions where participants are provided with 5 sets of 4 arguments (2 randomly chosen why-quit arguments and 2 randomly chosen how-to-quit arguments from pools of 10 each), there are three possibilities of how-to-quit the targeted arguments can be displayed across the 5 sets. Also, if there were no effect of the message then the probability of choosing a matched argument by chance in each of those scenarios would be:
 - [1, 1, 1, 1, 1]: probability of choosing targeted argument (e.g., if in why-quit message condition) would be $p/2 \times 5$
 - [2, 1, 1, 1, 0]: probability of choosing targeted argument would be $p + p/2 + p/2 + p/2 + 0 = p/2 \times 5$
 - [2, 2, 1, 0, 0]: probability of choosing matched argument would be $p + p + p/2 + 0 + 0 = p/2 \times 5$
- In conclusion, the expected value of O_C can be estimated as half of how-to-quit many why-quit arguments people in the observed control condition choose on average (i.e., $\frac{1}{2} * O_C$).

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Why-quit message	How-to-quit message
<p>WHY should you quit smoking?</p> <p>✔ Quitting smoking will help you breathe better and cough less. Quitting smoking stops the inflammation and irritation in lungs which can lead to easier breathing.</p>	<p>HOW can you quit smoking?</p> <p>✔ Identifying triggers that make you want to smoke and avoiding those triggers can help you quit smoking. Avoiding activities or feelings linked with smoking, such as drinking coffee or feeling down will help you quit smoking.</p>
<p>WHY should you quit smoking?</p> <p>✔ If you quit smoking, food will taste better and smell better. Quitting smoking can regain the sensitivity of taste buds and the nose so that food tastes and smells better.</p>	<p>HOW can you quit smoking?</p> <p>✔ Avoid cravings by having healthy snacks on hand, and you'll be able to quit smoking. Cravings can start when blood sugar is low so having snacks on hand can reduce cravings.</p>

Fig. 1.
Example of Study 1 why-quit and how-to-quit messages.

Table 1.
Rating score means and standard deviations for why-quit and how-to-quit arguments

Why-quit arguments	Mean	SD	How-to-quit arguments	Mean	SD
Quitting smoking will protect your friends and family from secondhand smoke exposure.	4.17	0.72	Using medications or nicotine replacement therapy (NRT) can improve your chances of quitting.*	4.04	0.82
You can lead a more energetic life if you quit smoking.	4.17	0.94	Reminding yourself of your reasons for quitting will make quitting smoking easier.*	3.91	0.95
Quitting smoking will prevent your skin from ageing prematurely.	4.13	0.92	Doing smoke-free activities with your family and friends can help you quit smoking.*	3.87	0.97
Quit smoking and you will be able to breathe better and cough less.*	4.13	0.76	Celebrating quit milestones will keep you motivated and focused on your quit goal.*	3.83	0.78
Quitting smoking strengthens your immune system, making you less likely to get sick.*	4.04	0.71	Identifying triggers that make you want to smoke and avoiding those triggers can help you quit smoking.*	3.78	1.24
Quitting smoking can lower your risk of type 2 diabetes.*	3.96	1.07	When trying to quit smoking, moderate physical activity can help you get through cravings.*	3.74	1.01
If you quit smoking, food will taste better and smell better.*	3.96	1.19	You can easily join an ex-smoker community to get advice on how to quit.*	3.74	0.96
Quitting smoking will keep your mouth healthy.*	3.78	1.04	Avoid cravings by having healthy snacks on hand, and you will be able to quit smoking.*	3.7	0.93
You will set a good example and show your family that a life without cigarettes is possible.*	3.7	1.29	Enrolling in an online quit smoking program or plan can help you quit smoking.*	3.7	0.93
Quitting smoking can reduce your risk of blindness.*	3.7	1.18	Keeping words of inspiration around the house will help you quit smoking.*	3.48	1.2
Quitting smoking can reduce your muscle aches and pains.*	3.65	1.19	Chewing on something will reduce cravings and help you quit smoking.*	3.43	0.99
Quitting smoking can reduce your risk of bone fractures.*	3.61	1.16	Throwing away all cigarette-related items will help you quit smoking.	3.43	1.27
Your home and car would not smell anymore if you quit smoking.*	3.43	1.16	Setting a quit date will make you more motivated to quit smoking.	3.43	1.16
If you quit smoking, you would not have to worry about when you can smoke next or where you can or cannot smoke.	3.22	1.24	Asking your family and friends to not give you a cigarette will help you quit smoking.	3.39	1.31
Quitting smoking will keep your hearing sharp.	3.13	1.22	Going to smoke-free places where you cannot smoke will help you quit smoking.	3.35	1.23

* Note. indicates arguments used in Study 1.

Table 2.

Study 1 means and standard deviations for the number of targeted why-quit and how-to-quit arguments chosen

Why-quit message condition	How-to-quit message condition	Control condition
$M^W = 1.93$ (SD = 1.03)	$M^H = 1.72$ (SD = 1.24)	$M^W = 1.2$ (SD = 0.79)
		$M^H = 1.3$ (SD = 0.79)

Note. M^W indicates the number of targeted why-quit arguments chosen. M^H indicates the number of targeted how-to-quit arguments chosen.

Table 3.

Study 2 means and standard deviations for the number of nontargeted why-quit and how-to-quit arguments chosen

Why-quit message condition	How-to-quit message condition	Control condition
$M^W = 3.37$ (SD = 1.52)	$M^H = 2.44$ (SD = 1.54)	$M^W = 2.68$ (SD = 1.49)
		$M^H = 2.32$ (SD = 1.49)

Note. M^W indicates the number of why-quit arguments chosen. M^H indicates the number of how-to-quit arguments chosen.