1-1-2016

When Similarity Strikes Back: The Positive and Negative Role of Character-Audience Similarity in Anti-Smoking Campaigns

Minji Kim
University of Pennsylvania, minjikim3@hotmail.com

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When Similarity Strikes Back: The Positive and Negative Role of Character-Audience Similarity in Anti-Smoking Campaigns

Abstract

As media technology evolves quickly, tailored and targeted communication has emerged as an important strategy in persuasion. One of the most widely used and easiest tactics of tailoring is using an exemplar or persuader character similar to the target audience. However, the effect of character-audience similarity may significantly differ depending on other message features such as how the similar character is shown to behave within the message. This dissertation examines the positive and negative effects of the similarity between the audience and the exemplar character in anti-smoking public service announcements (PSAs), based on demographics and smoking status. Would character-audience similarity still exert positive effect on persuasion even when the target of similarity assessment is shown to behave in socially unacceptable ways?

Two secondary data analyses on video anti-smoking PSAs were conducted first. Study 1 examined the main effect of character-audience similarity, finding a significant positive effect of demographic similarity between the smoker character and the audience. Study 2 focused on the secondhand smoking (SHS)-themed PSAs, where the smoker character's behavior may be seen as irresponsible and immoral by causing serious harm to others. The impact of character-audience similarity depended on the severity of consequences caused by SHS, so that the usually positive effects of character-audience similarity disappeared in PSAs depicting highly severe consequences of SHS. However, the effect was only marginally significant.

Informed by these two studies, an experiment (Study 3) was conducted to systematically manipulate and examine the effect of character-audience similarity (Similar vs. Dissimilar), theme of the message (self-harm vs. harm of SHS), and severity of consequences (high vs. low severity). A consistently negative and significant two-way interaction effect between character-audience similarity and theme emerged, suggesting that seeing a similar smoker character harming their own health (self-harm condition) increased engagement with the message and identification with the character, which in turn was associated with greater perceived effectiveness (PE). However, seeing a similar smoker endangering others via secondhand smoking (SHS condition) decreased engagement and identification, causing a boomerang effect on message effectiveness.

The results provide valuable guidelines for message design regarding the use of character-audience similarity: When the exemplar character acts in socially undesirable ways, such as endangering others via secondhand smoking, character-audience similarity might backfire, and message designers should avoid tailoring via character-audience similarity. While the studies in this dissertation were limited in the topics of smoking tobacco cigarettes, other behaviors (e.g. drunk driving) may also be subject to similar effects given that driving under the influence may lead to serious negative consequences on innocent others.

Degree Type
Dissertation

Degree Name
Doctor of Philosophy (PhD)

Graduate Group
Communication

WHEN SIMILARITY STRIKES BACK: THE POSITIVE AND NEGATIVE ROLE

OF CHARACTER-AUDIENCE SIMILARITY IN ANTI-SMOKING CAMPAIGNS

Minji Kim

A DISSERTATION

in

Communication

Presented to the Faculties of the University of Pennsylvania

in

Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

2016

Supervisor of Dissertation

Signature_____
Joseph N. Cappella, Ph.D., Gerald R. Miller Professor of Communication

Graduate Group Chairperson

Signature_____
Joseph Turow, Ph.D., Associate Professor of Communication

Dissertation Committee

Emily Falk, Ph.D., Associate Professor of Communication
Robert Hornik, Ph.D., Wilbur Schramm Professor of Communication and Health Policy
John B. Jemmott III, Ph.D., Kenneth B. Clark Professor of Communication and Psychiatry

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ACKNOWLEDGMENTS

   My cohort and officemates, all my "academic family" members in and outside of

Annenberg School, without you all this couldn't have been this much fun. Thank you for

sharing your insights making me a better scholar, and for giving me joy and social

support making me a better human. I can't wait to hear all the great things we will ever

achieve across the globe as we proceed.

   Finally, but most importantly, I would like to thank my family for their unconditional

love. I am forever grateful to them for believing in me and being there, ready with warm

hugs, whenever I need them the most. Thank you, and I love you.

ABSTRACT

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OF CHARACTER-AUDIENCE SIMILARITY IN ANTI-SMOKING CAMPAIGNS

Minji Kim

Joseph N. Cappella

As media technology evolves quickly, tailored and targeted communication has emerged as an important strategy in persuasion. One of the most widely used and easiest tactics of tailoring is using an exemplar or persuader character similar to the target audience. However, the effect of character-audience similarity may significantly differ depending on other message features such as how the similar character is shown to behave within the message. This dissertation examines the positive and negative effects of the similarity between the audience and the exemplar character in anti-smoking public service announcements (PSAs), based on demographics and smoking status. Would character-audience similarity still exert positive effect on persuasion even when the target of similarity assessment is shown to behave in socially unacceptable ways?

Two secondary data analyses on video anti-smoking PSAs were conducted first. Study 1 examined the main effect of character-audience similarity, finding a significant positive effect of demographic similarity between the smoker character and the audience. Study 2 focused on the secondhand smoking (SHS)-themed PSAs, where the smoker character's behavior may be seen as irresponsible and immoral by causing serious harm to others. The impact of character-audience similarity depended on the severity of consequences caused by SHS, so that the usually positive effects of character-audience

similarity disappeared in PSAs depicting highly severe consequences of SHS. However, the effect was only marginally significant.

Informed by these two studies, an experiment (Study 3) was conducted to systematically manipulate and examine the effect of character-audience similarity (Similar vs. Dissimilar), theme of the message (self-harm vs. harm of SHS), and severity of consequences (high vs. low severity). A consistently negative and significant two-way interaction effect between character-audience similarity and theme emerged, suggesting that seeing a similar smoker character harming their own health (self-harm condition) increased engagement with the message and identification with the character, which in turn was associated with greater perceived effectiveness (PE). However, seeing a similar smoker endangering others via secondhand smoking (SHS condition) decreased engagement and identification, causing a boomerang effect on message effectiveness.

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Introduction

Media technology in today's world has led to an exponential increase in the speed, quantity and diversity of message transmission. This also has meant a dramatic fall in the monetary and time costs of personalized message tailoring. As a result, targeting and tailoring has emerged as a vital strategy in many persuasive contexts: Promoting healthy behaviors, encouraging voting in general and for specific candidates, calling for charitable donations, selling products and services, and so on.

One widely used tactic in message design is using characters similar to those in the targeted audience. It is a practice so common that audiences regularly encounter models similar to themselves, demographically or otherwise, in advertisements they encounter.

This dissertation is about the effect of the similarity between an exemplar character and the audience in anti-smoking campaigns. Character-audience similarity is used to increase audience's liking of and engagement with the message, which would in turn facilitate message acceptance and behavioral change. However, it would be naïve to believe that similarity would dominate other predictors such as message features, audience's individual characteristics and the cultural and social contexts in which the message is consumed.

Theories of homophily has been around for more than half a century, and many studies have examined the effect of manipulated, incidental, or perceived similarity between source and receiver on persuasion. However, not all the results are unequivocal; it is possible that character-audience similarity is effective only under some circumstances and may hurt the message effectiveness in others.

The purpose of this dissertation is to examine the boundary conditions of character-audience similarity effect in anti-smoking messages, focusing on how the similar smoker character is depicted. Smoking cigarettes is different from other health behaviors because it is not only harmful for the smoker (i.e. firsthand smoking), but also for others around (i.e. secondhand smoking). Therefore, anti-smoking campaign messages often employ arguments about the harmful effects of the secondhand smoking, where the smoker character is depicted as an immoral person, endangering innocent others with his/her cigarette smoke. Would being similar to an immoral smoker character still increase the likelihood that the audience will accept the message and attempt to quit smoking? The studies in this dissertation manipulate character-audience similarity using multiple messages, thus avoiding case-category confounding and allowing valid causal inference about the positive and negative role of character-audience similarity on message effectiveness. These studies also acknowledge the different sources of character-audience similarity. This dissertation focuses on the similarity (or dissimilarity) between the audience and the smoker (i.e. exemplar) character, but not on the similarity to other characters, such as a non-smoker persuader.

First, two secondary data analyses were conducted using existing anti-smoking video public service announcements (PSAs). These two studies used professionally produced PSAs that was actually aired in the US as part of many national and regional campaigns, thus enhancing the external validity of the results. Also, character-audience similarity varied across multiple messages, increasing internal validity as well. Study 1 found the positive main effect of smoker-audience similarity on message engagement, which in turn was associated with higher perceived effectiveness of anti-smoking PSAs. Then, Study 2

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examined secondhand-smoking themed PSAs separately, to see whether the victimization severity of secondhand-smoking themed PSAs interact with smoker-audience similarity. In line with the suspicion that being similar to an immoral smoker character would hurt message effectiveness, seeing a similar smoker character was found to increase PE only in the low-severity PSAs, but not when the similar smoker character was causing more severe consequences via secondhand smoking. This effect, however, was not statistically robust in part due to issues of power. So more controlled studies using picture-and-text based messages were conducted to explore this hypothesis.

Study 3 examined how the effect of character-audience similarity differs as other message features change. A series of pilot studies was conducted to pre-test the stimulus material. Images of smoker characters were tested to ensure their comparability in the characters' attractiveness and likability (Study 3 – Pilot 1). Anti-smoking messages comprised of a picture of a smoker character and text including a short narrative about the consequences of the smoker's smoking on a non-smoker (i.e. secondhand smoking) were pre-tested (Study 3 – Pilot 2). Text-based messages of varying themes (harm on smoker vs. secondhand smoking) and severity (high vs. low) were tested to check how serious the smoker audiences perceive the consequences portrayed in the messages to be (Study 3 – Pilot3). Finally, the main experiment systematically manipulated the smoker-audience similarity (similar vs. dissimilar), theme of the message (self-harm vs. secondhand smoking) and severity (high vs. low) in anti-smoking messages comprised of a picture of a smoker character and text including a short narrative about the consequences of the character's smoking on the self or other non-smoker (Study 3 – Main Experiment). The results suggest that the effect of seeing a similar smoker in anti-

smoking messages varies depending on the theme of the message, especially when the similar smoker character is shown as endangering innocent others via secondhand smoking.

Literature Review

Tailored Communication and Character-audience Similarity

Persuasive communication efforts have traditionally focused on the use of mass media and broadcast for a general audience. However, modern approaches to persuasion in the health and consumer communication, accompanied by ever-developing new media technologies enabling fast handling of large data, are moving increasingly toward "narrowcasting," with targeted and tailored communication strategies (Kreuter & Wray, 2003). In retail venues, recommender systems make suggestions for products, often personalized ones, that a user may wish to utilize (Ricci, Rokach, & Shapira, 2011). In health communication, targeted health communication has been at work with specific subgroups in mind, featuring similar role models in persuasive messages as exemplars or addressing the target audience's specific social and cultural issues within the persuasive message. Taking one step further, tailored health communication implements individually personalized message production tactics, using "any combination of strategies and information intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and derived from an individual assessment" (Kreuter, Strecher, & Glassman, 1999, p. 489).

Evidence does show that tailoring strategies can be beneficial in enhancing persuasion: Skinner et al. (Skinner, Campbell, Rimer, Curry, & Prochaska, 1999) reviewed eight studies using tailored communication, and found that tailoring generally enhances recall, reading and perceived relevance and credibility of messages, which would in turn positively affect performing promoted behaviors. Noar and colleagues'

meta-analysis and systematic review found small but significant effects on behavior changes following tailored health communication when compared to non-tailored control groups (Noar, Benac, & Harris, 2007; Noar, Harrington, Van Stee, & Aldrich, 2011). Lustria et al. (2013) found that web-delivered tailored communication showed significantly greater improvement on health outcomes than control groups, mostly provided with non-tailored websites.

This dissertation focuses on one of the core aspects of tailoring, matching the persuasive message according to the audience's characteristics, and attempts to examine the effect of character-audience similarity, especially the similarity to the smoker characters in anti-smoking public service announcements (PSAs) on the audience's evaluation of the message persuasiveness (Study 1). Here, character-audience similarity is determined by matching on demographics – namely gender, age and race – and quitting status. This study also emphasizes the importance of how the smoker character is presented; for example, if there are 'innocent' non-smoker victims, the smoker character will be regarded more negatively, as a dangerous and possibly immoral person who endangers others, than when the message focuses on the negative health consequences on the smoker. Therefore, Studies 2 (secondary data analysis) and Study 3 (experiment) focus on the anti-smoking PSAs with secondhand-smoking (SHS) themes and examine the effect of smoker-audience similarity on audiences' evaluation of antismoking messages discussing consequences of smoking with varying levels of severity and different victims (self vs. other).

Negative Health Effect of Firsthand and Secondhand Smoking

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In 2014, about 16.8% of adult (aged 18 and older), or about 40 million people, in the United States smoke cigarettes (Center for Disease Control and Prevention, 2015a). More than 480,000 deaths each year are attributed to smoking cigarettes, and more than 16 million people are suffering from a disease caused by smoking (Center for Disease Control and Prevention, 2015a).

Involuntary exposure to tobacco smoke, or secondhand smoking (SHS), is a hot topic in anti-smoking discussion. Secondhand smoking causes respiratory diseases among children, lung cancer and coronary heart disease among adults (U.S. Department of Health and Human Services, 2006). During the 50 years between 1965 and 2014, more than 20 million deaths in the United States are attributable to smoking, and 2,457,000 (11.8%) among them, or 49,000 premature deaths annually, are estimated to be caused by SHS (U.S. Department of Health and Human Services, 2014). The Surgeon General's report estimates 7,330 (4.6%) lung cancer and 33,950 (8.2%) coronary heart disease deaths are estimated to be caused by secondhand smoking annually, resulting in 5.7 billion US dollars' worth of productivity loss (U.S. Department of Health and Human Services, 2014).

The popularity of SHS themes among anti-smoking PSAs (Beaudoin, 2002; Goldman & Glantz, 1998) targets this problem. Anti-SHS campaigns use particularly negative and stigmatizing portrayals of smokers by emphasizing the fact that smokers are harming not just their own, but also other people's health. In an ad called "baby blocks (2000)," a father is depicted as smoking cigarette in the living room, and a baby sitting behind is making words such as "bronchitis" and "asthma" using wooden blocks. The baby looks sad and is almost crying, but the father is depicted as not caring about the welfare of the

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child, deeply involved in a TV show. While the PSA aims to deliver the message that secondhand smoke is lethal especially to children at home and may strike a chord to young parents, the shockingly immoral portrayal of the smoker harming his/her own children might lead to reactance and rejection of the message among some smoker audiences, or even boomerang effects.

Character-Audience Similarity and Its Effect on Persuasion

Research has shown that source-receiver similarity facilitates persuasion by increasing positive emotional response. Possession of similar attitudes and traits (Eagly & Chaiken, 1993) or sharing a group membership (Wilder, 1990) is positively associated with liking the persuader and endorsing the persuasive message. A meta-analysis of HIV interventions found that demographic and behavioral similarity between the source and recipients resulted in more positive behavioral changes (Durantini, Albarracín, Mitchell, Earl, & Gillette, 2006).

Similarity is also advantageous for earning credibility. Credibility has multiple dimensions: People are more likely to be persuaded when the sources possess expertise, seem trustworthy, attractive or likeable (Berlo, Lemert, & Mertz, 1969; Ohanian, 1990). The aforementioned association between similarity and liking would facilitate at least some facet of source credibility; Rogers (1973) argued that source-receiver similarity in other aspects would enhance perceived open-mindedness, honesty and unbiasedness, and facilitate message acceptance and subsequent behavioral change. On the other hand, the persuaders' technical competence and knowledge, which often results in source-receiver

dissimilarity, will increase perceived expertise, and enhance receivers' learning new information about the promoted behavior.

Many smokers are quite knowledgeable about the negative consequences of smoking cigarettes but still choose to continue smoking; more than 90% of current smokers recognize that smoking is at least somewhat harmful (Gallup, 2013). Although the proportion of smokers who think smoking is "very harmful" is smaller (63%) when compared to nonsmokers (82%), it suggests that if smokers continue to smoke cigarettes it is not because they do not know its harmful effects. This emphasizes the importance of message acceptance rather than information acquisition for anti-smoking campaigns, and in turn, the crucial role of source-receiver similarity in persuasion to breed credibility.

Similarity to whom? Importance of characters. It is worth noting that message characters, who are the target of similarity assessment, can take multiple forms and roles. Anti-smoking PSAs, which are the objects of interest in this study, feature different types of characters (see Table 1). First of all, there are smokers – as *exemplars* of the negative health and life consequences of smoking or benefits of cessation. There may be separate non-smoker *persuaders*, who deliver the anti-smoking messages. For the anti-smoking PSAs targeting current smokers, it is possible that different characters play different roles in target audiences' message processing. Smoker characters are in the same situation as the currently smoking audiences; the audience is in a position to identify with similar smoker characters in anti-smoking PSA and feel that the message is more relevant to them, all of which may affect persuasion. On the other hand, while similar persuader characters may be liked and trusted more than dissimilar ones, non-smoker persuaders are subject to knowledge bias (Eagly, Wood, & Chaiken, 1978); the fact that they do not

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have direct experiences in smoking would make their roles qualitatively different from the smoker characters. Moreover, many persuaders' non-smoking status presents a fundamental dissimilarity with current smoker audiences, which is crucial considering that the messages are anti-smoking by nature.

Some anti-smoking campaign messages involve other characters, such as those who are directly or indirectly affected by the cigarette smoke ("victims"), or tobacco company executives representing the manipulative marketing tactics of Big Tobacco. These characters also shape the persuasive anti-smoking messages, but only indirectly. Thus their similarity is not as relevant as that of the persuaders or smoker characters in this context.

Table 1. Types of characters in anti-smoking PSAs

	Examples
Form of characters	
Human	
Visually shown	Human shown in still or moving images
Not shown (1): People referenced by others	"Do you know anybody who's been affected by tobacco-related illnesses?" "Yeah, <u>my uncle</u> and <u>my godmother</u>. They smoked a lot."
Not shown (2): Voiceover	Narration such as "Quit now for your family. Call 1-800-quit-now."
Non-human	
With human voice	Animated figure with human voice
Without human voice	Text on screen
Role of characters	
Smokers	
Current smokers	Characters shown as smoking cigarettes; Characters talking about their smoking habits
Former smokers	Characters talking about their quitting experience
Deceased smokers	Characters revealed to have died from smoking
Persuaders	Characters explaining harms of smoking; Characters explaining benefits of quitting; Characters recommending calling quit lines;
Others	Victim of secondhand smoking, without direct mention of their views on smoking; Tobacco company executives discussing their marketing tactics

Many studies examined the effect of similarity between the audience and persuader character. It was found that if a solicitor wears clothes in a similar style (hippie vs. straight), they were more successful in garnering a small favor from strangers (Emswiller, Deaux, & Willits, 1971). In a similar fashion, similarity to a sales agent in appearance, lifestyle and socio-economic status was observed to result in better customer-agent relationship quality and greater sales effectiveness (Crosby, Evans, & Cowles, 1990). Incidental similarity with a persuader, such as shared hometown, birthday or name has been shown to positively affect the success rate of persuasion in selling products in face-to-face settings (Jiang, Hoegg, Dahl, & Chattopadhyay, 2010) as well as recruiting survey participants via e-mail (Guèguen, Pichot, & Le Dreff, 2005). In the health communication field, Wang and Arpan (2008) observed that subjects responded more favorably to anti-HIV messages promoting condom use when the spokesperson shown in the picture was from a matching ethnic background (Black vs. White). African American subjects who read persuasive messages with a Black spokesperson agreed more with the message than those who read messages with a White spokesperson; the difference was not significant for White subjects.

Some researchers chose to manipulate the exemplar rather than the persuader to match audience characteristics. In testing a tailored anti-smoking intervention program, Strecher and colleagues (2008) used different pictures of smokers to manipulate the depth of tailoring. The low-tailoring condition only matched the smoker's gender with the audience; the high-tailoring condition matched gender, age, and race, in addition to incorporating other factors such as stage of change, smoking history, marital status, and having children in the household into the message. In 6-month follow-up, those in the

high-tailoring condition showed significantly higher cessation rates. Curtis (2010) found that in tailored health communication promoting use of nicotine replacement patches, matching demographic factors of the former smoker testifiers to those of the audience enhanced perceived message effectiveness, which in turn was associated with intentions to use the patch. Another study tested tailored letters including pictures of women discussing their mammogram experience (Skinner, Strecher, & Hospers, 1994) – creating a match between the target audience and the exemplar on features such as race, age, and past screening experience improved the recipients' information recall and their mammography screening status.

The positive effect of similarity between the exemplar character and the audience is not limited to health communication or self-reported measures. In political communication, Ostfeld and Mutz (2014) have found that showing immigrants with skin color similar to the non-Hispanic White participants enhanced favorable attitude toward immigrant-supportive policy. Using fMRI, Xu and colleagues (Xu, Zuo, Wang, & Han, 2009) found that seeing painful stimulations on a same-raced person increased neural activation in the anterior cingulate cortex (ACC), a region of the brain known to activate when one feels physical pain – this result suggests an empathic process when exposed to others' painful experience, if the other is similar to the participant. In commercial advertisements, showing a product user whose gender is matched to the audience's enhanced their product evaluation (Hung & Wyer, 2014, Study 2). Notably, the effect of gender matching was greater when self-focused attention was induced by placing the subjects in front of a mirror. Hung and Wyer argued that self-focused attention made the audience think more about the implication of the exemplar character's experience for

themselves, which resulted in greater attentiveness to the character-audience similarity and, in turn, greater likelihood of imagining oneself as using the product. Such results show that there exists some empirical evidence on why character-audience similarity, especially those of exemplar, can facilitate persuasion.

Although many studies provide supportive evidence that character-audience similarity matters in enhancing persuasion, they do not answer the question of which character should be tailored to match the target audience in a multi-character message. Study 1 examines the different roles of characters on effectiveness of video PSAs and suggests that match with the smoker character matters more than the match with the persuader character in persuading current smokers to quit smoking.

Character-Audience Similarity and Message Engagement

Message engagement – that is, audiences' attention to and involvement with the message – is crucial in persuasion. There are multiple aspects of message engagement, all of which might be facilitated by character-audience similarity, and hence play a key role in the similarity-persuasion connection.

Similarity and identification with the character. Audiences generally engage with the message when they identify with the characters (Cohen, 2006). Identification is "an imaginative process through which an audience member assumes the identity, goals, and perspective of a character" (Cohen, 2006, p. 184). Actual or perceived similarity between the audience and character is expected to facilitate identification (Slater & Rouner, 2002). These theories of identification are closely linked to social cognitive theory (Bandura, 2009), which emphasizes observational learning through behavioral

modeling. Modeling is enhanced when models are similar to the audience (or to those the audiences want to be alike). Moyer-Gusé (2008) theorized that "perceived similarity and identification with a vulnerable character will enhance the persuasive effects of entertainment-education content by increasing a viewer's perceived vulnerability" (p.419). Audiences gain motivation and self-efficacy through identification (Slater, 2002), which increases the likelihood of engaging in the promoted behaviors (De Graaf, Hoeken, Sanders, & Beentjes, 2012). In commercial advertisements, character-audience similarity in race was shown to increase identification with the character, although the difference was significant only for culturally targeted or ambiguous ads, and not for so-called "rainbow" ads with multiple races and cultural cues present (Brumbaugh, 2009).

Identification and subsequent empathic connections with characters allows the audience to embrace the characters' experiences and perspectives with less resistance (Dal Cin, Zanna, & Fong, 2004). Character-audience similarity based on shared value rankings was also observed to reduce perceived threats to attitudinal freedom (Silvia, 2005) which is known to cause psychological reactance and negatively affect persuasive effect (Dillard & Shen, 2005).

Similarity and transportation. Narrative persuasion research uses the concept of transportation, "a convergent process, where all mental systems and capacities become focused on events occurring in the narrative" (Green & Brock, 2000, p. 701), to capture the audience's engagement with and absorption into the message. Green and Brock found in multiple experiments that transportation into narrative facilitates yielding to the persuasive messages therein (Green & Brock, 2000, 2002; Green, Brock, & Kaufman, 2004), reporting post-attitudes that are congruent with the narrative. Durkin and

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colleagues found that exposure to anti-smoking ads that contained personal stories (i.e. narratives) drove the positive effect of campaign exposure on smoking cessation (Durkin, Biener, & Wakefield, 2009). In a similar light, extended elaboration likelihood model (E-ELM; Slater & Rouner, 2002) sees absorption into the narrative as a key mechanism of entertainment education by holding audience attention and discouraging counter-arguments.

Engagement with the message itself is likely to be enhanced by the presence of characters, especially the ones that are similar to the audience. Green (2004) found that seeing characters that undergo similar experiences as the audience will increase transportation into the narrative. In a study using films related to cervical cancer, Mexican Americans reported significantly stronger transportation, identification and emotion toward narrative featuring Latina characters than European Americans (Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013). A recent meta-analysis found that experimental manipulation of objective similarity between character and audience was able to yield significantly greater transportation (Tukachinsky, 2014). In commercial advertisements using narratives, character-audience similarity based on demographics was shown to enhance transportation, which in turn enhanced more favorable attitude toward the promoted products (van den Hende, Dahl, Schoormans, & Snelders, 2012).

Similarity, perceived relevance and message elaboration. Other theories such as the elaboration likelihood model (ELM; Petty & Cacioppo, 1986) also imply that in certain conditions character-audience similarity can facilitate central processing when audiences think the events described in the message are likely to occur to them because they happened to those who are similar to themselves (Briñol & Petty, 2006; Fleming &

Petty, 2000). The deliberate nature of central processing, or higher engagement, can in turn enhance persuasion, provided that the argument is strong and generates mostly favorable thoughts.

Tailored and targeted communication may enhance persuasion through this mechanism. Tailoring and targeting often utilizes characters that look and/or behave similarly to the target audience as their persuaders or exemplars in delivering persuasive messages. Jensen and colleagues indeed found the effect of tailored messages on promoting mammograms was fully mediated by perceived personal relevance (Jensen, King, Carcioppolo, & Davis, 2012). A concept similar to perceived relevance is self-referencing (Burnkrant & Unnava, 1989, 1995), which refers to the process where audiences relate the message to themselves. De Graaf (2014) found that character-audience similarity increased self-referencing which in turn resulted in greater perceived risk for intestinal cancer.

ELM suggests various mechanisms by which tailored (and targeted) communication, and the character-audience similarity which often accompanies such strategies, may facilitate persuasion at different levels of elaboration likelihood (Briñol & Petty, 2006; Petty, Barden, & Wheeler, 2009). First, when elaboration likelihood is moderate, the increase in perceived relevance caused by tailoring and targeting strategies may motivate one to engage in central processing. Kreuter and colleagues (Kreuter, Bull, Clark, & Oswald, 1999) found that tailoring indeed yielded more favorable thoughts, which may be taken as an indicator of central processing of messages. Other studies reporting that targeted or tailored messages were more likely to be read, re-read, and remembered again suggest deeper information processing is involved (Rimer et al., 1994; Skinner et al.,

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1994). In another study, tailored messages along with telephone interviews affected the

behavioral outcome mediated by increase in perceived relevance, trust, and recall of the

message (Ko, Campbell, Lewis, Earp, & DeVellis, 2011). On the other hand, when

elaboration likelihood is low, character-audience similarity may function as a peripheral

cue (Fleming & Petty, 2000). This may enhance the audience's liking of the message,

rendering it more acceptable. When elaboration likelihood is already high among the

audience, tailoring can lead to favorably biased processing, and therefore affect message

acceptance (Chaiken & Maheswaran, 1994; Petty et al., 2009).

   This body of research suggests that seeing a similar smoker character in anti-smoking

campaigns would result in greater identification, engagement and perceived relevance of

the message, which in turn would enhance the message effectiveness. Study 1 provides

some additional support for these claims.

When Similarity Fails to Facilitate Persuasion

   While many studies mentioned above have found positive effect of character-

audience similarity on persuasion, not all results are consistent, especially regarding

similarity on superficial features such as demographics (e.g. Brosius, 1999). Researchers

emphasize that perceived similarity would matter for identification, and that the sources

of perceived similarity are diverse, including commonalities in demographics, situation

and personality traits (Cohen, 2006). Indeed, De Graaf and Hustinx (2011) observed that

objective similarity manipulated via gender matching in an experimental setting failed to

affect perceived similarity; also, while perceived similarity affects identification with the

character and story-consistent beliefs, objective similarity in itself failed to yield such

significant results. It is possible that the social attraction facilitated by commonalities between persuader and the audience may not exert a direct positive effect on attitude changes (Simons, Berkowitz, & Moyer, 1970). The effect of objective, rather than perceived, similarity may be more subtle and indirect. As the evidence mentioned in the previous section shows, a more proximal outcome such as message engagement and/or identification with the character as mediating variables would be necessary to better understand the effect of character-audience similarity on message persuasiveness.

Character-audience similarity may also backfire on persuasion in some circumstances. One experiment used a TV show where the main character engages in binge drinking, and the audience reported significantly higher perceived similarity when they were told that the character was, similar to themselves, a college student. A follow-up survey showed that higher perceived similarity lowered the audience's perceived risk and induced more favorable attitudes toward binge drinking behavior (McKinley, 2010). In a textual narrative portraying the negative effect of using study drugs, character-audience similarity based on study drug usage experience backfired by lowering the audience's risk vulnerability (K. H.-K. Kim & Shapiro, 2013).

It is worth noting that these two studies feature distinctly different contexts from that of the present study. In McKinley (2010), the stimulus featured a main character who did not exhibit any resentment about the binge drinking behavior, which may have affected the extent the participants like or dislike the character. Having only one stimulus may cause case-category confounding (Jackson, 1992) where this type of other message features interfere with the effect of the intended independent variable; this issue can be addressed by using multiple stimuli that represent each condition, which will be

discussed more closely later. In the case of study drug message (K. H.-K. Kim & Shapiro, 2013), the character-audience similarity was limited to the drug usage experience. In contrast, this dissertation focuses on smoker-audience similarity based on demographics and quitting status, and assumes similarity based on experience (i.e. smoking) in all cases, since the main target audience of the messages is current smoker. However, these two studies suggest that there can be some boundary conditions for the effect of character-audience similarity on persuasion, especially regarding the audience's psychological reactance.

Similarity and psychological reactance (1): Threats to freedom. Psychological reactance may motivate audiences to reject persuasive messages. One critical cause of psychological reactance is perceived threat to freedom, which frequently motivates audiences to denigrate the source of threats, deny the threats, and otherwise attempt to undermine message effects. In worse cases, reactance might end up creating boomerang effects where the audience behaves in the opposite direction to what is promoted in the persuasive messages (Dillard & Shen, 2005).

Character-audience similarity was observed to reduce perceived coercion in some cases (e.g. Silvia, 2005), but not in others. In experiments using product placement (PPL) in textual narrative (Bhatnager & Wan, 2011), the effect of character-audience similarity on persuasion interacted with immersion into the story, so that matching the character and audiences' school enrollment resulted in more favorable attitudes toward the promoted brand, but the direction reversed when the audience were instructed to be immersed into the message. This shows that character-audience similarity enhanced the ease of

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engagement with the story, which is a cognitively burdensome activity. While such engagement did enhance audiences' ability to process the message and brand recall, it also made it easier for them to notice the persuasive intent of the message. This increases the perceived threat to attitudinal freedom and subsequent reactance. It should be noted that this study used a PPL strategy, embedding persuasive messages in an otherwise unrelated narrative, and is therefore very different from PSAs. However, these studies do suggest that stronger message engagement, facilitated by character-audience similarity, can also backfire in certain situations by invoking threats to freedom.

Similarity and psychological reactance (2): Excessive negative emotion. Another facet of psychological reactance involves excessive negative emotions induced by the messages. As mentioned earlier, character-audience similarity and subsequent identification with the character in persuasive messages would allow the audience to be engaged in the message and to experience the appeals and arguments in stronger way. In this light, character-audience similarity is expected to enhance the results of emotional appeal used in persuasive messages. One key implication is that overly strong appeals to emotions like guilt and shame can result in a boomerang effect.

Guilt refers to the negative affect due to the moral discrepancy between one's standard and one's behavior. The behavior can affect both self and others, but actions affecting others may yield greater guilt than actions affecting self (Morey et al., 2012). Guilt appeals with regard to the actions affecting others emphasize targets' damaging and hurtful behavior, and predictably, resonate particularly strongly in the context of close relationships (O'Keefe, 2002). In this sense, secondhand smoking (SHS)-themed anti-

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smoking messages can be said to involve guilt appeals that claim smoking endangers others, which impact is even more amplified when those 'others' are close to the smoker (e.g. family members vs. strangers). While guilt appeals can be quite effective (e.g. Lee & Paek, 2012), some researchers warn of potential psychological reactance following the induction of guilt. O'Keefe argues that explicit guilt appeals can evoke negative emotions such as anger and resentment, and thereby undermine the persuasive process (O'Keefe, 2000, 2002). Coulter and Pinto (1995) provide empirical evidence of guilt backfiring on commercial marketing. In their study, guilt appeals were negatively associated with attitude toward the advertisements and promoted brands, and positively associated with perceived manipulation by the ad. The effect of the guilt appeal was mediated by negative emotion such as anger, annoyance and irritation. This is closely related to the studies on psychological reactance mentioned earlier, where reactance was operationalized using anger and negative connotation (Dillard & Shen, 2005; Quick & Stephenson, 2007).

Shame is closely related to the emotion of guilt, but is regarded as a distinct concept. Brennan and Binney (2010) found that people often feel guilt as a prerequisite of shame, and both are regarded as carrying "messages about the moral consequences of one's action and 'doing the right thing'" (p.144). Both shame and guilt arise from the feeling of moral transgression, and involve a similar level of perceived severity and responsibility for the event (Tangney, Miller, Flicker, & Barlow, 1996). However, Tangney and colleagues also found that shame is often rated as a more intense and aversive experience. Shame and guilt were shown to be distinct from each other in a number of empirical studies: For example, Duhachek and colleagues (Duhachek,

Agrawal, & Han, 2012) showed that guilt appeals are more effective when coupled with gain frames, while shame appeals are more effective with loss frames. Agrawal and Duhachek (2010) found that a message depicting others as sufferers induced more guilt, while a message depicting others as observers induced more shame.

It is undeniable that shame appeals are often effective in promoting certain behaviors (de Hooge, Breugelmans, & Zeelenberg, 2008; Gerber, Green, & Larimer, 2010). However, shame, just like guilt, can backfire when the associated negative emotion is too strong. Ahmed and colleagues suggested that the stigmatization appeal, which is a very strong shame appeal, may decrease audiences' norm compliance (Ahmed, Harris, Braithwaite, & Braithwaite, 2001).

An anti-SHS PSA, portraying a smoker character immoral enough to smoke around other non-smokers and endanger others' health, is already employing quite strong guilt and shame appeals. Many PSAs show smokers harming close others, which can strengthen those emotions even further. When the stigmatized smoker character is very similar to the audience, it may backfire and result in psychological reactance due to the amplified negative affect. On the other hand, the same appeal may still be effective for those who do not find themselves to be sufficiently similar to the negatively portrayed smoker character.

Similarity and social identity. The positive effect of similarity on persuasion draws on the concept of in-group. Recognizing the shared characteristics, one identifies with the target of the similarity assessment, and there forms the basis for greater engagement and persuasion. However, when similar others are shown to possess undesirable qualities, such as having disagreeable personalities or behaving immorally, this may cause negative

affect, threaten audiences' identity, and ultimately generate a boomerang effect of smoker-audience similarity. Taylor and Mettee (1971) found that a confederate who behaved obnoxiously during an experiment was disliked more when subjects were told that they had similar personality scores; and the difference was greater when it was suggested that the subjects themselves may also possess an obnoxious personality. Since at least some of the effect of similarity on persuasion is associated with liking, this suggests that similarity may dampen the persuasive effect if the target of similarity assessment is regarded unfavorably.

Social identity theory posits that individuals' social identity, the self-conception as a group member, defines their self-concepts and people are motivated to maintain a positive feelings about their social identity (Tajfel & Turner, 1979). When the value of that social identity is called into question, people regard it as a psychological threat which must be avoided, reduced or resisted (Branscombe, Ellemers, Spears, & Doosje, 1999).

The response to social identity threats can take various forms. First, people strive to maintain a positive self-concept, and thus may disidentify themselves from the group associated with damaged morality in an attempt to protect their social identity and self-esteem (Elsbach & Bhattacharya, 2001). It was observed that when the group's status is threatened, people especially of lower identification with the group try to distance themselves from the group identity (Doosje, Spears, & Ellemers, 2002).

Endangering others through secondhand smoking is widely considered an immoral and irresponsible behavior, and it is especially framed so in an anti-SHS PSA. While shared characteristics between the audience and the smoker character may normally suggest a shared social identity (i.e. in-group), the audience may attempt to distance oneself from

the smoker character when the smoker character's morality is in question in order to protect one's own identity and moral images.

As another form of response to social identity threat invoked by seeing a similar character committing moral transgression, people may engage in defensive reactions. When faced with collective guilt due to the wrongdoings of the in-group, one strategy to alleviate the aversive psychological state is legitimizing the behavior by blaming the victims. For examples, the Nazis blamed the Jews for the economic and social challenges that Germany faced during World War I, and therefore regarded that the Jews deserved what they had to suffer (Wohl, Branscombe, & Klar, 2006). Similarly, in response to the social identity threats related to racial discrimination against African Americans, White subjects were observed to report higher racial prejudice against Blacks on a 'modern racism' scale (Branscombe, Schmitt, & Schiffhauer, 2007).

Similar observations are available from research on media entertainment. Tsay and Krakowiak (2011) observed that identification with and perceived similarity to the narrative character is positively associated with moral disengagement, where the readers evaluate the character's immoral behaviors as acceptable. This is based on disposition theory (Raney, 2003, 2004) on media enjoyment as well as moral sanction theory (Zillmann, 2000), where audiences hope for good outcomes for liked and/or "morally deserving" characters and bad outcomes for disliked and/or immoral ones (Tamborini et al., 2013). Since character-audience similarity can enhance character liking, it will be hard to accept that the similar (and thus liked) characters are morally wrong. One obvious way to resolve this conflict is to justify the characters' behavior. This can be

particularly problematic when the immoral character does not show any remorse about the behavior (e.g. McKinley, 2010).

The strategies may take different forms when examining audience responses to different anti-smoking PSAs. If audiences are more likely to disidentify themselves from the negative smoker character, they will report lower identification with the similar smoker character when the suggested consequences of smoking involve innocent others and are more severe, when compared to those who are exposed to low-severity and/or self-harm messages. Since greater identification with characters is expected to reduce counter-arguing (Moyer-Gusé, Chung, & Jain, 2011) and mediate the effect of narrative persuasion (De Graaf et al., 2012), the disidentification is expected to lower the message's persuasiveness, or at least nullify the positive effect of smoker-audience similarity on persuasion which otherwise would be observed.

On the other hand, if audiences are more likely to morally disengage, when a current smoker audience sees a smoker character in a PSA who is endangering others and is similar to oneself, it is possible that the audience may attempt to justify the behavior and/or reject the argument that it is wrong to smoke around others. This will significantly reduce the anti-SHS message's effectiveness. Audiences would still report higher identification with similar smokers than dissimilar ones regardless of the nature and severity of consequences, but due to the differential justification, the otherwise positive effect of smoker-audience similarity will either disappear or become negative for high severity messages.

In either way, this may point to a very important implication for message design. Tailoring and targeting strategies and matching the smoker character's characteristics to

that of the target audience incur extra effort and cost. Therefore, it is crucial to

understand if there are any boundary conditions that can undermine the tailoring effort.

Study 1: Character-audience Similarity in Anti-smoking PSAs

The first study in the sequence examined the effect of character-audience similarity on the perceived effectiveness (PE) of anti-smoking PSAs. Study 1 presents part of a published study (M. Kim, Shi, & Cappella 2016). The published study distinguished smoker and persuader characters, and explored their different roles in audiences' response to the messages. The results indicate that smoker-audience similarity exerts significant, positive indirect effect on perceived effectiveness (PE) via engagement, while persuader-audience similarity does not. The results presented here focuses on the smoker character, providing a basis for the main experiment (Study 3).

Hypotheses

Many studies have provided supportive evidence that character-audience similarity matters in enhancing persuasion, but in many cases the studies do not distinguish different roles of characters, such as persuaders (those who deliver the message) and exemplars (those who share the same experience with the target audience, who may or may not deliver the message), in our case the smoker character. This study aims to examine the role of characters in how they affect the audience's perceived effectiveness of and engagement with the persuasive message. Also, based on the identification and transportation theories, this study examines the mediational role of engagement on persuasion.

H1. Smoker-audience similarity will increase the audience's PE of anti-smoking PSAs.

H2. Smoker-audience similarity will increase the audience's engagement with the anti-smoking PSAs.

H3. Engagement will mediate the relationship between smoker-audience similarity and PE.

Method

Participants. Study 1 is based on a secondary analysis of two tobacco control studies conducted in 2009 (Survey 1) and 2010 (Survey 2), using a nationally representative sample of current smokers from the *GfK Custom Research* (formerly *Knowledge Networks*) web-based panel. Each participant watched and evaluated four anti-smoking PSAs randomly selected from a pool of ads and provided message evaluation. A total of 1,160 respondents participated in two surveys, and 4,588 evaluations were included in the analyses due to the missing responses. The mean age was 47.9 years old, $SD = 11.49$. 51.1% were female. The majority reported being non-Hispanic European American/White (75.4%), 10.3% as non-Hispanic African American/Black, and 14.2% as other or mixed race.

PSAs. Survey 1 and 2 used 60 and 40 television anti-smoking PSAs, respectively. Three independent coders watched the 100 PSAs and coded information about smoker and persuader characters (see Table 1 on p. 11 for more information on types and roles of characters). A smoker is defined as someone who is explicitly shown to be smoking a cigarette, or whose smoking habits or history is explicitly talked about. Both former and

current smokers were considered as smoker characters. A current smoker is someone who is explicitly shown as currently engaging in smoking (e.g. shown with lit cigarette, shown as smoking a cigarette), or verbally referred to as a current smoker (e.g. mentions one's own smoking habit, others talk about his or her smoking habits). In some cases, the smoker character was not visible on the screen, but mentioned by others (e.g. a man talking about his grandmother who died from smoking).

Smoker characters were first identified, and then coded for their gender (male vs. female), race/ethnicity (White vs. Black vs. other/can't tell), and age (baby/children vs. adolescent/teenager vs. 20-30 year-old young adults vs. 31-45 year-old middle aged adults vs. 46-60 year-old mature adults vs. over 60 year-old seniors vs. can't tell). Quitting status (former smoker vs. trying to quit vs. not trying to quit vs. deceased) was also coded; the smokers who explicitly mentioned their intention or effort to quit smoking, or using instruments to help cessation such as nicotine patches, were considered to be trying to quit (kappa ranged between .72 to 1.00).

It should be noted that not all PSAs feature both or either of smoker and persuader characters. Out of the 100 PSAs, 37 PSAs did not have a distinctive smoker character.

Measures. Smoker-audience similarity was calculated using multiple matching criteria – race, gender, age and quitting status. In terms of quitting status, the subject's response to stages of change was dichotomized into "not trying to quit (0-5)" and "trying to quit (6-10). 576 (49.7%) fell into the "trying to quit" category, and 584 (50.3%) were in the "not trying to quit" category.

Each criterion was given a 1 if the character and subject matched and 0 if they did not match. The matching scores on the four criteria were summed to form the final smoker-

audience similarity score, median = 2, *IQR* = 1-3; zero in the summed similarity score

would mean that the smoker character and the audience are completely dissimilar from

each other. For example, if John (male, white, 65, trying to quit) watched a PSA that

depicted a smoker (male, white, young adult, not trying to quit), he would get a 2 on his

similarity with the smoker character; if he instead watched a PSA showing a young black

female smoker, who is using nicotine gum to quit ("trying to quit"), John would score

zero on the similarity score. When multiple smokers were present, all of them were

coded for their demographics and quitting status, and a similarity score was calculated

based on shared characteristics across any of the characters. Therefore, if John from

above example watched a PSA with two smokers (A: white, female, young adult, not

trying to quit; B: black, female, senior, trying to quit), John would get a 3 on his smoker-

audience similarity score – one for race-matching with A, one for age-matching with B,

and one for quitting status-matching with B. By employing this approach, those who

watch PSAs with multiple smokers are more likely to have higher smoker-audience

similarity (association between number of smokers and smoker-audience similarity score:

γ = .55 among the 63 smoker-present PSAs). Therefore, number of smokers (0, 1, 2, 3,

4+) was used as control variable in all analyses.

    Key DVs were engagement (based on Green and Brock (2000): (a) I could picture

myself in the scene of the events shown in the ad, (b) The ad affected me emotionally, (c)

The events in the ad are relevant to my everyday life; Cronbach's alpha = .82; *M* = 2.73,

SD = 1.00) and perceived effectiveness (PE, based on Bigsby, Cappella & Seitz (2013):

(a) This ad was convincing, (b) Watching this ad helped me feel confident about how to

best deal with smoking, (c) The ad put thoughts in my mind about quitting smoking, (d)

The ad put thoughts in my mind about continuing to smoke. (d) was reversed and then averaged with (c) to create a valenced thoughts measure, which then were averaged with (a) and (b) to create PE; Cronbach's alpha = .75, $M = 2.98$, $SD = .82$). Control variables included subject characteristics (race, gender, age, quitting status), message features (argument strength, MSV, presence of narrative, number of smokers) and survey ID.

Analysis. Each respondent watched four PSAs; each PSA was shown to multiple respondents ranging from 23 to 75 ($M = 46.40$, $SD = 13.65$). The responses were not independent as each response was doubly-nested within a PSA as well as within a respondent, and therefore a cross-classified model was fitted in order to properly analyze the data, using multilevel mixed-effects linear regression in STATA 12. Also, joint significance tests (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) were used to assess the existence of any indirect effect of smoker-audience similarity on PE via engagement.

The smoker-audience similarity score was treated as an ordinal variable. Since there were relatively few cases with the highest scores, the two highest scores (3 and 4) were grouped together, resulting in four categories for smoker-audience similarity (0, 1, 2, and 3+).

Results

The first notable finding from the analyses is that the presence of character exerted quite a strong influence on both engagement and PE. The no-smoker PSAs (N=37) were evaluated significantly lower in both engagement and PE (See Table 2).

Table 2. Mean engagement and PE of PSAs categorized by presence/absence of characters

	# of PSAs	# of Responses	Engagement			PE		
			M	SD	95% CI	M	SD	95% CI
All PSAs	100	4,588	2.73	0.36	2.67 ~ 2.81	3.00	0.27	2.94 ~ 3.05
Smoker-present PSAs	63	2,872	2.85	0.37	2.76 ~ 2.94	3.09	0.27	3.02 ~ 3.15
No-smoker PSAs	37	1,716	2.54	0.27	2.45 ~ 2.63	2.85	0.22	2.78 ~ 2.92

Note. Number of responses refers to the number of responses excluding missing data on PE. More responses were missing for engagement, resulting in smaller sample size for models with engagement as a dependent variable.

Smoker-audience similarity can only be assessed when characters are present. If those who watched no-smoker PSAs also score zero for the smoker-audience similarity, the aforementioned difference between no-smoker and smoker-present PSAs would drive the effect of smoker-audience similarity. Moreover, this would result in a multicollinearity problem due to a strong association between number of characters and character-audience similarity, $\gamma = .89$ among all 100 PSAs. Therefore, the following analyses excluded the 37 no-smoker PSAs. This allowed a more conservative test of the hypotheses, restricting the definition of dissimilarity (vs. similarity). The observed effect among smoker-present PSAs is over and above the positive effect of character presence.

Overall, the effect of smoker-audience similarity on message engagement was significant, $\chi^2(3) = 7.83$, $p = .05$. For PE, smoker-audience similarity did not exert significant effect, $\chi^2(3) = 4.39$, $p = .22$. However, engagement was found to be significantly associated with PE after controlling for relevant character-audience similarity ($B = .48$, $SEs = .01$, $p < .001$). According to the joint significance test, one can reject the null hypothesis that the indirect effect of X on Y via M is zero when the effect of X on M and that of M on Y, controlling for X, are statistically significant. Since

smoker-audience similarity was observed to exert a positive effect on engagement and

engbagement was significantly associated with PE, a mediation effect of engagement

between smoker-audience similarity and PE was supported (Muller, Judd, & Yzerbyt,

2005). See Table 3 and Figure 1 for detailed analyses results.
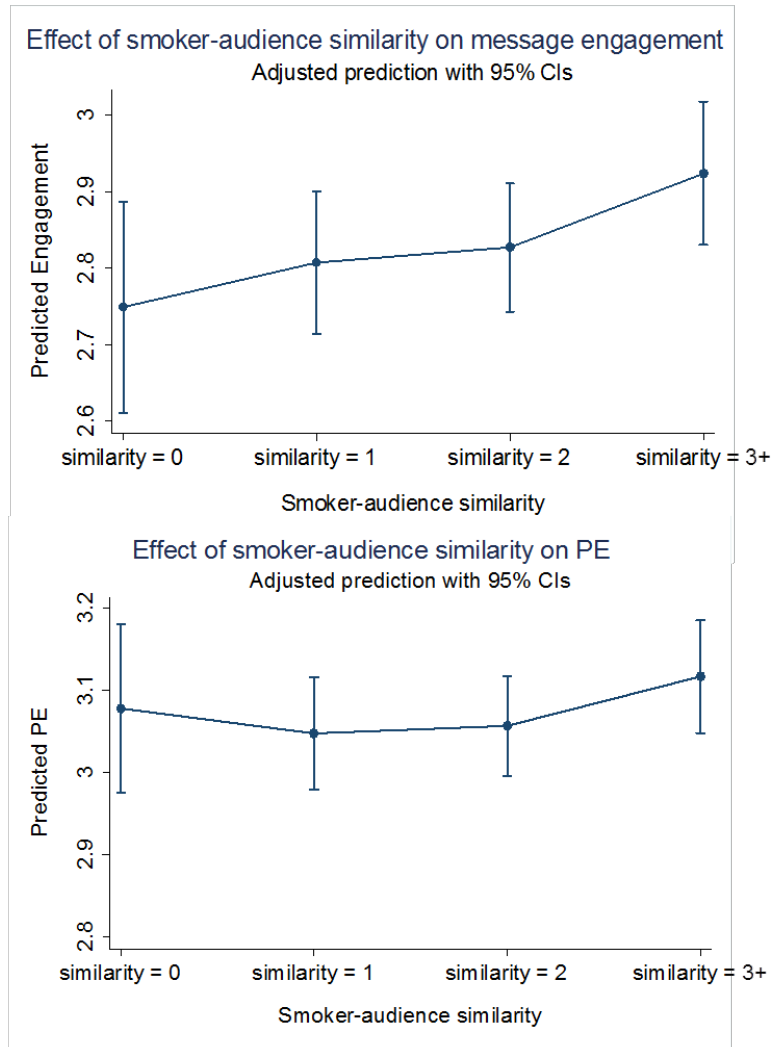
Figure 1. Predicted engagement and perceived effectiveness (PE) at different points of smoker-audience similarity. Estimated means and 95% confidence intervals are shown. Predicted values are adjusted with all control variables held at their mean score. Control variables include age, race, gender, quitting status, argument strength, presence of narrative, message sensation value (MSV), number of relevant characters and Survey ID (see Table 3 for further information on the statistical models).

Table 3. Effect of smoker-audience similarity on engagement and PE for smoker-present PSAs

Variable	on Engagement		on PE	
	B	*SE*	*B*	*SE*
Smoker-audience similarity				
Similarity = 1	**.06**	**.07**	**-.03**	**.05**
Similarity = 2 / 2+	**.08**	**.07**	**-.02**	**.05**
Similarity = 3+	**.18 ***	**.08**	**.04**	**.06**
Age	.00	.00	.00	.00
Race: black	.26 **	.08	.36 ***	.07
Race: other	.00	.07	-.08	.06
Gender: female	.19 ***	.05	.13 **	.04
Quitting status	-.33 ***	.05	-.29 ***	.04
Argument strength	.14 ***	.03	.08 ***	.02
Narrative	.27 ***	.08	.23 ***	.05
MSV	.00	.01	.00	.00
Number of characters				
2	-.07	.12	-.06	.08
3	.07	.20	.10	.13
4+	-.02	.10	.03	.06
Study ID	-.13 +	.08	-.11 *	.06
Constant	3.11 ***	.22	3.50 ***	.16
Omnibus test for similarity	$\chi^2(3) = 7.83$*		$\chi^2(3) = 4.39$	
N. of total observations	2,843		2,872	
N. of groups - PSA	63		63	
N. of groups - individual	1,140		1,144	
Random effect: variance (SE)				
PSA level	.05 (.01)		.02 (.01)	
Individual level	.36 (.03)		.29 (.02)	
Residual	.50 (.02)		.28 (.01)	

Note. All coefficients are unstandardized. For smoker-audience similarity, reference category (omitted) is similarity = 0. Age: raw age response; Race: White is reference category; Gender: Male is reference category; Quitting status: 1 = trying to quit, 2 = not trying to quit; Argument strength: normalized argument strength score within the two evaluation datasets; Narrative: 0 = narrative absent, 1 = narrative present; MSV = Message Sensation Value: sum of MSV scores, with 10 as maximum for number of cuts or edits; Survey ID: 1 = Survey 1, 2 = Survey 2.
*** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

Discussion

The goal of study 1 was to test the effect of character-audience similarity on the persuasiveness of anti-smoking PSAs. The results indicate that smoker, as a key character in anti-smoking PSAs, exerts significant indirect effects on PE via engagement when similar to the audience. Considering the fact that this result is obtained from a set of 63 smoker-present anti-smoking PSAs, with a range of different themes, message features and varying level of argument strength, the concern for case-category confounding is greatly reduced, thereby increasing confidence in the association between similarity, engagement, and PE.

This study provides valuable insights in designing anti-smoking PSAs: First, it is crucial to show a distinctive smoker character. The elevated score for engagement and PE when PSAs have smokers strongly support this. Effective anti-smoking PSAs are likely to profit from employing distinctive characters so that the audience can identify with them and engage with the message. It is worth noting that narrative structure can explain at least some of the effect of character presence as shown in Table 2. By definition, narrative format inherently requires the presence of relevant characters. Indeed, the presence of narrative format in PSAs is strongly linked to the presence of smoker character ($\gamma = .93$). There is almost no case where PSAs with narrative format ($n = 29$) did not feature one or more smoker characters; however, 36 out of 37 no-smoker PSAs were non-narrative. As the close association suggests, part of the effect of character presence may have been driven by the presence of narratives, which has been shown to facilitate persuasion in anti-smoking PSAs (Durkin et al., 2009). However, the analyses examining the effect of smoker-audience similarity on engagement and PE

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included the presence of narrative as a covariate (see Table 3). Also, when the 71 non-narrative PSAs were examined separately, the presence of smoker character still had noticeable effect on both engagement and PE (all $ps < .10$). This suggests that the presence of character can in itself enhance message effectiveness without the presence of narrative.

In addition to the presence of characters, the number of characters may also have affected message evaluation. As mentioned earlier, the more characters are present in a PSA, the more likely an audience finds a match with the character; the data indeed support the expectation. While this may suggest the potential benefit for "rainbow" ads where multiple characters represent diverse subgroups, the current study found that presenting single vs. multiple characters did not yield significant difference on PSA evaluations. When the similarity score was calculated using ratio of observed matches out of all possible matches, the results also did not change. Character-audience similarity was observed to exert positive effect on message engagement over and above number of characters.

In spite of the significant results, it would be naïve to expect similarity to trump all other factors that can lead an anti-smoking message to be effective. Certain themes in anti-smoking PSAs, for example SHS, may interact in a negative way with smoker-audience similarity. When smokers are depicted as committing a moral transgression by endangering others, similarity and subsequent identification with the smoker character may backfire and result in psychological reactance against the message. This would be more pronounced if the consequences of the smoker character's transgression are more

severe, such as harming their own family members and/or children (vs. endangering adult strangers).

Therefore, Study 2 was conducted to explore if there is differential effect of smoker-audience similarity between low- and high-severity SHS-themed PSAs, expecting that in high-severity PSAs the positive effect of smoker-audience similarity would disappear, or even flip over to exert negative effect on message evaluation.

Study 2: Character-audience Similarity and Severity

in the SHS-themed Anti-smoking PSAs

To explore if there is a boundary condition for the effect of smoker-audience similarity on the persuasiveness of anti-smoking campaigns, a second study was conducted using secondhand smoking (SHS)-themed anti-smoking PSAs, focusing on how the smoker character is depicted within a PSA. If the consequences of SHS shown in a PSA is highly severe, than the audience might see the smoker who provide the cause for the consequences is depicted as more immoral than when the consequences are not as severe. This study is very much exploratory in nature, since the main goal is to examine whether the hypothesized boundary condition can possibly exist, and can be observed in the expected direction with data where we already know that a positive effect of character-audience similarity exists. If this effect is conditioned at all by how the smoker character is depicted within the PSA, that would provide impetus for exploring this issue in detail and with studies designed specifically to evaluate its impact. Only a relatively small subsample of the data was eligible, undermining the power of the test.

Moral Judgment about Secondhand Smoking

Smoking cigarettes brings about many negative consequences, and many campaigns use them as the main argument to promote smoking cessation. The nature of consequences shown in the campaign messages varies according to who the victims are, and whether the smokers are suffering. Some of the consequences directly affect the

smokers, and the smokers only; their appearance (e.g. yellow teeth, aging skin), social relationships (e.g. rejected by others due to smell or bad breath), and health (e.g. lung cancer, heart diseases). Negative health effects on smokers may subsequently affect their non-smoking friends and family members – for example, family members may face emotional and financial difficulties when the smoker becomes ill or dies. Another category of consequences is due to SHS, which features several key differences. In the above examples, non-smokers are victims of 'indirect' emotional and financial suffering which do not affect their health directly. A large bulk of the suffering is reserved for the smokers themselves. In the case of SHS, however, the smokers do not suffer, at least not immediately, and not in the timeframe depicted in the SHS-themed messages. It is the non-smokers who suffer from negative health consequences of the smokers' behavior, and in the messages, it is they who bear almost all of the depicted negative consequences. This makes the smoker character in SHS-themed PSAs appear more irresponsible, and characterizes their behavior as serious moral transgressions.

Many smokers *do* recognize the negative consequences of secondhand smoking but they continue doing that in spite of the knowledge: 44% of smokers responded that they think secondhand smoking is "very harmful" to adults, and another 35% responded that secondhand smoking is "somewhat harmful" (Gallup, 2013). It is worth noting that a sizeable number of smokers do admit that secondhand smoking can pose substantial harm on others even as exposure to second-hand smoke remains prevalent. During 2007-2008, 40% of non-smoking adults in the US were exposed to secondhand smoke (Centers for Disease Control and Prevention, 2010). This suggests that many smokers persist in smoking behavior that puts others at risk in spite of their beliefs about the outcomes of

secondhand smoking, which renders them even more morally culpable for the consequences when compared to the harm done without knowing (Young & Saxe, 2011).

Therefore, the effect of smoker-audience similarity in SHS-themed PSAs works in rather distinct ways from messages emphasizing negative consequences on smokers. Since the major consequences are not on the smokers themselves, SHS-themed PSAs utilize different types of guilt appeal. Due to this reason, Study 2 focuses only on SHS. Messages utilizing other themes and the effect of smoker-audience similarity within those messages should also be examined, but are beyond the scope of this study, and should be addressed in future studies.

This study, like Study 1, is a secondary analysis of previous tobacco control studies, but 100 more anti-smoking PSAs were added to the dataset from two additional surveys to increase the number of applicable PSAs. A subset of the data was taken from the full dataset so that the effect of smoker-audience similarity in SHS-themed PSAs can be specifically explored.

Hypotheses

Study 1 found that in general, smoker-audience similarity can facilitate the acceptance of anti-smoking messages. However, it is possible that there are some boundary conditions where the effect disappears, or even backfires - especially when the PSA invokes too strong negative emotions and/or threats to the smoker's social identity. The basic idea is to ask whether a smoker would still be willing to identify with a character who is demographically similar but behaving in a morally marginal way, such as causing a highly severe consequence to others via secondhand smoking.

H1. Smoker-audience similarity will increase the audience's perceived effectiveness (PE) of SHS-themed anti-smoking PSAs.

H2. Smoker-audience similarity will interact with victimization severity, so that the effect of smoker-audience similarity disappears or becomes negative among high-severity SHS-themed anti-smoking PSAs.

Method

Participants. Datasets from four previous tobacco control studies conducted in 2006 (Survey 0)[1], 2009 (Survey 1), 2010 (Survey 2), and 2012 (Survey 3) were used. Survey 1 and 2 are the same as the ones used in Study 1, Effect of character-audience similarity on the perceived effectiveness of anti-smoking PSAs. A total of 2,320 current smokers participated in the four surveys. The mean age was 50.25 years old, $SD = 12.73$. 48.06% were female. 79.09% reported being non-Hispanic White, 8.92% non-Hispanic African American, and the remaining 11.98% as other or mixed race.

PSAs. The four surveys used 32, 60, 40 and 68 television anti-smoking PSAs respectively (total 200 PSAs). 100 PSAs were coded for the smoker's demographics (race, gender, age and quitting status) by three independent coders as reported in Study 1. The remaining 100 were coded by two different independent coders. The coders were trained using the previously coded 100 as a "Gold-standard." Since the reliability with

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[1] Survey 0 was excluded from Study 1 because the measurement of interest (PE) was not consistent to other studies. This data was included in Study 2 because the number of SHS-themed PSAs was small in the dataset.

the Gold-standard set was initially low (kappa ranged from .60 to 1.00), two more training sessions were conducted using similar anti-smoking PSAs, and the two coders reached high inter-coder reliability (all kappas > .90). About 30% of the PSAs were coded by both of the coders, and the kappa ranged between .88 and 1.00. The remaining PSAs were divided between the two coders to be coded independently.

A separate group of two independent coders conducted another coding procedure regarding the severity of victimization in SHS-themed PSAs. SHS-themed PSAs (N= 46) were included in this coding procedure. Victim characters in this study were determined as those who are suffering physically from someone else's smoking. Therefore, smoker characters were not included in this coding procedure even if they were suffering from disease. The suffering that nonsmoker victims go through can be as mild as coughing due to the smoke, or as severe as being diagnosed with lung cancer. Although suffering of nonsmokers can include emotional burden and depression due to the illness and death of family members who are smokers, the present study focuses on the physical suffering directly from the secondhand smoke only. The extent of suffering (no sign of suffering vs. unpleasant experience vs. disease due to SHS vs. died from SHS), as well as the victim character's information (relation to the smoker; if the victim is a baby or a child, or a pregnant woman) were coded. Inter-coder reliability (kappa) ranged between .75 and 1.00.

Consistent with Study 1, only smoker-present PSAs were included in the analyses. There were 29 smoker-present SHS-themed PSAs.

Measurements. Smoker-audience similarity was calculated in the same way as Study 1. To replicate the proposed main study, where the participants will be exposed to messages with either an all-matching or none-matching smoker character, only those who scored zero and 3+ were included in the analyses, resulting in 517 observations.

Victim severity was calculated as an index. Each category was given one or zero: a) Victim is ill or dead due to SHS (vs. having unpleasant experience due to SHS), b) Victim has some relationship between victim and smoker (vs. stranger); c) Victim is smoker's family member, d) Victim is a baby or child, and e) Victim is pregnant woman. The coding scheme is designed to weight family members greater than other acquaintances, so that if a PSA scores one for (c), then it also scores one for (b). The scores were then summed to create victim severity score ($M = 2.35$, $SD = 1.38$). PSAs scored between zero and two in victim severity were grouped as low-severity, three or more as high-severity.

The key DV was again perceived effectiveness, but since Survey 0 used only two questions to measure PE, the two common items ((a) The ad was convincing, (b) Watching this ad helped me feel confident about how to best deal with smoking) were averaged to create PE scale (Pearson $r = .61$, $p < .001$; $M = 2.87$, $SD = 1.00$). Engagement was again measured using the same three questions as in Study 1 ((a) I could picture myself in the scene of the events shown in the ad, (b) The ad affected me emotionally, (c) The events in the ad are relevant to my everyday life; Cronbach's alpha $= .73$; $M = 2.72$, $SD = 0.97$). However, Survey 3 did not measure any of the three questions, and thus only 15 PSAs and 294 observations were included in the analyses using engagement as DV.

Control variables included subject demographics (race, gender, age, quitting status), some message features (argument strength, MSV, presence of narrative, number of smokers) and survey ID. See Table 4 for the distribution of observations across the four cells.

Table 4. Distribution of observations across the conditions in Study 2

		PE			Engagement		
		Victim severity		Total	Victim severity		Total
		low	high		low	high	
Smoker-audience	0 match	30	79	109	20	15	35
Similarity	3+ match	156	252	408	74	185	259
	Total	186	331	517	94	200	294

Analysis. The data structure is the same as Study 1, where the responses are doubly-nested within a PSA as well as within a respondent due to the multi-exposure design (4 randomly selected videos per participant). However, when the message-level covariates are included (argument strength, presence of narrative, MSV and number of smoker characters) the residual message-level variance is not statistically different from zero, suggesting that there is no remaining effect of clustering by messages. Therefore the models include only an individual-level random effect, using multilevel mixed-effect linear regression in STATA 12.

Results

Smoker-audience similarity showed a positive but non-significant main effect on PE ($b = .23$, $SE = .17$, $p = .17$) and engagement ($b = .34$, $SE = .27$, $p = .20$). The directions are consistent with H1 but fail to provide reliable support with the low power. The

interaction between smoker-audience similarity and victimization severity was marginally significant, $b = -.41$, $SE = .24$, $p = .09$. When decomposed, smoker-audience similarity had a significant positive effect on PE for the low-severity PSAs ($b = .52$, $SE = .24$, $p = .03$), but not for the high-severity PSAs ($b = .11$, $SE = .18$, $p = .55$). For engagement, the interaction between Similarity and Severity failed to reach significant level, but the direction was consistently negative ($b = -.30$, $SE = .40$, $p = .46$). It is possible that the small sample size may have caused the null-effect, which will be better handled in the proposed main study. See Table 5 and Figure 2 for more detailed results.

Discussion

Study 2 attempted to explore if there is a boundary condition for the effect of smoker-audience similarity, which was shown to be significantly positive in Study 1. Theories in character identification, social identity and persuasion suggest that audiences may find difficulty accepting messages showing a similar-looking character behaving in an immoral way. Therefore this study examined if victimization severity in SHS-themed PSAs may work as a moderator on the effect of smoker-audience similarity.

Severity might seem too simple a label to cover all the constructs utilized in this study. In Study 2, as well as in Study 3 to follow in the next sections, "Severity" is used to cover the multiple message features that can affect the perceived severity of consequences described in the anti-smoking message: not only the seriousness of the consequences, but also the relational closeness of the victim character to the smoker character. This decision was made intentionally to address the unique nature of anti-secondhand smoking messages: Who the victims are is an as important argument as how much the victims are

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suffering due to the smoker's cigarette smoking. The same extent of disease might feel more severe and serious when it is happening to close others, when compared to distant others.

It should be noted that this study could use only a small subset (less than 6%) of available data to test the hypotheses. The direction of the effects is encouraging although hardly definitive. The results suggest that there is an interaction between smoker-audience similarity and victim severity on message evaluation, where the smoker-audience similarity exerts significant positive effect only among those who watched low-severity PSAs. The negative interaction did not show that the smoker-audience similarity backfires, but did make the effect disappear. It is possible that the moral transgression depicted in high-severity PSAs has made people disregard the smoker-audience similarity information. There is not much information available to examine why or how this happens, which require future studies, but the observed interaction effect, albeit quite small in its size and possibly by due to chance, is worth noting.

There are obviously some notable limitations in this study demanding subsequent research (Study 3). Since this study was based on a secondary data analyses, only a small subset of the whole dataset was relevant to the hypothesis (29 out of 200 PSAs; 517 out of 9,280 observations), and the distributions of observations across the condition were imbalanced (see Table 4). Moreover, there are only a small number of observations who were exposed to dissimilar smoker characters ($n < 25$), especially when engagement was used as a key DV. It is possible that the small number of samples may have reduced the statistical power, making it impossible to detect the interaction effect on engagement, but also have made the message evaluation less accurate (M. Kim & Cappella, 2013).

To address these problems, Study 3 (Main Experiment) employed random assignment across the conditions, sufficient power to detect the interaction effects between smoker-audience similarity and message features, and balance in the number of messages deployed per condition.

Table 5. Similarity and SHS victim severity predicting PE and Engagement

DV	PE		Engagement	
Predictors	**Coef.**	**(SE)**	**Coef.**	**(SE)**
Similarity	**0.52 ***	**(0.24)**	**0.46**	**(0.32)**
Victim severity	**0.53 ***	**(0.22)**	**0.27**	**(0.35)**
Similarity x Victim severity	**-0.41 +**	**(0.24)**	**-0.30**	**(0.40)**
Covariates: individual differences				
Age	0.005	(0.003)	-0.004	(0.005)
Race: Black	0.38 +	(0.00)	0.46 +	(0.26)
Race: Other	0.11	(0.17)	-0.01	(0.24)
Female	0.02	(0.09)	0.00	(0.13)
Quitting status	0.32 **	(0.11)	0.29 *	(0.14)
Covariates: message features				
Argument strength	0.19 **	(0.06)	0.16 *	(0.07)
Presence of narrative	-0.18	(0.11)	-0.06	(0.20)
MSV	-0.08 **	(0.03)	-0.07 *	(0.04)
Number of smoker character				
2	-0.41 **	(0.13)	-0.35 +	(0.20)
3 or more	-0.31 +	(0.17)	-0.10	(0.28)
Cons.	2.33 ***	(0.42)	2.82 ***	(0.57)
Wald chi-sq	77.74		32.99	
Log-likelihood	-682.83		-388.91	
n of responses	517		294	
n of individuals	468		273	
Random part				
Individual-level variance	0.48	(.08)	0.35	(.16)
Residual variance	0.38	(.07)	0.49	(.00)

Note. Unstandardized coefficients are shown; standard errors are in parentheses.
Reference category: Similarity - 0 matches (vs. 3+ matches); Race – White (vs.
Black, Other); Quitting status – Not trying to quit (vs. Trying to quit), Gender –
Male (vs. Female)

Argument strength is aggregated at the message level and then standardized,
since it was measured in three separate surveys using different smoker sample.

Survey ID (0-3) and presentation order were used as covariates but the results
were not displayed for brevity. *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

Smoker-audience similarity x Victim severity on PE
Adjusted prediction with 95% CIs

2.849902
2.323528
2.959739
2.840488

Smoker-audience similarity

low-severity — high-severity

Smoker-audience similarity x Victim severity on Engagement
Adjusted prediction with 95% CIs

2.581091
2.312692
2.768534
2.758534

Smoker-audience similarity

low-severity — high-severity
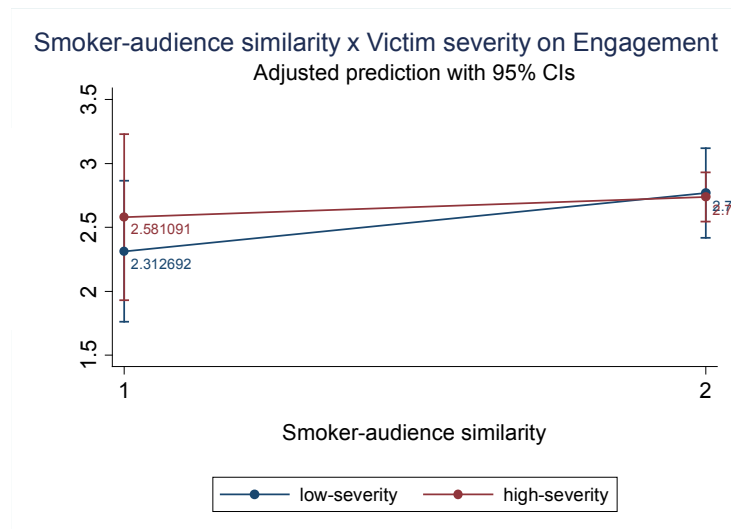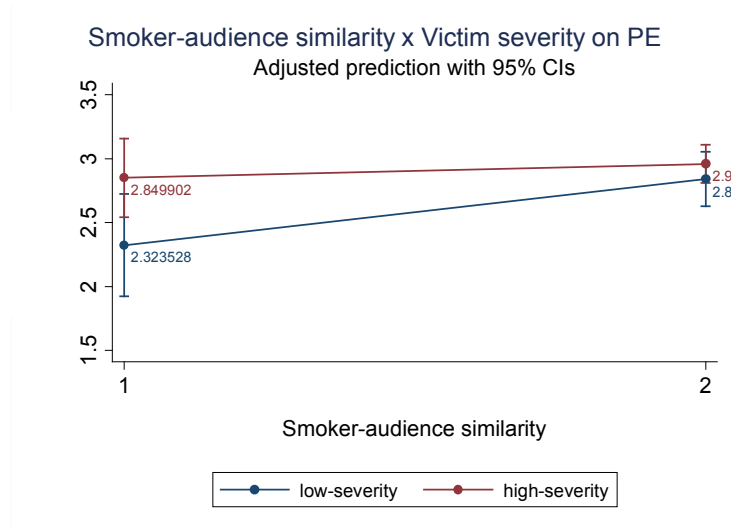
Figure 2. Effect of smoker-audience similarity and victimization severity on PE and engagement. Error bars represent 95% confidence intervals. Control variables include age, race, gender, quitting status, argument strength, presence of narrative, message sensation value (MSV), number of relevant characters and Survey ID (see Table 3-2 for further information on the statistical models).

Study 3: Introduction

To further develop the possibility found in Study 2, an experiment was designed to systematically manipulate the similarity between the audience and the smoker character in anti-smoking message, as well as the message features. The goal of the experiment is to find the boundary condition of the otherwise positive effect of character-audience similarity, indicated by significant interaction effects between smoker-audience similarity and other message features.

Since both Studies 1 and 2 were secondary data analyses, the analyses were limited to variables that were available in the original data. These studies could not examine the measurements that can tap into the cognitive process in message response, making it impossible to understand exactly why the observed interaction between similarity and victimization severity occurs. Study 3 – Main Experiment measured mediating variables including message engagement, identification with the character, reactance against the message, and empathy toward the victim, so that underlying mechanisms can be further explored.

While Study 1 and 2 used video PSAs, pre-existing video PSAs are limited in terms of the demographics of smoker characters, limiting the feasibility of manipulating the demographic similarity between the smoker character and the audience. For example, among the 200 PSAs used in Study 2, none of the SHS-themed PSAs featured older Black female smoker character. The stimuli in Study 3 used still images of smokers to accompany the textual messages about harmful consequences of smoking, thus allowing more control in the design of anti-smoking stimuli. An attempt to overcome the case-category confounding (Jackson, 1992) was made by randomly selecting one out of five

different smoker images in a demographic subgroup, as well as including two versions of the story representing each condition (one taking place in the smoker's home, and the other taking place in a public place). Although the number of cases is more limited than previous studies, this design allows some generalizability more than a single message design.

A series of pilot studies were planned and conducted to pretest the new stimulus materials. Multiple images showing the smoker characters (Pilot 1) were pre-tested to select the set of pictures that minimize any differences other than the race, age, and gender – such as attractiveness, likability and SES. This would ensure that any difference observed in message evaluation is due to the similarity or dissimilarity to the smoker character, rather than those variables varying between the demographic subgroups. Also, the textual messages were pre-tested (Pilot 2 and 3) to establish the severity manipulation.

Study 3 - Pilot 1: Smoker Images

In order to manipulate demographic similarity, I decided to use still images. Similarity can be manipulated in other ways, but the pictorial manipulation was closer to that of the PSA manipulation of similarity. The purpose of Study 3 – Pilot 1 was to select appropriate smoker images. The goal was to have five images of different smokers for each of the 8 demographic subgroups: 2 (Black vs. White) x 2 (Male vs. Female) x 2 (Younger vs. Older). Still images of a person holding a lit cigarette were collected from the Internet to fill each of the 8 subgroups. The images were acquired via Google image search, or purchased from professional stock photo websites including *Shutterstock.com* and *iStockphoto.com*.

Only color images were collected to make it easier to discern the smoker's race. All collected pictures clearly showed the smoker's whole face (from forehead to chin), which is important in cuing the person's age and race. Pictures showing smokers with sunglasses or other artifacts blocking faces were excluded. However, pictures with hoods and hats were included as long as the face was not covered. The collected pictures were mostly showing neutral poses and facial expression. Strongly positive or negative emotions were avoided. All celebrities or well-known public figures were excluded to prevent the effect of character familiarity.

Images were selected from the collected images (N = 80) based on evaluation by topic experts at Annenberg school's health communication research teams, and then pilot-tested with adult smokers on Amazon Mechanical Turk (MTurk) in March, 2015. For the complete list of the 80 images used in this pilot test, see Appendix 1.

MTurk Pilot test

Participants. 251 adult regular smokers (18+ years old, smoked 100+ cigarettes in life, smoking at least 5 cigarettes per day) in the US were recruited. To match the target population of the main experiment, all were Non-Hispanic White or Black. African Americans were oversampled: 40 (15.9%) were African American. 120 (48%) were female, with mean age of 38.59 years old ($SD = 11.19$). They saw 8 images randomly selected from the pool of 80, and evaluated the smoker character before moving on to the next image. Also, they were asked whether they recognize any of the smoker characters. 8 responses were excluded due to technical glitches, resulting in total of 2,000 responses evaluating 80 images (25 evaluations per image on average; M. Kim & Cappella, 2014). Each image was evaluated by on average 25 smokers, $SD = 5.52$, min $= 10$, max $= 37$.

Measurements. Participants evaluated the smoker characters in terms of attractiveness, likability and SES. Attractiveness was measured by two questions: 1) This person is physically attractive, and 2) This person is good looking, on 5-point Likert-type scale (1 = strongly agree, 5 = strongly disagree). The correlation between the two questions was very high, $r = .94$. The two responses were averaged to create an attractiveness measure ($M = 3.20$, $SD = 1.12$).

Likability was measured by eight items from Reysen Likability Scale (Reysen, 2005): 1) This person is likable, 2) I would like this person as a coworker, 3) I would like to be friends with this person, 4) The person is approachable, 5) I would ask this person for advice, 6) This person is friendly, 7) This person is warm, and 8) This person is similar to me. The original scale had 11 questions, but some were excluded as inappropriate for the

context ("I would like this person as a roommate") or overlapped with attractiveness measure ("This person is physically attractive") or education ("This person is knowledgeable"). The eight responses were averaged to create a likability measure ($M = 3.11$, $SD = .82$, Cronbach's alpha $= .93$).

SES was measured by asking participants to make the best guess for the smoker character's income and education level. For income, participants were asked "How much do you think is this person's annual household income, compared to the average household?" They were asked to move a slider from its default position at the middle (50) to a desired place (0 = lowest, 50 = median, 100 = highest). For education, participants were asked "What do you think is this person's highest achieved level of education? Please make your best guess." Response options were 1 = Grade school (Grade 8) or less, 2 = Some high school (Grade 9 through 12), 3 = High school graduate (Grade 12) or GED, 4 = Some college or technical school, 5 = College graduate or beyond. Since the two questions used different scales, the responses were transformed to z-scores. The two z-scores showed moderate correlation, $r = .65$. The two z-scores were averaged to create an SES measure ($M = 0.00$, $SD = .91$). Finally, participants were asked the smoker character's race, gender and age. For race, they could choose from three options: White, Black, or Other; for gender, Male or Female. For age, they were asked to make their best guess and enter the exact age of the character. A smaller version of the image appeared on top left corner of the screen while being evaluated.

Evaluation results (1): correct demographic perception. It was crucial to make sure that the images were perceived to be in the intended demographic subgroup without ambiguity. Race was particularly problematic, where some smoker characters were

perceived as "Other" rather than "Black" or "White". Seven images with less than 80%

accuracy in race determination were excluded from the image pool (5 black and 2 white

characters removed; min: BF1_07: 52%, max: WF2_10: 80%). Some smoker characters

were also considered as ambiguous in terms of gender, although the extent of ambiguity

was not as large as race. Two images (BF2_10: 89%, BF1_06: 88%) showed lower rate

of correct answers than other images, and therefore were excluded from the pool.

Age was examined in a slightly different way. There was some discrepancy between the

originally intended age groups (younger: 18-35 years old vs. older: 36-59 years old) and

what the participants evaluated. Two of "younger" Black male smoker characters were

perceived as over 35 years (BM1_03: 38.41; BM1_07: 36.50). Three of "older" Black

males were perceived as younger than 35 years old (BM2_02: 32.21; BM2_05: 32.89;

BM2_06: 32.93). Three "older" Black females (BF2_02: 31.43, BF2_05: 26.05; BF2_08:

32.65) and three "older" White females (WF2_03: 33.25, WF2_08: 31.64; WF2_10:

31.60) were perceived to be quite young. These 11 images were re-categorized into the

correct age groups. Based on this elimination and re-categorization process, 67 images

remained in the candidate image pool (see Table 6).

Table 6. Number of eligible smoker images in Pilot 1 based on correct categorization

Subgroup	No. of eligible images
Young Black Female (BF1)	8
Mature Black Female (BF2)	6
Young Black Male (BM1)	8
Mature Black Male (BM2)	9
Young White Female (WF1)	10
Mature White Female (WF2)	7
Young White Male (WM1)	10
Mature White Male (WM2)	9
Total	**67**

Evaluation results (2): Image selection. It is important that the images included in each of the demographic subgroups are comparable in their level of attractiveness, likability and SES – so that the difference between similar and dissimilar character is due to the demographic matching vs. non-matching, not because of differences in these characteristics. Having multiple images in each group would reduce the possibility of case-category confounding (Jackson, 1992), but it is still important to minimize significant differences across the groups. Therefore, 5 images were selected to represent each of the demographic subgroups in a way to minimize the observed differences in attractiveness, likability, and SES ratings. See Appendix 2 for the final list of 40 smoker images as well as their mean ratings.

It is important to compare the two groups that are opposite in all three demographics (e.g. younger Black female vs. older White male), since they will be the ones to be contrasted based on similarity manipulation. For example, a younger White female subject will see either younger White female smoker character in similar condition, or

older Black male smoker character in dissimilar condition. Therefore, four contrasts

were set for ANOVAs among the selected 40 images (see Figure 3).

It should be noted that being younger significantly increased the attractiveness ratings.

One contrast still shows significant differences (younger White female vs. older Black

males), and other contrasts also show similar directional differences, albeit not significant.

The final set of images were selected to minimize the gap as much as possible; i.e. the

most attractive images within older Black males and the least attractive images within

younger White females were selected. SES and likability, other key factors of source

effect on persuasion, are not significantly different in any of the contrasts.
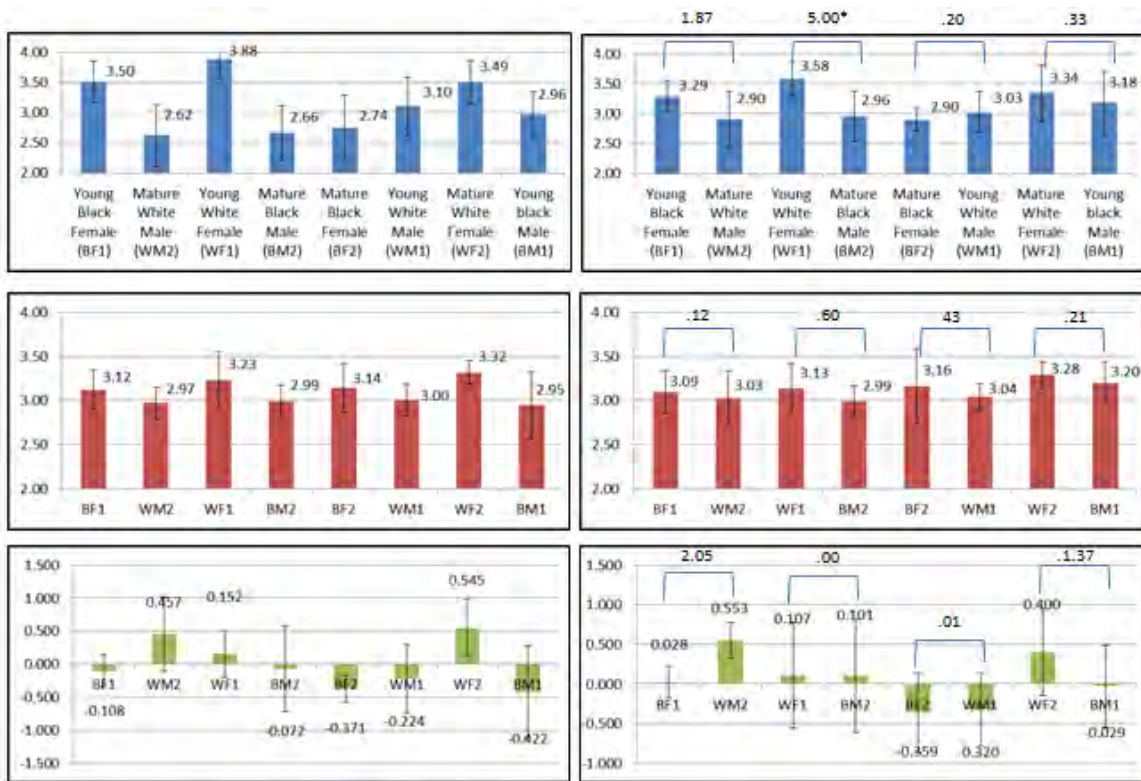
Figure 3. Smoker image evaluation for each demographic subgroup. Mean, 95% CIs, and contrasts (F statistics) are shown. Top panels: Attractiveness, Middle: Likability, Bottom: SES. Left panels show group average ratings for 67 eligible images; right panels show group average ratings for 40 selected images. Contrasts: $+ p < .10$, $* p < .05$, $** p < .01$.

Additional analyses. To make sure the objective demographic match translates to perceived similarity, a multi-level regression analysis was conducted using number of demographic match (range: $0 - 3$) as an ordinal independent variable and perceived similarity (part of likability scale: "This person is similar to me") as a dependent variable.

There was a significant main effect of objective similarity on perceived similarity, χ^2 (3) = 89.95, $p < .001$ using all evaluations ($n = 2{,}000$), which remained significant when only evaluations for selected images were used: χ^2 (3) = 58.39, $p < .001$ ($n = 963$). See Figure 4.
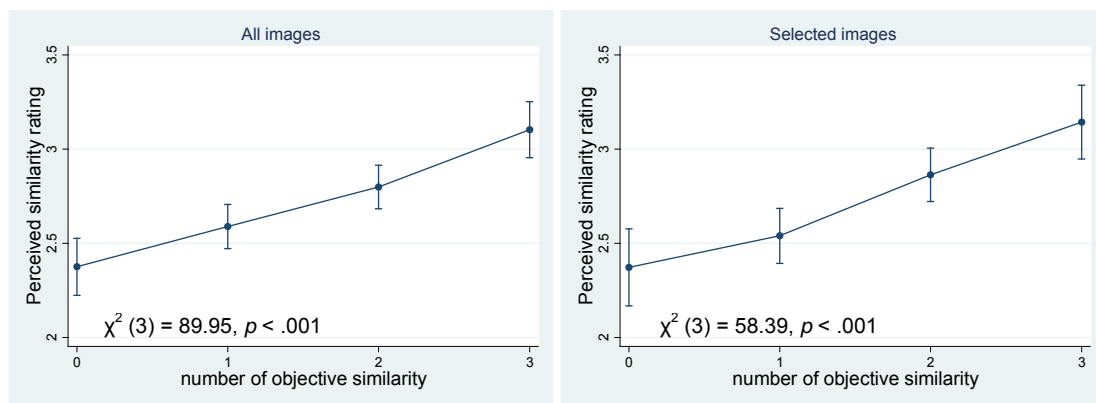
Figure 4. Effect of smoker-audience similarity on perceived similarity rating. Left panel shows the estimated means and 95% *CI*s based on cross-classified multi-level regression model using all evaluations ($N = 2{,}000$), and right panel shows results using selected image evaluations only ($n = 963$).

Study 3 - Pilot 2: SHS-themed Messages

The second pilot was focused on developing and pre-testing stories about secondhand smoking (SHS) that differed in severity and were pertinent to the two testing contexts (smoker's home vs. outside café). This pilot study only used secondhand smoke (SHS)-themed stories. A set of base stimuli were developed on the storyline of existing SHS-themed PSAs, and then changed to create two different levels of severity: one with family, child victim suffering from actual disease (high severity), and the other with stranger, adult victim having an unpleasant experience (low severity). This roughly replicates the high- vs. low-severity PSAs in Study 2, albeit in a different medium. First, this study examined whether the positive main effect of character-audience similarity found in Study 1 was replicated in textual form. Then, the interaction between character-audience similarity and severity of secondhand smoking consequences were examined. It is expected that the high severity stories will show more immoral portrayal of the smoker character; therefore the similarity to the more immoral smoker character might backfire to undermine message effectiveness as the audience react against the messages showing a similar smoker character in an attempt to protect their social identity.

To evaluate the textual stimulus materials a 2 (Similarity: Similar vs. Dissimilar) x 2 (Severity: High vs. Low) between-subject experiment was designed, where each participant saw two different stories that fit their assigned condition.

Hypotheses

H1. Smoker-audience similarity will have positive effect on PE.

H2-3. Smoker-audience similarity will interact with severity on (2) PE and (3) behavioral intention to refrain from smoking when others are around, so that the positive effect of smoker-audience similarity in low-severity messages would disappear or become negative among those who were exposed to high-severity SHS-themed anti-smoking messages.

H4. Smoker-audience similarity will interact with severity on message engagement.

H5. Message engagement will mediate the effect of smoker-audience similarity and victimization severity on PE of SHS-themed antismoking messages.

H6. Smoker-audience similarity will interact with victimization severity on psychological reactance, so that the negative effect of smoker-audience similarity in low-severity messages will disappear or become positive in high-severity SHS-themed antismoking messages.

H7. Psychological reactance will mediate the effect of smoker-audience similarity and victimization severity on PE of SHS-themed anti-smoking messages.

RQ1. Will identification with the smoker character mediate the interaction effect between smoker-audience similarity and victimization severity on PE?

RQ2. Will perceived similarity with the smoker character mediate the interaction effect between smoker-audience similarity and victimization severity on PE?

Methods

Participants. Similar eligibility criteria and screening procedures were used as Pilot 1, except that the participants were only required to be a daily smoker (answering "every

day" for the question "do you currently smoke cigarettes every day, some days, or not at all?") (Centers for Disease Control and Prevention, 2015). Participants were recruited via Amazon Mechanical Turk (MTurk). Participants were paid $1.07 for their time.

Procedure. Participants first responded to questions about demographics and smoking history. Then they were randomly assigned to one of the four conditions in a 2 (Similarity: Similar vs. Dissimilar) x 2 (Severity: High vs. Low) between-subject experiment. Each participant saw two different stories that fit their assigned condition in a random order. After reading one story, the participants were asked to evaluate the story and the smoker character in it before moving on to read the second story.

Stimuli. There were two different conditions for each of the story. Each participant saw both stories with counterbalanced order. All textual stimuli are included in Appendix 3.

A set of base stimuli were written based on two existing PSAs: One PSA was about a young girl lying down and coughing, and her mom is calling the school reporting her sickness while smoking a cigarette which is implied as the cause for the girl's illness. This story was edited to feature a smoker smoking in his/her home, and the victim of SHS was either the smoker's son having an asthma attack (family, child, disease: high severity), or the next-door neighbor who recently moved in, suffering from the smell of cigarette smoke (adult, stranger, unpleasant experience: low severity).

The second story was based on another PSA featuring a young man smoking a cigarette in an outside café, while other people –invisible but with audible voices – are coughing, until eventually the young man puts his cigarette out. This story was edited to show a smoker smoking at an outside café; the victim was either the smoker's daughter,

again having an asthma attack (high severity), or another patron sitting next to the smoker, who ends up walk away from her table due to the cigarette smoke (low severity). As previously mentioned, it should be noted that the label "severity" not only refers to the objective seriousness of the symptoms caused by the smoking, but also the closeness and intimacy of the victim character to the smoker character. It is expected that these features together would affect the perceived severity of consequences of secondhand smoking described in the messages.

All stories were accompanied by a picture of a smoker, selected in Pilot 1. Appendix 6 provides an illustrative example of the stimuli shown to the participant. Which smoker character picture was shown was determined by the participants' demographic characteristics and their assigned condition (Similar vs. Dissimilar). In the similar condition, the pictures were selected from the subgroup of images in which all of race (Black vs .White), age (Young vs. Mature), and gender (Male vs. Female) were matched to those of the participant. The two stories were supposed to be about two separate smokers; therefore, two pictures were randomly selected from the pool of five in the demographic subgroup at hand. In the first message, regardless of the context, the smoker was named Michael or Jennifer; in the second message, the smoker was named David or Amy. These names were selected as they were one of the most common names during the last 50 years (Social Security Administration, 2013). Popular names that are mostly used in one race but not in the other were excluded (e.g. Emily and Jacob were used by many Whites but not among Blacks; Fryer & Levitt, 2003; Sweeney, 2013)

Measurements. See Appendix 7 for the questionnaire as used in Study 3 – Main

Experiment. Most of the measurements here were the same, except for the psychological

reactance.

Perceived effectiveness. Eight items were included in this scale measured on a five-

point Likert-type scale (Cronbach's α= .89, $M = 3.36$, $SD = .84$).

Message engagement. Five items were included in this scale measured on a five-

point Likert-type scale (Cronbach's α= .73, $M = 3.19$, $SD = .98$).

Psychological reactance. Three subscales were measured with regard to

psychological reactance: Threats to freedom (3 items: "The message threatens my

freedom to choose", "The message tried to make a decision for me", "The message tried

to pressure me"; α = .85, $M = 2.79$, $SD = 1.12$), perceived exaggeration (5 items: "This

message is exaggerated", "This message is dishonest", "This message is fake", "This

message is insulting", "This message is stupid"; α = .92, $M = 2.16$, $SD = 1.01$), and

irritation/anger (4 items: "I felt irritated", "I felt angry", "I felt annoyed", "I felt

aggravated"; α = .93, $M = 2.28$, $SD = 1.12$). These three scales were positively correlated

with each other (all rs > .50), and all negatively correlated with PE. Therefore, these

three scales were combined to create one psychological reactance scale (α = .94, $M =$

2.36, $SD = .92$).

Perceived similarity to the smoker character. Five semantic differential scales (1-5)

were used (Cronbach's α= .94, $M = 2.91$, $SD = 1.10$).

Identification with the smoker character. Six items on five-point Likert-type scale

based on Cohen (2001)'s identification scale were used (Cronbach's α= .90, $M = 3.35$,

$SD = .90$).

Intention to refrain from smoking when others are around. This scale included

three questions on a four-point scale (1 = definitely will not, 2 = probably will not, 3 =

probably will, 4 = definitely will) about their intention in the next three mbonths: "smoke

outside the house to protect my family's health", "refrain from smoking in an enclosed

indoor space when others are around", and "refrain from smoking in any public spaces,

such as outside park" (Cronbach's α = .71, *M* = 3.16, *SD* = .72)

Knowledge test score. The participants were asked two questions to make sure they

read and sufficiently understood the message. One question asked where the story was

happening, where a correct answer received one point. The other asked the names of two

central characters (smoker and victim), 0.5 point each. The sum score (range: 0-2) were

included as a control variable in all analyses.

Analyses. Separate ANOVA models were fitted for the first and the second

evaluations. The models included character-audience similarity, severity (low vs. high),

and context (outside café vs. home), as well as all possible interaction terms among them.

Knowledge test score was also included as a control variable. For the moderated

mediation analyses (H4-7, RQ1-2), joint significance test (MacKinnon et al., 2002) was

used. First, the interaction effect of independent variables on mediator variable (a) was

tested. If (a) is significantly different from zero, and then the main effect of mediator

variable controlling for the independent variables (b) is significant, then one can declare

significant mediation. The magnitude of indirect effect can be calculated by multiplying

(a) and (b). It should be noted that while this method is statistically appropriate to show

that the indirect effect is significantly different from zero, it is not sufficient to establish

the causal directions between the mediator and the dependent variable. The hypotheses

in this study rely on theoretical claims that stronger identification with the character (Cohen, 2001) and engagement with the message (Dal Cin et al., 2004) would increase the message's persuasive effect; however, the possibility of reverse causation between the mediator and the dependent variable still exists.

Results

 Participants. 621 smokers participated in the experiment (June 13-27, 2015). 11 respondents were rejected (i.e. not paid) since they attempted the screening multiple times to access the experiment – they were either not a daily smoker, or other race. Their data were excluded from the analyses. 18 participants reported technical issues in reading the messages, and were excluded from further analyses. 17 participants were further excluded because they failed the attention filter in any of the two messages they read and evaluated ("Please select 'strongly agree' for this question", included as one of engagement scale questionnaire). As a result, analyses below were conducted using responses from 575 participants.

 The majority of participants were female ($n = 365$, 63.7%), non-Hispanic white ($n = 536$ (93.5%). On average, the participants were 36.11 years old ($SD = 10.23$). Respondents smoked cigarette every day, on average 17.32 cigarettes per day during the past 7 days ($SD = 15.40$). Participants reported Fagerström test of nicotine dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991) scores of $M = 4.52$, $SD = 2.27$, suggesting low to medium level of dependence on nicotine (Fagerström, Heatherton, & Kozlowski, 1990). Average (median) participant was at 6 among the 10 stages of change (SOC; DiClemente et al., 1991), locating them between "I think I should quit but

I am not ready"(5) and "I am starting to think about how to reduce the number of

cigarettes I smoke a day" (8) with mean SOC at 5.70, $SD = 2.78$. 247 (43.1%)

participants reported having one or more children under 18 years old in their households,

about half of them ($n = 129$) having one child.

See Table 7 below for the distribution of demographics and smoking related statistics

across the four experimental conditions. Overall, there is not much difference across the

conditions. Only race showed significant association with condition ($\chi^2(3) = 7.37$, p

= .06), where the proportion of Blacks is higher than overall average in low similarity-

high severity condition, but this is probably due to the small number of Black participants

(6.4% of all participants).

Table 7. Descriptive statistics of Pilot 2 participants in each condition

	Condition				Total
	High similarity		Low similarity		
	High severity	Low severity	High severity	Low severity	
n	146	137	136	156	575
Female	91	92	85	98	366
(%)	62.3%	67.2%	62.5%	62.8%	63.7%
White	139	127	132	140	538
(%)	95.2%	92.7%	97.1%	89.7%	93.6%
Age (mean)	36.75	36.25	35.35	36.13	36.13
Age (*SD*)	10.91	10.04	9.77	10.07	10.20
Young (<35 yrs)	69	67	74	83	293
(%)	47.3%	48.9%	54.4%	53.2%	51.0%
SOC (mean)	5.82	5.61	5.88	5.49	5.70
SOC (*SD*)	2.77	2.88	2.63	2.84	2.78
Trying to quit	84	72	71	75	302
(%)	57.5%	52.6%	52.2%	48.1%	52.5%

Manipulation check. Two questions were asked to check whether the perceived victimization severity worked in line with the conditions. First question measured perceived severity: "The effect of secondhand smoking on the non-smokers discussed in the story I just read was ..." (1 = Not serious at all, 11 = Extremely serious). Another question measured perceived suffering of the victim: "In the story I just read, the non-smoker was experiencing ..." (1 = No suffering at all, 11 = Extreme suffering). The two responses were highly correlated with each other in both messages (1st evaluation: $r = .69$; 2nd evaluation: $r = .86$). When averaged, the perceived severity responses were

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significantly different between high vs. low severity conditions for both the first ($t = -$ 9.89, $p < .001$; low severity: $M = 8.27$, $SD = 2.09$; high severity: $M = 9.74$, $SD = 1.39$) and second ($t = -12.83$, $p < .001$; low severity: $M = 7.53$, $SD = 2.53$; high severity: $M = 9.76$, $SD = 1.53$) evaluation. The perceived severity did not differ between home vs. outdoor café stories (1st evaluation: $t = -.57$, $p = .57$; 2nd evaluation: $t = -1.41$, $p = .16$). Therefore, severity manipulation was successful. It should be noted that the severity manipulation is achieved by changing the intrinsic message features (O'Keefe, 2003). The perception test confirms that this sample of participants perceives the high-severity message as more severe than the low-severity message; however, the two messages feature different victims (family, child vs. stranger, adult) thus one may also say that this manipulation check is not really necessary.

Another set of questions were used to check whether the participants correctly acknowledged the demographic features of the smoker character that were manipulated to be either similar or dissimilar to them. Again, this may not be necessary, but still confirms that the message was seen by the participants as intended. Participants were asked whether the smoker characters were similar or different from themselves in terms of age, race and gender. For age, four response options were given: quite younger than me, about my age, quite older than me, and don't remember. In similar condition, 73.9% in first evaluation and 77.9% in second evaluation responded that the characters were about the same age; in dissimilar condition, only 25.5% and 15.6% in first and second evaluation responded that the characters were about the same age.

For race and gender, participants were given three response options: same, different, and don't remember. For race, 98.2% (first) and 99.7% (second) reported that the smoker

character was the same race as them in similar condition; only 1.4% and 1.0% did so in dissimilar condition. For gender, the proportion of participants responded that the characters were of same gender as them was 99.7% and 100% in similar condition, and 0.7% and 0.3% in dissimilar condition.

Hypotheses testing. H1 predicted that smoker-audience similarity will have overall positive effect on PE, as shown in Study 1. Contrary to expectation, the overall main effect of Similarity was not significant, $F(1,566) = .82$, $p = .36$ for the first evaluation, and $F(1,566) = .06$, $p = .81$ for the second evaluation. Severity was the only significant predictor (first evaluation: $F(1,566) = 30.12$, $p < .001$; second evaluation: $F(1,566) = 21.71$, $p < .001$). So the more severe the effect of SHS, the more effective the message was seen to be.

H2 predicted negative interaction effect between Similarity and Severity on PE. Also contrary to expectation, the interaction was not significant (first evaluation: $F(1,566) = 1.43$, $p = .23$; second evaluation: $F(1,566) = .14$, $p = .71$. Moreover, the observed pattern was opposite from the expected positive interaction: That is, the effect of smoker-audience similarity was negative in the low-severity condition and positive in the high-severity condition, although the simple main effect was not significant in either condition (all ps > .13). H3 predicted negative interaction between Similarity and Severity on intention, which also yielded similar results, with not significant interaction effect (first evaluation: $F(1,566) = 1.38$, $p = .24$; second evaluation: $F(1,566) = .40$, $p = .53$) and negative simple main effect of similarity in the low severity condition, which is opposite from what was expected (albeit not significant, all ps > .18). Therefore, H2 and H3 were not supported.

H4 and H5 were about the effect of smoker-audience similarity and severity on engagement (H4), and the mediating role of engagement on PE (H5). Similar to H2-3, Similarity and Severity did not show significant interaction on engagement (first evaluation: $F(1,566) = .64$, $p = .43$; second evaluation: $F(1,566) = 3.06$, $p =.08$). Therefore, H4 was not supported; H5 was also not supported by definition (i.e. mediator is not significantly associated with IVs). Similar results were found for reactance (H6-7), with non-significant interaction (first evaluation: $F(1,566) = .03$, $p = .86$; second evaluation: $F(1,566) = .12$, $p < .001$).

Regarding RQ1, the mediating role of identification with the smoker character between smoker-audience similarity, Severity and PE was examined. First, Similarity and Severity showed significant negative interaction on identification (first evaluation: $F(1,566) = 4.03$, $p = .045$; second evaluation: $F(1,566) = 13.60$, $p < .001$). When decomposed, Similarity predicted higher identification in the low-severity condition (first evaluation: change score = .10, $SE = .10$, $p = .34$; second evaluation: change score = .23, $SE = .11$, $p = .03$), but seeing a similar smoker in the high-severity condition resulted in significantly lower identification (first evaluation: change score = -.19, $SE = .10$, $p = .06$; second evaluation: change score = .-.33, $SE = .11$, $p = .002$). Since identification is a significant predictor of PE controlling for similarity, severity and their interaction term (all ps < .001), identification is a significant mediator in the moderated mediation according to the joint significance test.

RQ2 pertained to the mediating role of perceived similarity to the smoker character. Similarity and Severity showed significant negative interaction on perceived similarity (first evaluation: $F(1,566) = 7.71$, $p = .01$; second evaluation: $F(1,566) = 9.41$, $p = .002$),

so that Similarity increased perceived similarity in the low-severity condition (first evaluation: Mean difference = .20, SE = .12, p = .11; second evaluation: Mean difference = .36, SE = .13, p = .004), but reduced perceived similarity in the high-severity condition (first evaluation: Mean difference = -.29, SE = .12, p = .02; second evaluation: Mean difference = -.19, SE = .13, p = .14). Consistent with RQ1 results, perceived similarity is a significant predictor of PE (all ps < .01) controlling for Similarity, Severity, their interaction term and all the other potential mediators, suggesting a significant moderated mediation.

Discussion

This pilot study had two main goals: 1) replicate the positive main effect of smoker-audience similarity observed in Study 1 when using text and still image stimuli, and 2) examining the two-way interaction effect between similarity and severity in SHS-themed messages. Contrary to expectations, the positive main effect of smoker-audience similarity on PE was not replicated. It is possible that the different medium affected how important smoker-audience similarity is in evaluating the message. When the audience is watching a video message, the smoker character is often shown throughout the message, and therefore the similarity (or the lack thereof) remains salient. However, in the text-based stimuli used in this pilot study (see Appendix 6 for an illustrative example), smoker-audience similarity is salient in the initial section of the message (top) where the picture of the smoker is shown along with the textual description of the demographics, but as one scrolls down through the message, the narrative may dominate the participants' attention. This may explain why severity is significant predictor, but not similarity.

Also, it should be noted that Study 1 had multiple message themes, where 16 out of 100 PSAs had either primary or secondary theme related to SHS, while the pilot study messages were all SHS-related. Considering the significant interaction of Similarity and Severity on identification and perceived similarity, it is possible that by focusing only on SHS themes and having equal distribution of high and low severity messages, the effect of smoker-audience similarity might have been washed away. Also, in general the consequence of SHS were perceived as quite serious in both low- and high-severity conditions, and this might have interfered with similarity working as a facilitator of message acceptance.

 The hypotheses regarding negative interaction between smoker-audience similarity and severity on message effectiveness were overall not supported in this pilot. Moreover, although not significant, the pattern showed opposite direction from what was hypothesized (i.e. the smoker-audience similarity enhanced persuasion in the high-severity condition).

These disappointing and unexpected findings were mitigated somewhat by the results on identification and perceived similarity. The two-way interaction between smoker-audience similarity and severity was negative and significant on perceived similarity to and identification with the smoker character, which is consistent with the theoretical assumptions and proposed hypotheses. This result suggests that when the portrayal of the objectively similar smoker character is severely stigmatizing (e.g. endangering one's own child), the audience distances itself from the intrusive, damaging behavior, perhaps in an attempt to protect the social identity. However, even though identification is positively,

albeit weakly, correlated with PE ($r = .14$, $p < .001$)[2], the Similarity x Severity interaction on PE yielded a result opposite to that on identification.

It is possible that the audience perceived the consequences of secondhand smoking on distant others as quite serious and thus judged the smoker negatively, which in turn resulted in the boomerang effect of similarity in the low-severity condition. The perceived severity was quite high in low-severity message ($M = 7.89$, $SD = 2.35$), even though it was significantly lower than high-severity messages ($M = 9.75$, $SD = 1.46$). To address this possibility, some additional conditions were added in Study 3 – Main Experiment: Messages discussing negative health consequences of smoking on the smoker ("self-harm" theme). When compared to the SHS-themed messages, the self-harm messages should be perceived as invoking less serious consequences and also not as committing a moral transgression, causing the effect of smoker-audience similarity and its interaction with Theme and Severity to differ.

In Study 3 – Main Experiment, all measures remained the same except for psychological reactance. The three scales related to psychological reactance (threats to freedom, perceived exaggeration and anger) behaved in a very similar way, with quite high correlation coefficients (all rs > .52). Based on the results on variables related to psychological reactance, a shorter scale was used in Study 3 - Main Experiment.

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[2] The bivariate correlation between perceived similarity and PE is smaller but negative ($r = -.02$).

Study 3 - Pilot 3: Textual Stimuli

The goal of pilot 3 was to make sure the textual stimuli are perceived as intended, especially regarding the severity manipulation. The survey was conducted on MTurk between 11/02 – 11/23, 2015. Due to unexpected results in perceived seriousness in the first set of participants, three separate trials were conducted with revised stimuli until the expected results were observed. The first trial of Study 3 – Pilot 3 yielded unexpected results for self-harm conditions. To better understand the results, a second trial tested self-harm stimuli, which showed different results; it was in line with the expectation, but the difference between the two severity conditions was not significant. Therefore, self-harm stimuli were revised and re-tested in the third trial.

Methods

Participants. The same eligibility and screening procedure was used as Pilot 2, so that only adult daily smokers who are non-Hispanic White or Black and between 15 – 59 years old participated in the study.

Stimuli. To make sure severity manipulation works as intended, all cues related to similarity had to be removed from the stimuli. Therefore, only the textual part of the messages was used. Also, to remove any gender-related cues from the text, all the names (e.g. Michael, Jennifer) were replaced with "[NAME]", and all pronouns were replaced with "[his/her]." Both self-harm and SHS-themed messages were used in this study. In self-harm messages, severity was manipulated by mentioning relatively less serious (e.g. gum disease, high blood pressure) or highly serious consequences of smoking (e.g. oral

cancer, stroke). In SHS-themed messages, low-severity messages mentioned distant adult victim; high-severity messages mentioned smokers' own child suffering from asthma attack. Other parts of the messages were kept as similar as possible.

Procedures.   Participants were randomly assigned to one of the four conditions: 2 (SHS vs. self-harm) vs. 2 (high- vs. low-severity). They were asked to read two messages (home and outside café) that fit their assigned condition in a random order; after reading the first message, participants evaluated each message before moving on to the next one.

Measurements. See Main Experiment section for details in measurements.

Perceived seriousness.   Perceived seriousness was measured using one item: "The effect of [smoking/secondhand smoking] on the [smoker/non-smokers] discussed in the story I just read was.." (1 = not serious at all, 11 = extremely serious). Perceived suffering question used in Pilot 1 was not included in the analysis because the victim characters in the self-harm condition messages (= smoker) do not show signs of current suffering, but only the threats for future illness.

Perceived effectiveness.   Eight items on five-point scale were used to measure perceived effectiveness.

Engagement.   Five items on five-point scale were used to measure message engagement.

Disease evaluation.   Perceived seriousness of multiple diseases and symptoms that can be caused by smoking was measured, only in trial 2 and 3. This was to ensure that the perceived seriousness evaluation of the stimuli was in line with the actual perceived seriousness of each disease should the unexpected results from Trial 1 are observed again.

In trial 2, the order of this measure and stimuli evaluation was counterbalanced (i.e. Half of the participants responded to this question before reading and evaluating the two stimuli). In trial 3, everyone completed this measure after finishing the stimuli evaluation.

The participants were given 12 health consequences of smoking. Some were discussed in the stimuli: high blood pressure, poor blood circulation, gum disease, premature tooth loss (low severity) and stroke, oral/neck cancer, death (high severity). Other items that were not discussed in self-harm stimuli were included: nicotine addiction, sinus infection, asthma, lung infection (e.g. bronchitis, emphysema), and lung cancer. They were asked to rank order the items from 1 (extremely serious) to 12 (not serious at all).

Results

Trial 1. *Participants*. 157 adult daily smokers participated in this trial. 7 were excluded because their initial screening tests showed that they were not eligible (not daily smokers, and/or not fit in terms of demographics). 4 more workers were eliminated because they failed attention check items (either a) failed to select "strongly agree" when prompted, or b) failed both of the knowledge test questions after reading the text: where is the story taking place; what is the consequences of the smoking/secondhand smoke discussed in the story). As a result, 146 participants were included in the analyses.

The majority was non-Hispanic white (97.3%) and female (68.5%). Mean age was 36.21 years old, $SD = 8.91$, min $= 21$, max $= 59$. Number of cigarettes per day is 16.73, $SD = 15.13$. Mean stage of change is at 5.99, $SD = 2.52$. About half of the participants had no children (48.6%). 74 participants read self-harm texts (50.7%), and 35 and 39 of them read low- and high-severity texts, respectively. 72 participants read SHS texts, and 31 and 41 of them read low- and high-severity texts, respectively.

Gender distribution was actually different across the conditions. One of the four conditions, self-harm/low-severity, had more males ($n = 18$) than female ($n = 17$), which is not consistent with the whole sample, $\chi^2(3) = 10.13, p = .02$. Gender can be important predictor of perceived seriousness because of difference in trait empathy. To assess the effect of gender difference, gender was included as covariates in the analyses below. Age, having children, stage of change and FTND did not differ across the conditions, all ps > .16.

Analyses and results. Because the evaluations were nested within individuals, multi-level linear regression models, with predictors including theme (self-harm vs. SHS), severity (high vs. low), gender and message context (home vs. outside café), were used in analyses below. A significant two-way interaction between theme and severity emerged on perceived seriousness ($b = 2.33, SE = .60, p < .001$). SHS messages showed significant main effect on seriousness as expected (Low-severity: $M = 8.50, SD = 2.15$; High-severity: $M = 10.30, SD = 1.25, b = 1.91, SE = .42, p < .001$). However, in the self-harm condition, severity did not have significant effect, and the direction was opposite from what was expected (Low-severity: $M = 9.13, SD = 2.06$; High-severity: $M = 8.90$, $SD = 2.49, p = .31$). Further analyses revealed that in the self-harm condition, female participants were showing a pattern opposite from expected direction ($b = -1.39, SE = .52$, $p = .01$), but not males ($b = 1.27, SE = .64, p = .048$). Engagement also showed similar pattern (Low-severity: $M = 3.63, SD = .65$; High-severity: $M = 3.54, SD = .70$). Again, it was female participants that were driving this unexpected result. These unexpected patterns could not be explained by previous research. Therefore, self-harm messages were re-tested, revised and tested again in two separate trials.

For the SHS-themed messages, severity was not significantly associated with PE or engagement: High-severity messages yielded higher PE ($M = 3.53$, $SD = .94$) and engagement ($M = 3.70$, $SD = .81$) than low-severity messages (PE: $M = 3.31$, $SD = .76$; engagement: $M = 3.49$, $SD = .69$), but the difference was not significant (all $ps > .21$).

Trial 2. *Participants.* Trial 2 used only the self-harm stimuli from Trial 1, with two conditions (high- vs. low-severity) to which the participants were randomly assigned. 78 adult daily smokers participated in the survey, and 4 were excluded because they failed the attention filter. The majority was non-Hispanic White ($n = 72$) and female ($n = 44$). Mean age was 37.61 years old, $SD = 10.19$. Average number of cigarettes per day was 20.74, $SD = 12.98$. Stage of Change was on average at 5.70, $SD = 2.74$; 42 (56.8%) had no child in the household. 37 (50.0%) saw low-severity messages, and 46 (62.2%) saw home message first. All demographics and smoking related variables were not different across the two severity conditions (all $ps > .29$). The descriptive statistics did not significantly differ from that of Trial 1.

Analyses and results. Similar to Trial 1, multi-level linear regression models, with predictors including Severity (high vs. low), message context (home vs. outside café), and order of message/disease evaluation were fitted.

This time, the perceived seriousness results showed expected direction (low-severity: $M = 8.88$, $SD = 2.43$; high-severity: $M = 9.88$, $SD = 1.84$). Also male and female smokers did not differ in their evaluation.

While the direction of perceived seriousness turned out to be as expected, the overall difference between high- and low-severity messages was not significant at $p < .05$ level. Therefore, a revision was made to make the difference in perceived seriousness larger.

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Trial 3. *Stimuli.* Symptom descriptions were changed to make low-severity consequences appear less serious, and high-severity consequences appear more serious than previous versions. For example, in high-severity home message (stroke), descriptions of death and lifelong disabilities were added ("Some end up with slurred speech or reduced memory", "Almost 130,000 Americans die from a stroke every year"). Also more descriptive and vivid explanations of the symptoms were added (original: "If the blood flow to the brain is blocked, it causes a stroke"; revised: "When clots block blood flow to the brain, a stroke occurs – brain cells cannot get oxygen and begin to die.")

Also the language explaining consequences was made easier to understand (original: "Smoking is a main risk factor of oral and throat cancer"; revised: "smoking is the main reason people get oral and throat cancer"); these changes were made per the recommendation from CDC's Health Literacy Council (Center for Disease Control and Prevention, 2015b).

Participants. Same as Trial 2, this trial used only self-harm stimuli, with two severity conditions. 81 adult daily smokers participated in this trial and were randomly assigned to one of the two conditions. 5 of them failed the attention check questions, and 1 reported technical difficulties in displaying the message, and thus excluded from further analyses, leaving 75 participants for analyses.

The majority of participants were White ($n = 73$) and female ($n = 45$). Mean age was 36.71, $SD = 9.63$, min = 21, max = 58. Average number of cigarette per day was 18.87, $SD = 17.32$. Stage of change was on average at 5.30, SD = 2.83. 39 (52%) had no children under 18 years old in their household. 45 (60%) saw low-severity message; 35 (46.7%) read home messages first.

All demographics and smoking related variables were not significantly different across the two severity conditions. Having children showed marginally significant difference between the condition ($\chi^2(1) = 2.88$, $p = .09$): The majority ($n = 27$, 60%) of low-severity condition participants had no children, while the majority ($n = 18$, 60%) of high-severity condition participants had children.

Analyses and results. Similar to Trial 2, multi-level linear regression models, with predictors including severity (high vs. low), and message context (home vs. outside café) were fitted. Since having children was different across the conditions, it was added as a covariate.

Perceived seriousness was significantly higher in the high-severity condition ($M = 10.00$, $SD = 1.76$) than low-severity condition ($M = 8.88$, $SD = 2.43$), $b = 1.28$, $SD = .43$, $p = .003$. There was no significant interaction effect between severity manipulation and having children, gender, message context, or presentation order.

PE was slightly higher in high- ($M = 3.68$, $SD = .55$) than low-severity condition ($M = 3.56$, $SD = .81$), but the difference was not significant. The same was true for engagement (High-severity: $M = 3.93$, $SD = .54$; Low-severity: $M = 3.83$, $SD = .74$).

While the effect size of severity manipulation in perceived seriousness is not very large, the manipulation relies more on the differences in the actual message content, namely the consequences of smoking discussed in the messages. The diseases used in the high-severity stimuli were indeed ranked as more serious (Death: $M = 1.45$, $SD = 1.91$; Stroke: $M = 3.90$, $SD = 1.97$; Oral/neck cancer: $M = 4.00$, $SD = 1.83$) than consequences discussed in low-severity stimuli (Higher blood pressure: $M = 6.61$, $SD = 2.07$; Poor blood circulation: $M = 8.02$, $SD = 2.41$; Gum disease: $M = 8.70$, $SD = 2.11$; Premature

teeth loss: $M = 8.70$, $SD = 2.53$). This result ensures that the high-severity messages include more grave consequences, which the smokers also believe as to be more serious than the ones mentioned in the low-severity messages.

Additional changes to the stimuli after trial 3. While the difference in perceived seriousness achieved statistical significance, it is still not as large. Therefore, before moving onto the main experiment, a few changes were made in a way that makes low-severity messages less personal than high-severity message. For example, words referring to the organs affected by smoking (e.g. "Michael's heart" "Jennifer's blood vessel") were changed to "the heart" and "the smoker's blood vessel" to make it appear as distant from the character, and thus less personal, expecting that the consequences would feel less engaging and less visceral, and hopefully less serious. No changes were made to the high-severity versions. See Appendix 5 for final version of stimuli used in the main experiment.

Discussion – Summary of pilot tests. The three pilot tests have been conducted to establish stimuli materials: Smoker images were tested to minimize the differences in attractiveness, likability and SES across the different demographic subgroups, so that the only systematic differences among the group are of race, age, and gender. The textual stimuli (anti-smoking messages) were developed where the theme (self-harm vs. SHS) and severity of consequences were systematically manipulated, and tested in terms of various outcome variables.

Pilot 2 has found that the interaction between Similarity and Severity was opposite from what was originally expected: Seeing a similar smoker engaging in a highly immoral behavior (i.e. endangering one's own child via secondhand smoking) was

associated with lower PE than seeing a dissimilar smoker, while seeing a similar smoker in a low-severity condition was associated with higher PE than seeing a dissimilar smoker – although the simple main effect of Similarity was not significant. It is suspected that because the perceived seriousness of consequences of low-severity condition messages were still quite high, the negative effect of character-audience similarity on message effectiveness was already activated in low-severity condition.

Therefore, Study 3 – Main experiment included another between-subject factor: Theme of the message (self-harm vs. SHS), and all messages for the eight different conditions were pre-tested in Study 3 – Pilot 3. It is expected the difference in depiction of immoral smoker character is more pronounced when the self-harm vs. SHS-themed messages are compared than when low- vs. high-severity messages are compared. It should also be noted that while the actual severity manipulation happens by changing the contents of the message, actually changing the audience perception was quite difficult – especially so when the consequences are affecting only the smoker character. When the Study 3 - Pilot 3 participants were asked to rank the seriousness of various consequences of smoking, stroke, oral/neck cancer and death were indeed ranked as significantly more serious than high blood pressure and gum disease; but when reading a narrative about stroke vs. blood pressure, the difference in perceived seriousness was quite small, albeit significant.

This means that the hypotheses need updates to reflect the design change: It is expected that the overall SHS condition would be perceived as depicting the smoker character in a significantly more immoral light, harming innocent non-smokers, while the self-harm condition is less so because the harm is restricted to the smoker and not others.

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Therefore, the boomerang effect of Similarity is expected to appear more clearly when compared between the two different themes, so that the effect of character-audience similarity is positive in the self-harm condition, but negative in the SHS condition. While this means updates on the hypotheses, the theoretical basis for the revised hypotheses, i.e. reduced message effectiveness due to threats to the social identity when the anti-smoking message features a similar but immoral character, still remains the same.

Study 3 - Main Experiment

Hypotheses

In this study, two classes of hypotheses will be examined. The first group of
hypotheses pertains to the persuasive outcomes of the antismoking messages as a
function of character-audience similarity, theme of the message and severity of the
consequences (H1 – 2). The outcomes include perceived effectiveness (PE), attitudes and
behavioral intentions regarding smoking in general as well as smoking when others are
around. Additional moderating role of the participants' race, gender and parental status
were also examined in this regard (H5 – 7). The second is about the potential mediators
for the persuasive outcomes, including message engagement, reactance against the
message, identification with and perceived similarity to the smoker character, empathy
toward the victim of firsthand or secondhand smoking (H3 – 4, RQ1 – 3). While these
variables are related to the persuasive outcomes, they are not the ultimate goal of the anti-
smoking campaigns. However, observing how these more proximal variables are
affected by character-audience similarity and other message features, namely Theme and
Severity, would allow better understanding of when and how character-audience
similarity can enhance or undermine message persuasiveness.

Due to the unexpected direction of Similarity x Severity interaction effect observed in
Pilot 2, new conditions were added – harmful effect of smoking on the smoker character
("self-harm"). This change was made to extend the operationalization of threats to social
identity when exposed to a similar but immoral smoker character from comparison

between different levels of severity in the consequences of secondhand smoking, to comparison between endangering oneself vs. innocent other non-smokers.

Therefore, the hypotheses were refined to include the additional moderating role of message theme (self-harm vs. secondhand smoking) as well as the severity of the consequences. It should be noted that the core research question stays the same – what is the boundary condition for the otherwise positive effect of character-audience similarity?

Also, in an attempt to further examine nuanced responses, empathy toward the victim was added to the measurements: In the SHS condition, the victims are non-smokers; in the self-harm condition, the victim is the smoker character. Measuring the audience's emotional responses toward the character that is endangered by the smoking behavior, empathy is also intended to tap into the question whether it is disidentification from the character or moral disengagement that drives the boomerang effects of character-audience similarity.

Based on social identity theory (Tajfel & Turner, 1979), people often respond to the social identity threats by distancing themselves from the group identity (e.g. Doosje et al., 2002), or engaging in defensive reactions such as justifying the consequences that might cause the identity threats (e.g. Tsay and Krakowiak, 2011). In the same light, it is expected that the otherwise positive effect of smoker-audience similarity will be significantly weaker, or even become negative when the similar smoker character is depicted as engaging in socially and ethically unacceptable behavior, e.g. endangering others via SHS. In the main experiment, the negative depiction of the smoker character was operationalized in two different ways: When the smoker character is endangering innocent victims (i.e. SHS, vs. self-harm), and when the consequences the character is

causing are more severe (i.e. high-severity, vs. low-severity). It should also be noted that the effect of victimization severity in self-harm and SHS conditions may differ, because the difference between bothering strangers (low-severity) and endangering one's child with SHS (high-severity) can be perceived as much greater than and somewhat qualitatively different from the difference between getting gum disease and oral cancer. Therefore, both two- and three-way interaction effects between similarity, victimization severity and message theme were hypothesized (see Figure 5).

H1a-f. Smoker-audience similarity will interact with message theme on (a) perceived effectiveness (PE), (b) attitude toward SHS, (c) attitude toward smoking, (d) behavioral intention to avoid SHS, (e) behavioral intention to quit smoking, and (f) anti-SHS policy support, so that the positive effect of smoker-audience similarity in the self-harm condition will disappear or become negative among SHS-themed anti-smoking messages.

H2a-f. Smoker-audience similarity and severity will negatively interact on (a) PE, (b) attitude toward SHS, (c) attitude toward smoking, (d) behavioral intention to avoid SHS, (e) behavioral intention to quit smoking, and (f) anti-SHS policy support, so that the positive effect of similarity in the low-severity condition will disappear or become negative among high-severity anti-smoking messages. However, the difference will be significantly larger in SHS-themed messages (i.e. three-way interaction).
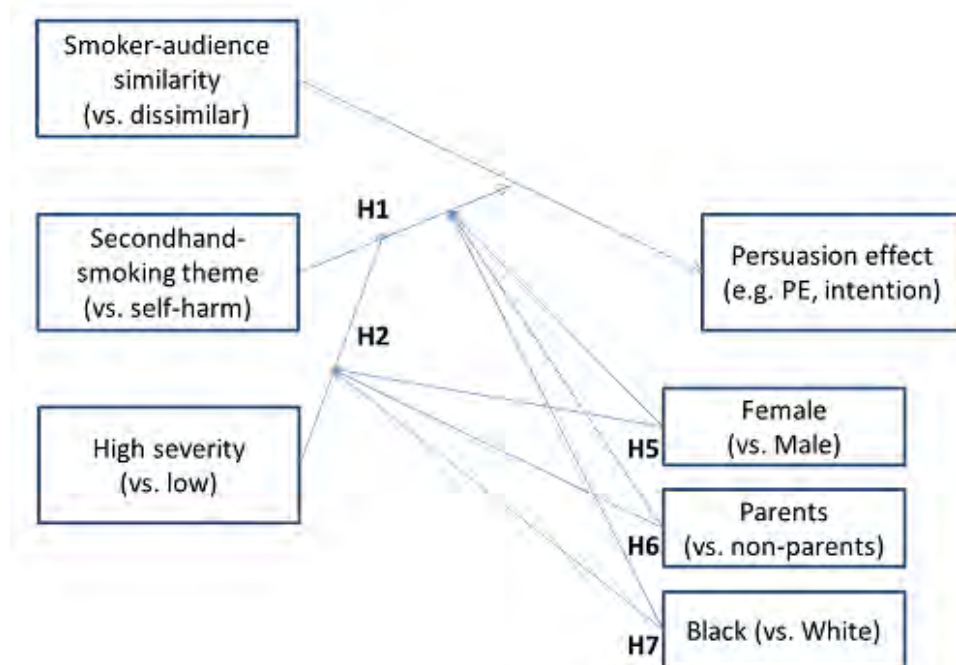
Figure 5. Hypotheses (1): Effect of Similarity, Theme and Severity (H1a-f and H2a-f) and other demographic variables (H5a-f - H7a-f) on outcome variables.

As observed in Study 1, it is expected that message engagement will mediate the similarity-persuasion relationship. Since it is expected that PE is the most proximal persuasive outcome, more complex moderation and moderated mediation hypotheses will focus on PE as a key dependent variable.

Results that are similar to H1 and H2 will be observed on engagement, which in turn positively affects PE (moderated mediation; Preacher, Rucker, & Hayes, 2007). Psychological reactance is expected to be another important mediator with a similar pattern of results, but in a direction opposite from the effects on the persuasive outcome. Unlike engagement, psychological reactance will reduce the message effect by motivating audiences to reject persuasive messages, creating a boomerang effect (see Figure 6).

H3a. Smoker-audience similarity will interact with message theme and severity on message engagement: the positive effect of smoker-audience similarity in the self-harm condition will disappear or become negative among SHS-themed anti-smoking messages (i.e. negative two-way interaction).

H3b. Smoker-audience similarity will negatively interact with severity on message engagement only in the SHS condition, but not in the self-harm condition (i.e. three-way interaction).

H3c. Message engagement will mediate the effect of smoker-audience similarity, message theme and severity on PE.

H4a. Smoker-audience similarity will interact with message theme and severity on psychological reactance: the negative effect of smoker-audience similarity in the self-harm condition would disappear or become positive among SHS-themed anti-smoking messages.

H4b. Smoker-audience similarity will positively interact with severity on psychological reactance in the SHS conditions, but not in the self-harm conditions.

H4c. Psychological reactance will mediate the effect of smoker-audience similarity, message theme and severity on PE.
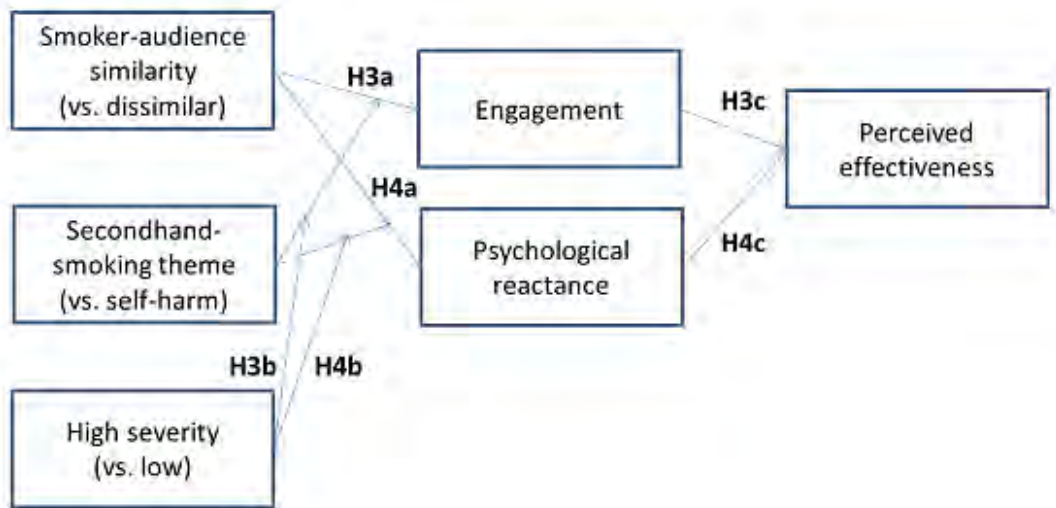
Figure 6. Hypotheses (2): Moderated mediation via message engagement (H3a-c) and reactance (H4a-c)

The audience may choose to either disidentify from the similar smoker character endangering others severely (Doosje et al., 2002), or morally disengage from the consequences (Tsay and Krakowiak, 2011) to protect their social identity. The set of research questions below are pertinent to the potentially competing hypotheses regarding the two coping mechanisms. If identification (RQ1) and/or perceived similarity (RQ2) are significant mediators and H1a and/or H2a is supported, these findings would support the disidentification coping mechanism against social identity threats: When the similar character is shown as immoral and unlikable, the audience will disidentify from the character, undermining the perceived effectiveness of the anti-smoking message. Identification is an important aspect of audiences' reaction toward characters with emphasis on sharing perspectives (Cohen, 2001); but there can be other aspects in audience reactions that stress feelings more, such as sympathy and perceived similarity.

Perceived similarity was also examined as another potential mediator variable, where similar results to character identification is expected.

Conversely, if empathy (RQ3) is a significant mediator, it would suggest that moral disengagement is at work: When the similar character is shown as immoral and unlikable, the audience will still report greater identification, but justify the character's behavior, hence reject its negative consequences which would also undermine the perceived effectiveness of the anti-smoking message (see Figure 7).

RQ1. Will identification with the smoker character mediate the interaction effect between smoker-audience similarity, message theme and severity on PE?

RQ2. Will perceived similarity with the smoker character mediate the interaction effect between smoker-audience similarity, message theme and severity on PE?

RQ3. Will empathy toward the victim mediate the interaction effect between smoker-audience similarity, message theme and severity on PE?
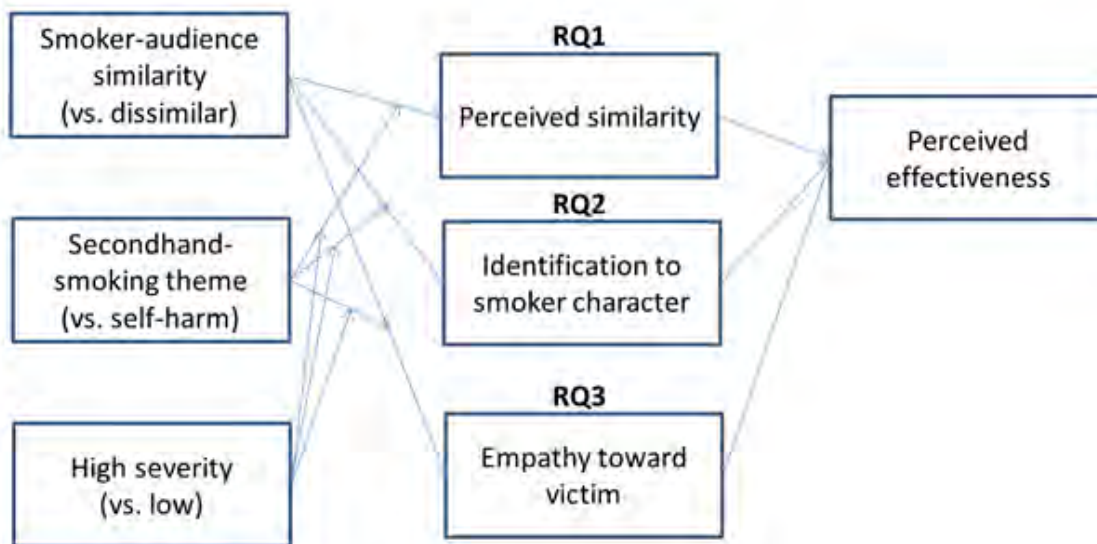
Figure 7. Research questions: Moderated mediation via perceived similarity (RQ1), identification (RQ2), and empathy toward the victim (RQ3) on PE.

Gender and parental status (having one or more children under 18 years old in the household vs. no children) may be an important moderator due to their relationship with baseline acceptance of anti-smoking messages. Traditionally, women are socialized to assume a nurturing role and emotionally take care of the family members. While the gender role is rapidly changing in the modern world, a recent study found that SHS-themed PSAs have significantly more positive effect among female smokers (Baek & Cappella, 2010). This result suggests that there are still notable gender differences in responding to messages featuring others' suffering.

Similarly, parents may be more concerned about the negative consequences of smoking either on themselves or their children, and therefore would be less likely to demonstrate psychological reactance due to seeing a similar smoker character in negative portrayal. Therefore, it was hypothesized that gender and parental status will further moderate the hypothesized effect of smoker-audience similarity, message theme and

victimization severity, where the boomerang effect of Similarity appears weaker among females (vs. males) and parents (vs. non-parents; see Figure 5).

H5a-f. Female smokers will show weaker interaction between smoker-audience similarity, severity and message theme on (a) PE, (b) attitude toward SHS, (c) attitude toward smoking, (d) behavioral intention to avoid SHS, (e) behavioral intention to quit smoking, and (f) anti-SHS policy support than males.

H6a-f. Parents (having children under 18 year old at the household) will show weaker interaction between smoker-audience similarity, severity and message theme on (a) PE, (b) attitude toward SHS, (c) attitude toward smoking, (d) behavioral intention to avoid SHS, (e) behavioral intention to quit smoking, and (f) anti-SHS policy support than non-parents (no children at the household).

Race can also be an important moderator, but in a different direction from gender or parental status. Appiah (2001) and Wang and Arpan (2008) found that racial match of audience to the spokesperson in commercial and health communication messages resulted in significant difference only for the African American audiences, and not for Caucasian audiences. It is possible that minorities are more sensitive to the race of the message characters, as well as of their own. In this case, it is possible that African American smokers are more likely to perceive greater similarity to a demographically matched character than White smokers, which may in turn lead to stronger reactance due to seeing a similar smoker character committing a moral transgression (see Figure 5).

H7a-f. Black smokers will show stronger interaction between smoker-audience similarity, severity and message theme on (a) PE, (b) attitude toward SHS, (c) attitude toward smoking, (d) behavioral intention to avoid SHS, (e) behavioral intention to quit smoking, and (f) anti-SHS policy support than White smokers.

Methods

Participants. Participants were recruited via Qualtrics, a third-party online survey administration company. Invitations were sent out via e-mail to their nation-wide opt-in panel. Participants were compensated with "Survey cash" which later can be exchanged for monetary compensation. All participants were between 18-59 years old, had smoked at least 100 cigarettes in their life, and smoked at least one cigarette/day. Only non-Hispanic White or non-Hispanic Black smokers were recruited to facilitate racial matching. A few block sampling strategies were used: Gender (50% male, 50% female), age (50% young = ~35 years old, 50% mature = 36~59 years old), and having children (50% no child, 50% with one or more children in the household). African Americans were oversampled to allow for further moderation analyses.

Stimuli. The experiment, hosted on Qualtrics.com, used a 2 (Similarity: Similar vs. Dissimilar) x 2 (Theme: Self-harm vs. SHS) x 2 (Severity: Low vs. High) between-subject design. All participants were randomly assigned to one of the eight conditions, and saw two messages (home and outside café) that fit the assigned condition in a random order.

The messages were comprised of a picture of a smoker holding a lit cigarette (as selected based on Pilot 1), as well as textual stimuli including a short narrative about the

smoker character and the consequences of his/her smoking behavior. Similarity was

manipulated by matching or not matching the race (White vs. Black), age (young vs.

mature), gender (female vs. male), and quitting status (trying to quit vs. not trying to quit)

of the smoker character to those of the participants (Similar: all match; Dissimilar: no

match). The information about the smoker character was shown in the image as well as

the textual description of the character in the first paragraph.

Theme and Severity were manipulated by the narratives (evaluated in Pilot 3 with a

few revisions – see Pilot 3 discussion section for the changes made; see Appendix 5 for

the final version of textual stimuli). In the self-harm condition, low-severity messages

discussed the possibility of the smoker character getting gum disease and high blood

pressure, and high-severity message discussed oral cancer and stroke. In the SHS

condition, low-severity messages discussed an adult stranger victim who was coughing

and/or complaining about the smell of the secondhand smoke, and high-severity

messages discussed the smoker's child having an asthma attack due to the secondhand

smoke. Figure 8 shows an example of the stimuli as shown to the participants.

Figure 8. Example of experimental stimuli. This example shows SHS-themed high-severity condition message (Home context). Young White Female smokers in the similar condition or Mature Black Male smoker in the dissimilar condition would have seen this message.

Procedure. Invited participants were informed that they would be participating in a study to evaluate health campaign messages. After they agreed to the informed consent, they were asked screening questions to determine eligibility. Most of the questions were the same as the previous pilot studies, including smoking status (more than 100 cigarettes lifetime, smoke at least one tobacco cigarette every day), race (non-Hispanic White or

Black), and age (18-59 years old); another screening criterion added in this experiment was that the number of smoking-related surveys they have taken during the previous three months had to be less than 3 (excluded $n = 96$). Participants were also asked questions about their demographic information and smoking history, including stages of change (DiClemente et al., 1991) and Fagerström test of nicotine dependence (FTND; Heatherton et al., 1991). They read and evaluated the first message, and then moved on to read and evaluate the second message.

To ensure the participants were spending enough time reading the message, all participants had to wait at least 15 seconds on the message screen before moving on to the next screen. Average time to finish reading based on when they clicked the "next" button on the message screen was 72.62 seconds for the 1st message ($SD = 81.52$), and 77.87 seconds for the 2nd message ($SD = 101.09$). After each message, participants were asked whether they had any difficulties seeing the message. Those who responded "yes" were terminated from the survey (excluded $n = 16$ for first message, $n = 3$ for second message). Among the evaluation questions were two attention filters, one after each message, that instructed the participants to select 'strongly agree'. People who failed to select "strongly agree" for this question were terminated from the survey ($n = 256$).

After answering all message evaluation questions for each message, participants responded to two knowledge test questions to ensure that they had actually read the message. The score was used as a control variable in the analyses. See Measurement and Results – Knowledge test for details.

After the evaluation was finished, intention, attitude, policy support and current house rules regarding smoking were measured. Finally, the participants responded in which state they are currently living, their household income, and education level.

Measurements. *Perceived effectiveness.* Perceived effectiveness (PE) was measured using eight items, adopted from Bigsby et al. (2013) with a few added items: "This message was convincing", "This message was believable", "This message was important to me", "Reading this message helped me feel confident about how to best deal with smoking", "This message made me concerned about my smoking", "This message made me stop and think", "This message put thoughts in my mind about quitting smoking", and "This message put thoughts in my mind about continuing to smoke". All items were on a five-point Likert-type scale (1= strongly disagree, 5 = strongly agree). The last two questions measured favorable and unfavorable thoughts toward quitting smoking. They were combined to generate one valenced thoughts measure, by first subtracting unfavorable thoughts from favorable thoughts, then dividing the results by two and adding three to put the score back into 1-5 scale (1st evaluation: Cronbach's α= .86, M = 3.84, SD = .76; 2nd evaluation: Cronbach's α= .88, M = 3.80, SD = .80).

Engagement. Engagement was measured using five items, including four items adopted from Green and Brock's (2000) transportation scale and modified to fit the context of this experiment: Because the messages (~300 words) were significantly shorter than the ones used in other narrative persuasion studies, the word "narrative" was changed to the "message" in these items. The five items were measured on five-point scale (1= strongly disagree, 5 = strongly agree): "I could picture myself in the scene of the events shown in the message", "The message affected me emotionally", "I was

mentally involved while reading the message", "My attention was fully captured while reading the message", "The events in the message are relevant to my everyday life." These five items were averaged to create a message engagement measure (1st evaluation: Cronbach's α= .85, *M* = 3.87, *SD* = .82; 2nd evaluation: Cronbach's α= .86, *M* = 3.82, *SD* = .85).

Reactance. Psychological reactance was measured using six items on a five-point scale (Dillard & Shen, 2005; Shi, Messaris, & Cappella, 2014). Whereas previous studies on reactance have used a longer questionnaire, these six items were selected based on correlation coefficients acquired from Pilot 2 results. Two items were selected from the threats to freedom scale ("This message tried to make a decision for me", "This message tried to pressure me"), two were from the self-reported anger scale ("While reading this message, I felt irritated", "While reading this message, I felt annoyed") and two were from the perceived exaggeration scale ("This message is dishonest", "This message is stupid"). All six items were measured on a five-point scale (1 = strongly disagree; 5 = strongly agree) and averaged to create a reactance measure (1st evaluation: Cronbach's α= .90, *M* = 2.18, *SD* = .95; 2nd evaluation: Cronbach's α= .92, *M* = 2.09, *SD* = .98).

Identification with the smoker character. Identification was measured using six items (Cohen, 2001) on a five-point scale (1 = strongly disagree; 5 = strongly agree). The questions included the name of the smoker character in the story the participants just read (male character: Michael in the first story, David in the second story; female character: Jennifer and Amy, respectively): "I was able to understand the events in the story in a manner similar to that in which [Name] understood them", "I think I have a good understanding of [Name]", "I tend to understand the reason why [Name] does what

[he/she] does", "While reading the story, I could feel the emotions [Name] portrayed",

"While reading, I felt I could get inside [Name]'s head", and "At key moments of the

story, I felt I knew what [Name] was going through" (1st evaluation: Cronbach's α= .90,

M = 3.63, SD = .84; 2nd evaluation: Cronbach's α= .93, M = 3.53, SD = .94).

Perceived similarity to the smoker character. Perceived similarity was measured by

five semantic differential scales (1-5) from the perceived homophily scale (McCroskey,

Richmond, & Daly, 1975): "Does NOT think like me – Thinks like me", "Does NOT

behave like me – Behaves like me", "Different from me – Similar to me", "Unlike me –

Like me" and "Has morals unlike mine – Has morals like mine" (1st evaluation:

Cronbach's α= .93, M = 3.36, SD = 1.15; 2nd evaluation: Cronbach's α= .96, M = 3.23,

SD = 1.25).

Empathy toward the victim. The victim in each message was determined by the

theme of the message. In the SHS condition, the victim was the non-smoker character

exposed to the secondhand smoke; in the self-harm condition, the victim was the smoker

character. Empathy was measured by five questions on a five-point scale (S. J. Kim &

Niederdeppe, 2014). "Below are the questions about [the smoker/the non-smoker] shown

in the story that you just read. Please indicate how much you agree or disagree with the

following statements about the character: I felt no concern for people like him/her

(reverse coded)", "I did not feel emotionally involved while reading the story (reverse

coded)", "The story just seemed illogical to me (reverse coded)", "I felt sorry for

him/her", "I felt angry on behalf of him/her". The full scale showed low reliability

(Cronbach's α= .51) due to the negative correlation between the last item ("I felt angry")

and the first three reverse-coded items (rs = -.19 ~ -.11). When this item was removed,

the four remaining items showed better reliability (1st evaluation: Cronbach's α= .63; 2nd evaluation: Cronbach's α= .61)[3], and were averaged to create an empathy scale (1st evaluation: $M = 3.63$, $SD = .81$; 2nd evaluation: $M = 3.58$, $SD = .81$).

Knowledge test score. Participants answered two questions per each message to test their attention to the message. The first question, "In the story you just read, there was a smoker character smoking tobacco cigarettes. Where was he/she smoking?", had five response options: His/her home, Outside café, Bar (indoors), Park, and Street. The second question, "In the story you just read, one of the consequences of [smoking/secondhand smoking] below was mentioned. What was it?" had six options: Asthma attack (correct answer for high-severity SHS messages), Oral and throat cancer (high-severity outside café message), Gum disease (low-severity outside café message), Stroke (high-severity home message), Increase in blood pressure (low-severity home message), and none of the above (low-severity SHS messages). All options were displayed in a random order. Participants were given 1 point for each correct answer, with possible range of points between 0 and 2 per each evaluation (1st evaluation: $M = 1.48$, $SD = .70$; 2nd evaluation: $M = 1.64$, $SD = .60$). This variable was used as a control variable in all ANOVA and regression models.

Attitude toward smoking when others are around. Attitude toward smoking around others was measured by five items on five-point semantic differential scales: "My smoking when other people are around is: Bad – Good", "Unenjoyable – Enjoyable",

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[3] This somewhat low reliability is mainly due to "I felt sorry for him/her", and its low correlation to the reverse-coded items. When this item was dropped, Cronbach's α rose to .77 for both evaluations, but the analyses results did not change.

"Unpleasant – Pleasant", "Foolish – Wise", "Harmful – Beneficial" (Cronbach's α= .86, *M* = 1.75, *SD* = .92).

Attitude toward one's own smoking. Attitude toward one's own smoking was measured by the same five semantic differential scales as attitude toward smoking when others are around, but with a different stem statement: "My smoking in general is…" (Cronbach's α= .82, *M* = 2.29, *SD* = .88).

Intention to avoid smoking when others are around. Intention to avoid smoking around others was measured using three items on a four-point scale (1 = Definitely will not, 2 = Probably will not, 3 = Probably will, 4 = Definitely will): "How likely is it that in the next 30 days you will: Smoke outside the house to protect my family's health", "Refrain from smoking in an enclosed indoor space when others are around", "Refrain from smoking in any public spaces, such as an outside park" (Cronbach's α= .71, *M* = 3.25, *SD* = .68).

Intention to quit smoking. Intention to quit smoking was measured by four items on the same four-point scale as intention to avoid smoking when others are around: "How likely is it that in the next 30 days you will: Call a quitline", "Quit smoking completely and permanently", "Reduce the number of cigarettes you smoke in a day", "Talk to someone (friend, family, spouse) about quitting smoking" (Cronbach's α= .84, *M* = 2.63, *SD* = .73).

Anti-SHS policy support. Participants were asked to respond about what they think about smoking in some places "regardless of what the current policies are in (their) workplace or (their) home." Three items were asked on a three-point scale (1 = NOT allowed at all, 2 = Allowed in some areas, 3 = Allowed in all areas): "In bars, cocktail

lounges, and clubs, smoking should be…" "Inside casinos, smoking should be…" "On outdoor children's playgrounds and outdoor children's sports fields, smoking should be…" (Cronbach's α= .79, $M = 2.46$, $SD = .44$).

Analyses. For the message evaluation variables, all participants saw two different messages in the same condition and evaluated each message using the same questionnaire. The evaluations were the unit of analysis, but due to the multiple exposure design, the evaluations were nested within each individual. Therefore, two approaches were taken. First, ANOVA models using only the first or second evaluations at a time were fitted. The models included the main effect of smoker-audience similarity: similar (vs. dissimilar), message theme: SHS (vs. self-harm), severity: high (vs. low), message context: home (vs. outside café), and all possible two-, three-, and four-way interaction terms as independent variable. This was done to reflect the factorial design, although the key interaction terms were Similarity x Theme, Similarity x Severity, and Similarity x Severity x Theme. Effect sizes (partial η^2) for key independent variables were calculated using the user-generated program *effectsize* (http://www.ats.ucla.edu/stat/ stata/faq/effectsize.htm).

Second, multi-level regression models were examined to see whether the results were significant. These models account for the fact that the units of analyses, the evaluations, are nested within each individual participant (two per participant). In the regression models, all independent variables were effect-coded (Similarity: dissimilar = -0.5, similar = +0.5; Theme: self-harm: -0.5, SHS = +0.5; Severity: low = -0.5, high = +0.5; Context: outside café = -0.5, home = +0.5) to keep the statistical significance test consistent with ANOVA models. The order (1 vs. 2) of evaluation was added as an additional control

variable. These models were analyzed using STATA 12. The participants' knowledge

test scores were included as a control variable in both set of analyses. See Results –

Knowledge test section for details.

To address moderated mediation hypotheses and research question, PROCESS macro

for SPSS (Hayes, 2013) was used to calculate the magnitude of the conditional indirect

effect (indicated by the product of the coefficients for the effect of independent variables

and their interaction term on the mediator (a) and for the effect of mediator on DV

controlling for the independent variables' main and interaction effects (b)) as well as the

bias-corrected bootstrap confidence intervals using 5,000 bootstrap samples. Here, all

variables were also effect coded. As mentioned earlier, it should be noted that the

coefficient being statistically different from zero cannot show the causal direction

between the mediating and dependent variable. The experimental study design can

establish the internal validity where the independent variables (Similarity, Severity and

Theme) causes changes in mediating variables (e.g. identification with the character,

message engagement) and dependent variable (PE), but not between the mediating and

dependent variables. While previous theories (e.g. Cohen, 2001) would argue that the

mediating variables would work to enhance message effectiveness, the study design does

not validate the causal direction since they were measured almost at the same time after

exposure to the messages.

Results

Participants. A total of 1,843 adult daily smokers participated in the experiment. 265

participants were terminated during the survey because they failed attention filters and 19

others were terminated because they had technical issues in displaying one of the stimuli. The remaining 1,559 participants were included in the analyses below.

Table 8 shows the distribution of demographic and smoking-related variables across the conditions. As designed by the quota, 781 (50.1%) were 18-35 years old (younger smokers). 783 (50.2%) were male. The majority ($n = 1,191$, 76.4%) were White. About half of the participants (50.6%) had one or more children under 18 living in their household.

Compared to the Pilot 2 (smaller-scale experiment) conducted on MTurk, there were obvious demographic differences due to the quota design: Among the main experiment participants, there was a lower proportion of female (Main experiment: 50.1% vs. Pilot 2: 63.3%) and White (76.4% vs. 93.2%), and higher proportion of having one or more children in the household (50.6% vs. 43.1%). The proportion of young participants (49.8% vs. 51.1%) and Stage of Change were almost identical (Mean: 5.98 vs. 5.99) between the main experiment and Pilot 2.

All participants were randomly assigned to one of the eight conditions: 2 (Theme: SHS vs. Self-harm) x 2 (Severity: High vs. Low) x 2 (Similarity: Similar vs. Dissimilar). There were no significant differences observed across the eight conditions in terms of any demographic variables (race, age, gender, education, having children and household income) or smoking-related variables (stage of change, number of cigarette per day, and number of previous quit attempts), except for Fagerström test of nicotine dependence (FTND; Heatherton et al., 1991). See Table 8 for detailed descriptive statistics across the eight conditions.

A priori power analysis suggested $n = 143$ per cell would provide adequate power to detect the interaction effect with a small effect size of Cohen's f^2 of .02 for PE, or $r = -.15$ (as observed in Study 2). With sample sizes per cell ranging between 145 and 179, the current sample size would provide adequate power to detect the two- and three-way interaction effects between Similarity, Severity and Theme. Four-way interaction effect analyses involving demographic moderators were quite underpowered, especially for analyses involving race, as some cells have as little as 39 Black smokers (e.g. Dissimilar/ Low-severity/Self-harm condition). So any effects with four way interactions (or their absence) should be understood in the context of low statistical power and treated as merely suggestive for future replication.

Table 8. Descriptive statistics of the main experiment participants in each condition

| | | | Self-harm | | | | SHS | | | |
| | | | Low-severity | | High severity | | Low-severity | | High severity | |
		All	Dissimilar	Similar	Dissimilar	Similar	Dissimilar	Similar	Dissimilar	Similar
Total	*n*	1,559	186	191	196	196	215	183	200	192
Demographic variables										
Female	*n*	776	85	90	100	110	108	88	102	93
	(%)	(49.8%)	(45.7%)	(47.1%)	(51.0%)	(56.1%)	(50.2%)	(48.1%)	(51.0%)	(48.4%)
White	*n*	1,191	147	146	148	152	168	137	144	149
	(%)	(76.4%)	(79.0%)	(76.4%)	(75.5%)	(77.6%)	(78.1%)	(74.9%)	(72.0%)	(77.6%)
Younger	*n*	781	96	96	95	96	117	90	105	86
(18-35 yrs old)	(%)	(50.1%)	(51.6%)	(50.3%)	(48.5%)	(49.0%)	(54.4%)	(49.2%)	(52.5%)	(44.8%)
Having children	*n*	788	99	92	90	98	109	93	110	97
	(%)	(50.5%)	(53.2%)	(48.2%)	(45.9%)	(50.0%)	(50.7%)	(50.8%)	(55.0%)	(50.5%)
Income	*M*	2.48	2.67	2.48	2.48	2.30	2.45	2.53	2.48	2.46
	SD	1.21	1.33	1.26	1.21	1.12	1.17	1.26	1.13	1.17
Education	*M*	4.93	5.03	4.92	4.91	4.92	4.88	4.95	5.03	4.85
	SD	1.00	1.06	1.04	0.98	0.93	1.00	1.02	0.97	0.99
Smoking-related variables										
Stage of Change	*M*	5.99	5.48	6.30	5.91	5.95	6.07	6.11	6.10	5.93
	SD	2.71	2.81	2.55	2.75	2.86	2.72	2.69	2.68	2.57
# of cigarette/day	*M*	23.05	25.70	22.05	22.66	22.52	21.68	22.31	24.03	23.67
	SD	22.21	24.37	21.43	22.00	20.71	20.64	21.69	23.94	22.92
# of quit attempts	*M*	3.77	3.75	3.72	3.49	3.71	3.75	3.65	3.14	4.97
(Life time)	*SD*	9.17	8.60	5.37	4.06	8.20	8.37	6.58	7.40	17.93
FTND+	*M*	5.25	5.72	5.17	4.98	5.22	5.31	5.26	5.36	5.00
	SD	2.33	2.35	2.32	2.39	2.21	2.29	2.28	2.42	2.36

Note. +*p* < .10 across the eight conditions.

Bivariate association among DVs. Pearson regression coefficients show that most DVs are correlated with each other in the expected directions (see Table 9). Perceived similarity and identification with the smoker character showed correlation coefficients of .61 and .67 for the first and the second message, respectively. There were medium to high correlations among PE, engagement, identification, and intention to quit smoking. As expected, reactance was negatively associated with PE and engagement, as well as intention to quit smoking, intention to avoid SHS, and policy support.

Table 9. Pearson correlation among DVs

	Message order	PE_all	Engage	Perceived similarity	Identifi- cation	Reactance	Empathy (to victim)	Att_SHS	Att_smk	Int_SHS
Message evaluation										
PE_all	1st									
	2nd									
Engage	1st	.75 ***								
	2nd	.80 ***								
Perceived similarity	1st	.29 ***	.45 ***							
	2nd	.30 ***	.44 ***							
Identify	1st	.48 ***	.61 ***	.61 ***						
	2nd	.50 ***	.60 ***	.66 ***						
Reactance	1st	-.45 ***	-.36 ***	-.11 ***	-.16 ***					
	2nd	-.49 ***	-.39 ***	-.10 ***	-.16 ***					
Empathy (to victim)	1st	.46 ***	.44 ***	.12 ***	.27 ***	-.59 ***				
	2nd	.46 ***	.43 ***	.05 *	.19 ***	-.56 ***				
Post-exposure										
Attitude toward SHS	1st	-.28 ***	-.21 ***	.03	-.04 +	.40 ***	-.40 ***			
	2nd	-.30 ***	-.22 ***	.05 *	-.02	.40 ***	-.40 ***			
Attitude toward smoking	1st	-.27 ***	-.23 ***	.01	-.06 *	.38 ***	-.36 ***	.70 ***		
	2nd	-.31 ***	-.25 ***	.04	-.06 *	.39 ***	-.36 ***			
Intention to avoid SHS	1st	.43 ***	.33 ***	.06 *	.19 ***	-.27 ***	.26 ***	-.31 ***	-.26 ***	
	2nd	.42 ***	.31 ***	.02	.16 ***	-.26 ***	.24 ***			
Intention to quit smoking	1st	.61 ***	.56 ***	.30 ***	.42 ***	-.23 ***	.23 ***	-.15 ***	-.23 ***	.49 ***
	2nd	.61 ***	.52 ***	.24 ***	.37 ***	-.22 ***	.23 ***			

Note. Message evaluation variables were measured for both messages; Post-exposure variables were measured only once per participants after they finished reading both messages. *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

Manipulation check. The similarity manipulation worked as intended. After reading the first message, most participants in the similar (1st message: 96.7%; 2nd message: 97.2%) and dissimilar conditions (1st message: 93.0%; 2nd message: 95.6%) correctly identified the smoker characters as being either the same or a different race as themselves. Similar results were observed for gender similarity, where over 95% of participants in each condition correctly identified the similarity. The age similarity manipulation check yielded similar results, although the proportion of correct participants was considerably lower; this is to be expected, as the gap between being "about the same age" and "quite younger/older than me" would be smaller than the gap between "same gender" and "different gender". After the first message, 64.3% of similar condition participants responded that the smoker character was "about the same age" as their age, while only 26.1% of dissimilar condition participants responded so, $\chi^2(3) = 267.31$, $p < .001$. After the second message, 66.7% of similar condition participants responded that the smoker character was "about the same age", where only 15.9% of dissimilar condition participants responded so, $\chi^2(3) = 448.33$, $p < .001$.

To check the severity manipulation, perceived seriousness of the consequences was measured: "The effect of [smoking/secondhand smoking] on the [smoker/non-smokers] discussed in the story I just read was.." (1 = not serious at all, 11 = extremely serious). ANOVA models including the main effect term of Similarity, Severity, Theme and Context as well as all the possible interaction terms revealed that the manipulation was successful overall (1st evaluation: $F(1,1543) = 9.70$, $p = .002$; 2nd evaluation: $F(1,1543) = 30.70$, $p < .001$). High-severity condition participants reported higher perceived seriousness (1st evaluation: $M = 9.20$, $SD = 2.24$; 2nd evaluation: $M = 9.19$, $SD = 2.23$)

than those in the low-severity condition (1st evaluation: $M = 8.86$, $SD = 2.34$; 2nd evaluation: $M = 8.54$, $SD = 2.48$). However, a different pattern emerged between the SHS and the self-harm messages, indicated by a significant two-way interaction between Severity and Theme (2nd evaluation only: $F(1,1543) = 18.53$, $p < .001$). Only the SHS stories showed significant differences between the high- vs. low-severity conditions (High: $M = 9.56$, $SD = 1.00$, Low: $M = 8.40$, $SD = 2.62$). Although the high-severity condition participants evaluated the messages as depicting more serious consequences than the low severity messages, the difference in perceived seriousness in self-harm themed messages was in the correct direction, but not significant (High severity: $M = 8.82$, $SD = 2.39$; Low severity: $M = 8.68$, $SD = 2.33$).

For the 1st evaluation, three-way interaction between Severity, Theme and Context emerged as significant on perceived seriousness ($F(1,1543) = 4.18$, $p = .04$). Unlike the 2nd evaluation, the overall two way interaction between Severity and Theme was not significant ($p = .14$); but it is more pronounced in the home stories, with greater effect of Severity manipulation in the SHS condition (High severity: $M = 9.58$, $SD = 2.06$; Low severity: $M = 8.79$, $SD = 2.44$) than in the self-harm condition (High severity: $M = 8.96$, $SD = 2.21$; Low severity: $M = 8.99$, $SD = 2.17$). On the other hand, in the café stories, both the SHS condition (High severity: $M = 9.15$, $SD = 2.40$; Low severity: $M = 8.91$, $SD = 2.42$) and the self-harm condition (High severity: $M = 9.12$, $SD = 2.23$; Low severity: $M = 8.72$, $SD = 2.33$) showed similar patterns in terms of the perceived seriousness.

The main effects of the context of the message (Home vs. Café, $ps > .30$), Similarity ($ps > .30$) or Theme ($ps > .05$) were not significant on perceived seriousness. Other than

the interaction effects mentioned above, no other two- or three-way interaction terms involving Severity were significant.

As already mentioned in Study 3 – Pilot 3, the Severity manipulation was achieved by changing the actual message contents (O'Keefe, 2003), rather than relying on the perceived seriousness. The differences in low- vs. high-severity condition messages are still intact, in spite of the lack of significant difference in perceived seriousness.

Knowledge test. The participants were tested on their recall of facts mentioned in the messages they read using two questions each for one message, so an evaluation was associated with a score ranging from $0 - 2$ (1st evaluation: $M = 1.48$, $SD = .70$; 2nd evaluation: $M = 1.64$, $SD = .60$). The knowledge test score was used as a covariate in the analyses where message evaluation variables (measured for each of the messages; e.g. PE, engagement, identification with the character) were the key outcome variables. The sum score for both messages (range: $0 - 4$; $M = 3.12$, $SD = 1.12$) were used as a covariate where attitudes and intentions (measured once for each participant after reading both messages) were the key outcome variables. Here, results regarding only the sum scores were shown for brevity.

Most participants achieved full score (51.4%), and another 22.6% acquired 3 out of 4. However, 156 participants scored 0 ($n = 58$) or 1 ($n = 98$). 75 participants got 0 for one message and 2 for the other. The knowledge test scores were significantly affected by the conditions. Similarity ($F(1,1543) = 11.84$, $p = .001$) and Severity ($F(1,1543) = 69.72$, $p < .001$) manipulation resulted in substantial differences in knowledge scores. Those who were in the similar ($M = 3.22$, $SD = 1.07$) or high-severity ($M = 3.35$, $SD = 1.05$)

conditions scored higher than those in the dissimilar ($M = 3.02$, $SD = 1.15$) or the low-severity condition ($M = 2.89$, $SD = 1.13$). Self-harm condition participants ($M = 3.17$, $SD = 1.08$) also scored higher than their counterparts in the SHS condition ($M = 3.06$, $SD = 1.15$), $F(1,1543) = 3.35$, $p = .07$.

These main effects were qualified by a significant two-way interaction effect between Severity and Theme ($F(1,1543) = 13.35$, $p < .001$). This interaction effect (see Figure 9) suggests that the difference between high-severity self-harm condition scores ($M = 2.30$, $SD = 1.03$) and low-severity self-harm condition ($M = 3.04$, $SD = 1.12$) was smaller than those in the SHS condition (high-severity: $M = 3.40$, $SD = 1.08$; low-severity: $M = 2.74$, $SD = 1.13$).
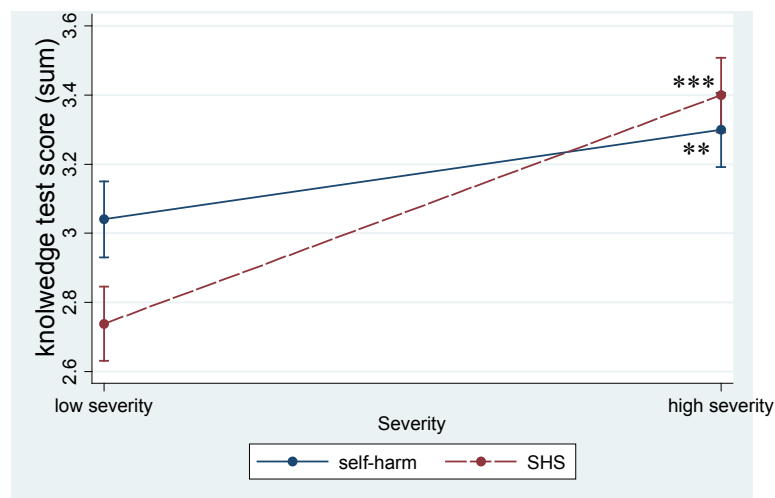
Figure 9. Effect of Severity and Theme on the knowledge test score. Estimated means and 95% CIs are shown. Statistical significance of the simple main effect of Severity in each condition is marked when applicable: $+p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

The three-way interaction between Similarity, Severity and Theme was marginally significant, $F(1,1543) = 3.23$, $p = .07$, suggesting that the Similarity x Severity interaction

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on knowledge test score was greater in the SHS condition than in the self-harm condition. However, this effect substantially weakened ($F(1, 1516) = 2.17$, $p = .14$) when other demographic (gender, race, age, education, income, having children), smoking-related variables (FTND, stage of change) and time spent reading the message were included as control variables[4], as well as the main effect of Theme, $F(1,1516) = 1.89$, $p = .17$.

The knowledge test score can be reasonably understood as a measure of attention to the message. At the same time, the significant differences between conditions observed in accuracy suggest that the manipulations are potential causal factors in attention as a kind of cognitive engagement. Therefore, knowledge test score was included as a continuous control variable in all ANOVA and regression models presented below.

Hypotheses testing (1): Smoker-audience similarity, message theme and severity on perceived effectiveness (PE). H1a and H2a hypothesized the two- and three-way interaction effects between smoker-audience similarity, victimization severity and message theme (SHS vs. self-harm) on PE with Similarity as the key independent variable at hand. ANOVA models including Similarity, Severity, Theme, message context (home vs. outside café), all possible interaction terms as well as the knowledge test score (see Table 10) was fitted to test these hypotheses.

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[4] Being female (F(1,1516) = 25.13, p < .001), White (F(1,1516) = 7.36, p = .01), older (F(1,1516) = 20.91, p < .001), less dependent on nicotine (i.e. lower FTND; F(1,1516) = 11.18, p = .001), and reading slowly (F(1,1516) = 15.58, p < .001) were positive predictor of knowledge test scores, controlling for experimental conditions.

Similarity and Theme interacted significantly on PE (1st message: $F(1, 1542) = 4.54$, $p = .03$, partial $\eta^2 = .003$; 2nd message: $F(1, 1542) = 4.41$, $p = .04$, partial $\eta^2 = .003$): Seeing a similar smoker character in the self-harm condition increased PE, but in the SHS condition, seeing a similar smoker character decreased PE (see Table 11 and Figure 10 for the mean difference across the conditions), although the simple main effects of Similarity did not reach significant level in either condition. No other higher order interaction effect terms involving Similarity were significant (all ps > .35). Multi-level regression models including effect coded variables produced the same results. Therefore, H1a was supported, but H2a was not.

As mentioned earlier, there were significantly more White smokers than Blacks among the participants. As a result, more White smoker characters (to White participants, $n = 584$) were shown in the similar condition than Black smoker characters (to Black participants, $n = 178$); in the dissimilar condition, more Black smoker characters ($n = 607$) were shown to the participants than White smoker characters ($n = 178$).

While the random assignment to the similar vs. dissimilar conditions still establishes the internal validity in the current design, it is possible that seeing White vs. Black characters in general regardless of racial matching and non-matching might have generated different emotional responses and thus influenced the observed effect of

character-audience similarity[5]. To examine whether this bias might have actually

affected the results, post-stratification was used to weight the sample to assume equal

number of participants from White and Black smoker population by over-weighting

Black participants. Here, multivariate regression models were fitted using effect-coded

independent variables (Similarity, Severity, Theme, and Context) and their interaction

terms, as well as the knowledge test score as a covariate.

The results were largely the same: The two-way interaction between Similarity and

Theme was negative and significant (first evaluation: $b = -.21$, $SE = .05$, $p < .001$; second

evaluation: $b = -.16$, $SE = .05$, $p = .002$), supporting H1. The three-way interaction

between Similarity, Severity and Theme on PE was not significant in either first or

second evaluation (all $ps > .20$).

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[5] T-tests for dependent variables showed that engagement (1st evaluation: $t = 1.71$, $p = .09$; 2nd evaluation: $t = .84$, $p = .40$) and empathy (1st evaluation: $t = .68$, $p = .50$; 2nd evaluation: $t = 2.54$, $p = .01$) were indeed influenced by the character's race, where seeing a Black smoker character garnered greater engagement (2nd evaluation, Black: $M = 3.85$, $SD = .86$; White: $M = 3.78$, $SD = .84$) and empathy toward the victim (2nd evaluation, Black: $M = 3.64$, $SD = .81$; White: $M = 3.53$, $SD = .81$) from the participants.
No other dependent variables were significantly predicted by the character's race (all ps $> .11$), although the directions were largely consistent.

Table 10. Analysis of Variance (ANOVA) on Perceived effectiveness

	First evaluation			Second evaluation		
	df	*F*	*p*	*df*	*F*	*p*
Model	16	1.47	.10	16	2.38	.00
Similarity	1	0.00	.98	1	0.04	.85
Severity	1	1.38	.24	1	7.41	.01
Theme: SHS (vs. self-harm)	1	4.08	.04	1	12.08	.00
Similarity x Theme	**1**	**4.54**	**.03**	**1**	**4.41**	**.04**
Similarity x Severity	**1**	**0.84**	**.36**	**1**	**0.12**	**.73**
Severity x Theme	1	4.20	.04	1	7.02	.01
Similarity x Theme x Severity	**1**	**0.58**	**.45**	**1**	**0.88**	**.35**
Context: Home (vs. outside café)	1	0.01	.94	1	1.66	.20
Knowledge test score	1	0.75	.39	1	0.82	.36
Residual	1542			1542		
Total	1558			1558		

Note. *n* = 1,559 for each evaluation. Interaction terms involving message context (home vs. outside café) were not displayed for brevity (all *p*s > .05). See Appendix 8 for full ANOVA table.

Table 11. Observed means and *SD*s of PE across the conditions

	First evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.83	0.80	3.85	0.68	3.84	0.74	3.78	0.78	3.90	0.71	3.84	0.75	3.84	0.75
		n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797
Similar	3.97	0.68	3.87	0.82	3.92	0.75	3.71	0.84	3.81	0.75	3.76	0.79	3.84	0.78
		n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762

	Second evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.83	0.80	3.84	0.73	3.84	0.76	3.70	0.84	3.85	0.80	3.77	0.82	3.80	0.79
		n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797
Similar	3.92	0.73	3.90	0.75	3.91	0.74	3.57	0.89	3.81	0.78	3.69	0.84	3.80	0.80
		n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762

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Figure 10. Effect of Similarity and Theme on PE (H1a). Graph shows estimated means and 95% *CI*s based on ANOVA model assuming balanced design. Statistical significance of the simple main effect of similarity in each condition is marked when applicable: *** *p* < .001, ** *p* < .01, * *p* < .05, + *p* < .10.

Hypotheses testing (2): Moderated mediation on perceived effectiveness (PE). See Appendix 8 and 9 for the full ANOVA tables as well as observed mean and *SD*s of dependent variables reported here across the conditions.

H3a-b hypothesized the effect of smoker-audience similarity, message theme and severity on message engagement. First, ANOVA models yielded the expected two-way interaction effect between smoker-audience similarity and message theme (H3a; 1st evaluation: $F(1, 1542) = 5.03$, $p = .03$, partial $\eta^2 = .003$; 2nd evaluation: $F(1, 1542) = 4.50$, $p = .03$, partial $\eta^2 = .003$; see Figure 11). This result was replicated in the multi-level regression model as well ($b = -.18$, $SE = .08$, $p = .03$).

When decomposed, the simple main effects of Similarity did not reach significant level in either the self-harm or SHS conditions (all *p*s > .07), but the directions were opposite from each other. Seeing a similar smoker character in the self-harm messages increased engagement, but seeing a similar smoker character in the SHS-themed messages decreased engagement. No other higher-order interaction effect terms

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involving Similarity emerged as significant (all ps > .23). Therefore, H3a (Similarity x

Theme) was supported, but H3b (Similarity x Severity x Theme) was not.
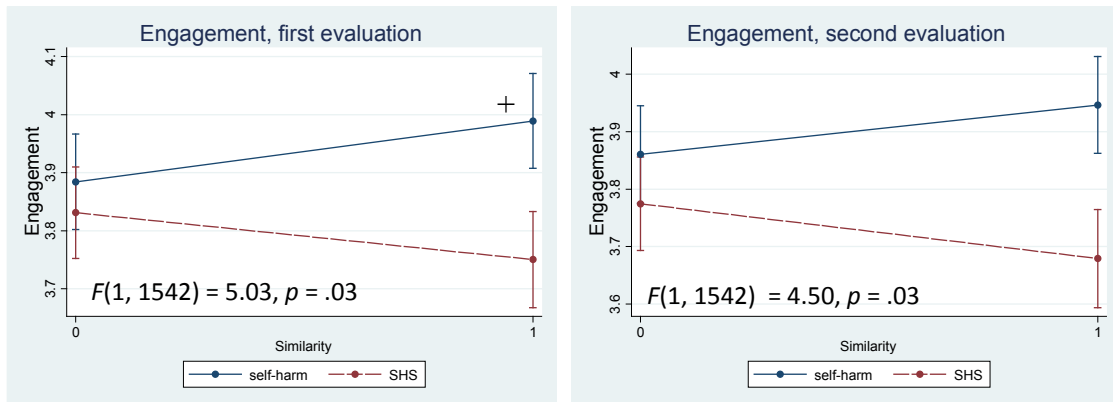
Figure 11. Effect of Similarity and Theme on message engagement (H3a). Estimated means and 95% *CI*s based on ANOVA model assuming balanced design are shown. Statistical significance of the simple main effect of similarity in each condition is marked when applicable: *** p < .001, ** p < .01, * p < .05, + p < .10.

For reactance (H4), the ANOVA model yielded a marginally significant two-way

interaction effect between Similarity and Theme (1st evaluation: $F(1, 1542) = 3.03$, p

= .08, partial η^2 = .002; 2nd evaluation: $F(1, 1542) = 3.86$, p = .05, partial η^2 = .002).

This two-way interaction effect emerged as marginally significant in the multi-level

regression model (b = .18, SE = .09, p = .05). Participants in the SHS condition showed

stronger reactance against the message when the smoker character was similar to them

(1st evaluation: estimated mean difference = .11, p = .08; 2nd evaluation: estimated mean

difference = .16, p = .02); in the self-harm condition, smoker-audience similarity was

associated with lower reactance, although the association did not reach statistical

significance in both evaluations (all ps >.46).

No other higher-order interaction effect terms involving Similarity emerged as significant (all $ps > .08$[6]). Therefore, H4a (Similarity x Theme) was supported, but H4b (Similarity x Severity x Theme) was not.

RQ1 examined the moderated mediation effect of Similarity, Severity and Theme via identification with the smoker character on PE. First, in the ANOVA model, the two-way interaction effect between Similarity and Theme was significant (1st evaluation: $F(1, 1542) = 9.16$, $p = .003$, partial $\eta^2 = .006$; 2nd evaluation: $F(1, 1542) = 6.50$, $p = .01$, partial $\eta^2 = .004$): Smoker-audience similarity increased identification in the self-harm condition, but not in the SHS condition (see Figure 12). No other higher-order interaction effect terms involving Similarity were significant (all $ps > .17$).
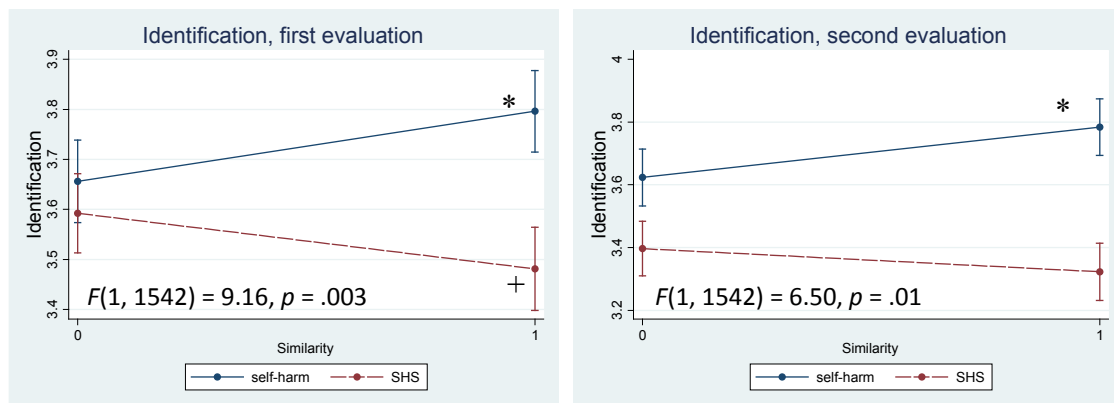
Figure 12. Effect of Similarity and Theme on identification with Smoker Character (RQ1). Estimated means and 95% *CIs* based on ANOVA model assuming balanced design are shown. Statistical significance of the simple main effect of similarity in each condition is marked when applicable: *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

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[6] The four-way interaction between Similarity, Severity, Theme and Context was marginally significant, $F(1,1542) = 3.10$, $p = .08$, for the 1st evaluation only. Other than this, all ps are higher than .16. Since the context is not the variable of interest, this interaction effect was not further interpreted.

RQ2 examined the mediating role of perceived similarity to the smoker character on PE. Unlike identification, the two-way interaction between Similarity and Theme was significant only for the first evaluation ($F(1, 1542) = 4.03$, $p = .04$, partial $\eta^2 = .003$), but not for the second evaluation ($F < 1.00$). In the multi-level regression using effect coded variables, the two-way interaction term was not significant ($b = -.16$, $SE = .11$, $p = .14$). No other higher-order interaction effect terms involving similarity reached significant level (all $ps > .43$).

RQ3 pertained to the mediating role of empathy toward the victim (self-harm condition: the smoker character; SHS condition: the non-smoker victim character) on PE. Only the first evaluation showed a significant two-way interaction between Similarity and Theme on empathy ($F(1, 1542) = 3.99$, $p = .046$, partial $\eta^2 = .003$), but not the second ($F < 1.00$). A multi-level model also failed to yield significant two-way interaction between Similarity and Theme on empathy, $p = .13$. Other than a three-way interaction effect between Similarity, Theme and Context[7], no other higher-order interaction effect terms involving similarity reached significant level ($ps > .20$).

In sum, out of the five potential mediator variables, the two-way interaction effect between Similarity and Theme consistently emerged for engagement with the message and identification with the smoker character.

The moderated mediation hypotheses and research questions were also examined using PROCESS macro (Hayes, 2013) on SPSS 19 with 5,000 bootstrap samples. All results reported below are unstandardized coefficients and bias-corrected 95% bootstrap

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[7] Again, since Context was not the variable of interest, this interaction effects (1st message: $F(1,1542) = 2.51$, $p = .11$; 2nd message: $F(1,1542) = 4.73$, $p = .03$) were not further interpreted.

confidence intervals (*CI*s). Here, all variables were effect coded (-0.5 vs. 0.5). All five

mediators were analyzed in one model per Hayes's recommendation (2013, chapter 5).

Table 9 shows that the correlation among the mediator variables are not very high,

reducing the concern for multicollinearity. The correlations among the mediators ranged

from .05 to .66 for positively associated variables (e.g. identification and perceived

similarity: r = .61 and .66 for the first and the second evaluation respectively; perceived

similarity and empathy: r = .12 and .05), and -.59 to -.10 for negatively associated

variables (e.g. reactance and empathy: r = -.59 and -.56 for the first and the second

evaluation respectively; reactance and perceive similarity: r = -.11 and -.10). See Figure

13 for the path diagram showing significant paths with the unstandardized coefficients.

For the first evaluation, all but one mediators showed significant moderated mediation

effect of Similarity and Theme on PE (engagement: b = -.111, *CI* = -.207 ~ -.012;

identification: b = -.023, *CI* = -.044 ~ -.006; perceived similarity: b = .013, CI = .001

~ .031; empathy: b = -.011, *CI* = -.028 ~ -.001). The 95% CI for reactance included zero

at p < .05 level (b = -.021, *CI* = -.052 ~ .002), albeit quite close[8]. For the second

evaluation, only engagement (b = -.111, *CI* = -.213 ~ -.006), reactance (b = -.032, *CI* = -

.067 ~ -.001) and identification (b = -.028, *CI* = -.055 ~ -.007) emerged as significant

mediators. Moderated mediation via perceived similarity (b = .007, *CI* = - .007 ~ .023)

and empathy (b = -.003, *CI* = -.014 ~ .005) failed to reach significant level at p < .05.

The results indicate that the effect of seeing a similar (vs. dissimilar) smoker character

in the self-harm condition and in the SHS condition is significantly different across the

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[8] 90% bootstrap CI for the moderated mediation effect for reactance was significantly different from 0, -
.047 ~ -.002.

two condition, which is mediated by engagement with the message (H3) and identification to the smoker character (RQ1). Seeing a similar smoker character in the self-harm condition significantly enhances PE indirectly via increase in identification (1st evaluation: $b = .012$, $CI = .002 \sim .027$; 2nd evaluation: $b = .019$, $CI = .005 \sim .038$); in the SHS condition, Similarity exerts negative indirect effect on PE via identification, although the effect is significant only in the 1st evaluation ($b = -.009$, $CI = -.024 \sim -.0004$; 2nd evaluation: $b = -.009$, $CI = -.026 \sim .007$). The indirect effect of Similarity on PE in the self-harm and the SHS condition mediated via engagement also differed significantly between the two conditions, in the same direction as to the indirect effect mediated by identification, but the indirect effect in both conditions were not significant at $p < .05$ level.

Reactance (H4; 2nd evaluation only), perceived similarity (RQ2; 1st evaluation only) and empathy (RQ3; 1st evaluation only) were not consistently significant mediators at $p < .05$ level. Therefore, H3c was supported; H4c showed partial support for only the second evaluation. RQ1 and RQ3 were testing competing mechanisms of the boundary condition of character-audience similarity effect – disidentification from the similar character engaging in an immoral behavior, or moral disengagement by justifying the immoral behavior and negative consequences caused by the similar character. Since identification is a consistent mediator but empathy is not, it seems the observed interaction effect between Similarity and Theme is due to the difference in the effect of character-audience similarity on identification with the character between the self-harm (identification) and the SHS (disidentification) condition, rather than empathy toward the victim.

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Perceived similarity yielded an unexpected pattern of results: While the bivariate correlation between perceived similarity and PE was positive across all the conditions, in the full moderated mediation model the path between perceived similarity and PE became negative, such that the direction of moderated mediation via perceived similarity was opposite from the other paths.
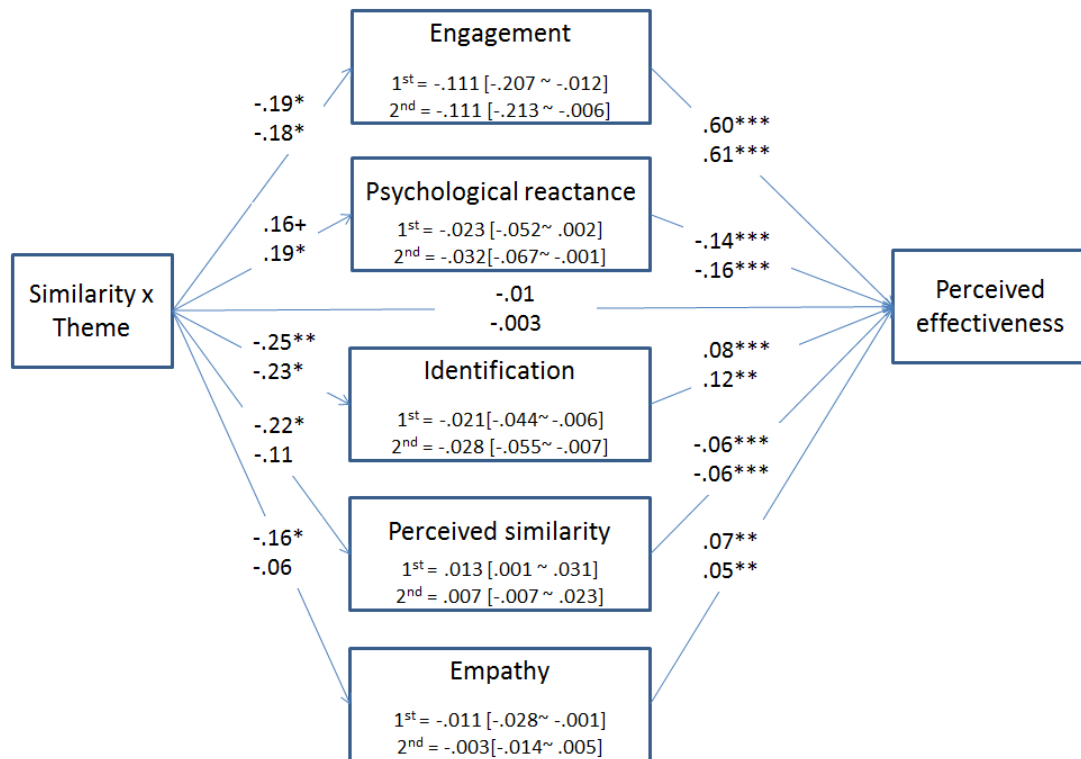
Figure 13. Path diagram showing moderated mediation effect of Similarity and Theme on PE via engagement (H3c), reactance (H4c), identification (RQ1), perceived similarity (RQ2) and empathy (RQ3). Unstandardized coefficients based on PROCESS macro are shown for each path. The magnitude of indirect effects are shown under each mediator (unstandardized coefficients and 95% bootstrap *CIs* are shown). Each line shows results from the first and second evaluation, respectively. Paths from the other main effect, two-, three- and four-way interaction terms (n.s.) were not displayed for brevity. See Appendix 10 for the full regression table.
*** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

Hypotheses testing (3): Smoker-audience similarity, message theme and severity on attitudes and intentions. See Appendix 8 and 9 for the full ANOVA tables as well as observed mean and *SD*s of dependent variables reported here across the conditions. H1b-f and H2b-f hypothesized the two- and three-way interaction effects between smoker-audience similarity, message theme, and severity on attitudes and behavioral intentions, with similarity as the key IV at hand. ANOVA models including Similarity, Severity, Theme (SHS vs. self-harm), message context (home vs. outside café) and all possible interaction terms as well as a control variable (knowledge test score) were fitted to test these hypotheses. The two-way interaction effects between Similarity and Theme on attitude toward smoking (H1c: $F(1, 1542) = 7.91$, $p = .01$, partial $\eta^2 = .005$) was significant. The same interaction effect was marginally significant on attitude toward smoking when others are around (H1b: $F(1, 1542) = 3.13$, $p = .08$, partial $\eta^2 = .002$). These variables did not show significant three-way interaction between Similarity, Severity and Theme (all ps > .35). Intention to avoid smoking when others are around (H1d) or intention to quit smoking (H1e) did not show any significant two- or three-way interaction involving smoker-audience similarity (all ps > .19).

Policy support (H1f and H2f) did not show significant two-way interaction effect between Similarity and Theme, but a marginally significant three-way interaction between Similarity, Severity and Theme ($F(1, 1542) = 3.50$, $p = .06$, partial $\eta^2 = .002$) emerged as shown in Figure 14. However, when decomposed, the pattern was different from what was hypothesized: As expected, the Similarity x Severity interaction effect was stronger in the SHS condition ($F = 2.35$) than in the self-harm condition ($F = 1.25$), although the interaction effect failed to reach significant level in both conditions. Unlike

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the expectation that high-severity SHS messages would cause smoker-audience similarity

to backfire and undermine the message effectiveness, no such result was observed. The

pattern suggests that the two-way interaction between Similarity and Theme, although not

significant for this specific variable of policy support, was mostly driven by the low-

severity conditions: In other words, Similarity is associated with greater message

effectiveness in the low-severity self-harm condition, and weaker message effectiveness

in the low-severity SHS condition. On the other hand, the high-severity self-harm and

the high-severity SHS condition did not differ in terms of the Similarity effect.

In sum, regarding the two-way interaction effect between Similarity and Theme, only

H1c was supported. Regarding the three-way interaction effect between Similarity,

Severity and Theme, none of the sub-hypotheses of H2 were supported.
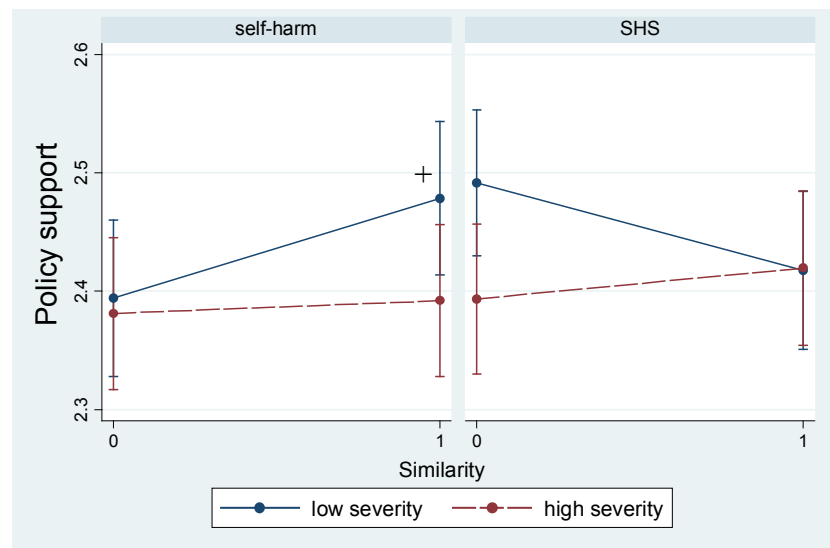
Figure 14. Effect of Similarity, Theme and Severity on anti-SHS policy support (H2f).
Graph shows a marginally significant three-way interaction ($F(1,1542) = 3.50, p = .06$).
Estimated means and 95% *CI*s based on ANOVA model assuming balanced design are
shown. Statistical significance of the simple main effect of similarity in each condition is
marked when applicable: *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

Hypotheses testing (4): Moderating role of demographic variables on outcome variables. The main effect of character-audience similarity as well as its interaction with message features (Severity and Theme) may appear differently across the demographic subgroups. For example, the boomerang effect of Similarity in the SHS condition may be weaker among females due to their higher tendency to empathize with others (i.e. the victim of secondhand smoking). This may help them to overcome the identity threats caused by seeing a similar smoker character as a perpetrator in SHS. In the similar light, parents may be more sensitive towards others' suffering, especially when the victim is a child – hence further mitigating the boomerang effect of Similarity in the SHS condition.

In terms of race, it is expected that Black smokers will be more sensitive toward the demographic matching between themselves and the smoker character. This may intensify the effect of Similarity, as well as aggravating the boomerang effect of Similarity when the similar smoker character is shown as engaging in immoral behaviors such as endangering others, or associated with more serious consequences of smoking.

Hypotheses testing (4-1): Gender. H5a-f pertained to the additional moderating role of gender in the effect of smoker-audience similarity, severity and message theme; it was hypothesized that females would be less subject to the boomerang effect of Similarity based on the expectation of their higher trait empathy. Indeed, females (1st message: $M =$ 3.74, $SD = .79$; 2nd message; $M = 3.70$, $SD = .79$) reported greater empathy toward the victim than males (1st message: $M = 3.52$, $SD = .82$; 2nd message; $M = 3.47$, $SD = .81$), all ps < .001.

ANOVA models were fitted including the main effect of Similarity, Severity, Theme, message context, gender, and all possible interaction terms, as well as a control variable

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(knowledge test score), with the six outcome variables. Being female was a significant

positive predictor of PE for both the 1st (female: $M = 3.90$, $SD = .74$; male: $M = 3.79$, SD

$= .77$; $F(1, 1526) = 8.28$, $p = .004$) and the 2nd evaluation (female: $M = 3.89$, $SD = .78$;

male: $M = 3.72$, $SD = .80$; $F(1, 1526) = 18.64$, $p < .001$). However, gender did not yield

significant difference between the two groups in terms of the main effect of Similarity, or

any higher order interaction effects involving Similarity on PE, failing to support H5a.

Female smokers showed significantly more negative attitude toward smoking when

others are around (female: $M = 1.67$, $SD = .92$; male: $M = 2.06$, $SD = 1.09$; $F(1, 1526) =$

34.01, $p < .001$) and toward smoking (female: $M = 2.25$, $SD = ..90$; male: $M = 2.51$, SD

$= .98$; $F(1, 1526) = 17.76$, $p < .001$). Also, female smokers' intention to avoid smoking

when others are around (female: $M = 3.28$, $SD = .70$; male: $M = 3.19$, $SD = .68$; $F(1,$

$1526) = 6.57$, $p = .01$) and anti-SHS policy support (female: $M = 2.48$, $SD = .42$; male: M

$= 2.36$, $SD = .50$; $F(1, 1526) = 17.71$, $p < .001$) were significantly higher than male

smokers. Intention to quit smoking was almost the same between the two groups (female:

$M = 2.67$, $SD = .73$; male: $M = 2.66$, $SD = .76$; $F(1, 1526) = 2.30$, $p = .13$).

Intention to quit smoking (H5e) showed marginally significant interaction between

Similarity, Theme and Gender ($F(1,1526) = 3.49$, $p = .06$, partial $\eta^2 = .002$). When

decomposed, this three-way interaction effect suggested that, as hypothesized, the two-

way interaction between Similarity and Theme (i.e. boomerang effect of Similarity in the

SHS condition) appeared mostly among the male smokers, but female smokers in both

the self-harm and the SHS conditions responded no differently to the similar (vs.

dissimilar) smoker character (see Figure 15). Therefore, intention to quit smoking

showed a result consistent with H5e, although only marginally significant ($p > .05$).
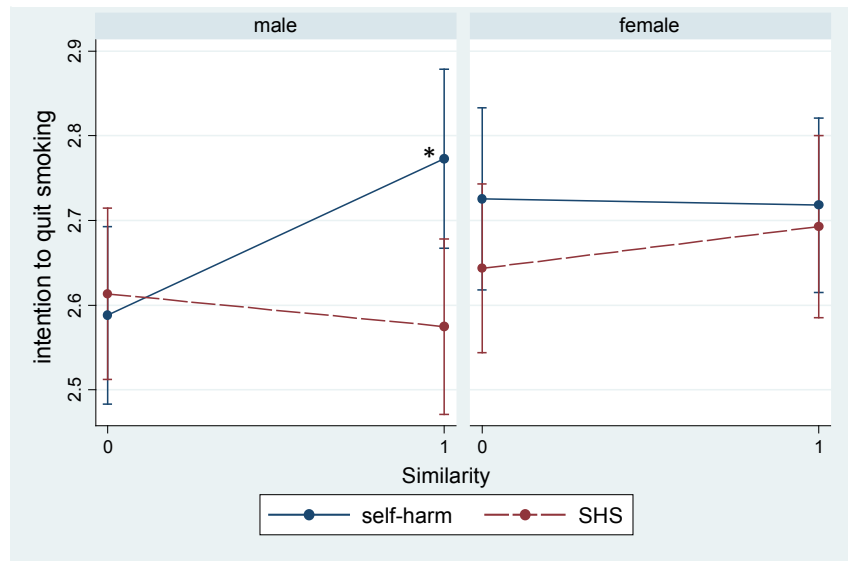
Figure 15. Effect of Similarity, Theme and Gender on intention to quit smoking (H5e). Graph shows a marginally significant three-way interaction ($F(1,1526) = 3.49$, $p = .06$).Estimated means and 95% *CI*s are shown based on ANOVA model. Statistical significance of the simple main effect of similarity in each condition is marked when applicable: *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

While no other outcome variables showed similar pattern of Gender further moderating the Similarity x Theme interaction, Gender showed significant interaction with Similarity and Severity on attitude toward smoking when others are around (H5b; $F(1,1526) = 7.13$, $p = .01$, partial $\eta^2 = .004$) and anti-SHS policy support (H5f; $F(1,1526) = 6.06$, $p = .01$, partial $\eta^2 = .004$). Figure 16 shows that the two-way interaction between Similarity and Severity emerged in opposite direction between male and female smokers. For male smokers, seeing a similar smoker caused greater message effects (i.e. greater policy support and less favorable attitude toward smoking when others are around) in the low-severity condition; on the other hand, female smokers responded favorably to Similarity manipulation in the high-severity condition. As expected, when seeing a

similar smoker character associated with more negative consequences of smoking, male smokers were more likely to show boomerang effect than female smokers. Females were more likely to accept the messages featuring a similar smoker character if the discussed consequences are more negative. While not significant, these interaction terms showed consistent direction on PE – i.e. both Similarity x Theme and Similarity x Severity interaction effects were more pronounced among male smokers.

No other higher-order interaction effects involving Similarity, Severity and Theme on any of the outcome variables (all ps > .17). Therefore, H5b (attitude toward smoking when others are around) and H5f (anti-SHS policy support) were supported; H5e (intention to quit smoking) yielded results in consistent direction, but failed to reach significant level.
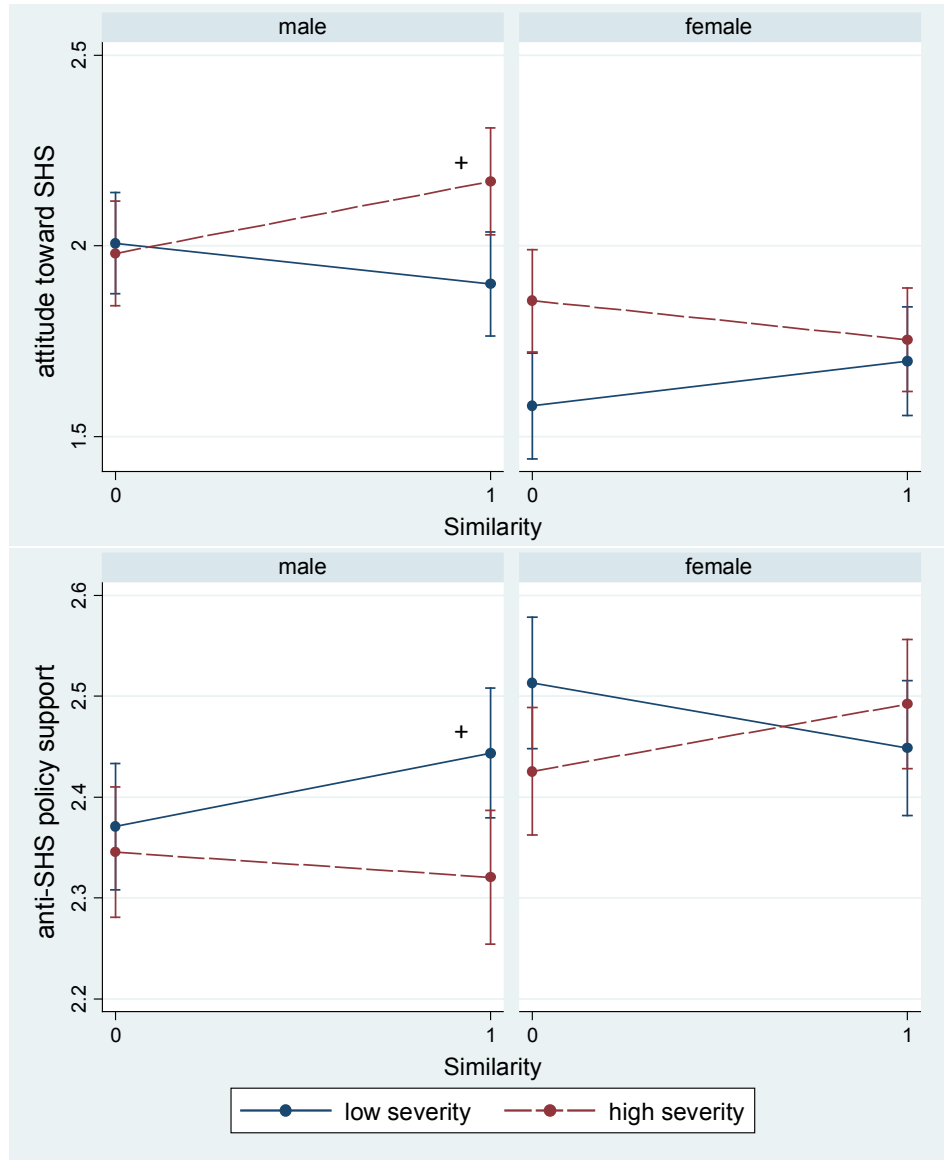
Figure 16. Effect of Similarity, Severity and Gender on attitude toward smoking when others are around (H5b) and anti-SHS policy support (H5f). Estimated means and 95% *CI*s are shown based on ANOVA model. Statistical significance of the simple main effect of similarity in each condition is marked when applicable: *** $p < .001$, ** $p < .01$, * $p < .05$, + $p < .10$.

Hypotheses testing (4-2): Parental status A similar pattern of results were expected for parents vs. non-parents smokers, expecting that the fact that they have children would mitigate the boomerang effect, if any, especially in the high-severity SHS condition.

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ANOVA models were fitted including the main effect of Similarity, Severity, Theme, message context, having children under 18-year-old in the household, and all possible interaction terms, as well as a control variable (knowledge test score), with the outcome variables including PE, attitudes and intentions.

Being a parent (1st evaluation: $F(1, 1526) = 40.19$; 2nd evaluation: $F(1, 1526) = 30.69$, all ps $< .001$) was a significant positive predictor of PE. Parental status failed to yield significant interaction effect with the main effect of Similarity, or any higher order interaction effects involving Similarity, failing to support H6a.

Parents showed significantly more negative attitude toward smoking when others are around ($M = 1.78$, $SD = 1.02$; $F(1, 1526) = 14.64$, $p < .001$) and toward smoking ($M = 2.30$, $SD = .97$; $F(1, 1526) = 13.67$, $p < .001$) than non-parent smokers (attitude toward smoking when others are around: $M = 1.96$, $SD = 1.02$; attitude toward smoking: $M = 2.46$, $SD = .92$). Also, parents' intention to avoid smoking when others are around ($F(1, 1526) = 60.01$, $p < .001$), intention to quit smoking ($F(1, 1526) = 45.71$, $p < .001$) and anti-SHS policy support ($F(1, 1526) = 4.36$, $p = .04$) were significantly higher than non-parent smokers. However, parents and non-parents were not different in terms of the main effect of similarity, the two-way interaction between Similarity and Theme or Similarity and Severity (all ps $> .17$).

With regard to the three-way interaction effect between Similarity, Severity and Theme, parents and non-parents showed marginally significant difference on intention to quit smoking, $F(1, 1526) = 3.08$, $p = .08$, partial $\eta^2 = .002$ (see Figure 17 for details). Non-parents showed boomerang effect of smoker-audience similarity in high-severity SHS condition where a child victim is shown suffering due to the secondhand smoking –

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in other words, seeing a similar smoker *lowers* the non-parent smokers' intention to quit smoking. Parents did not show much difference across the eight conditions, and although not significant, respond positively toward Similarity manipulation in the high-severity SHS condition. No other outcome variables showed such results; therefore, only H6e showed results consistent with the hypotheses, with marginally significant results.
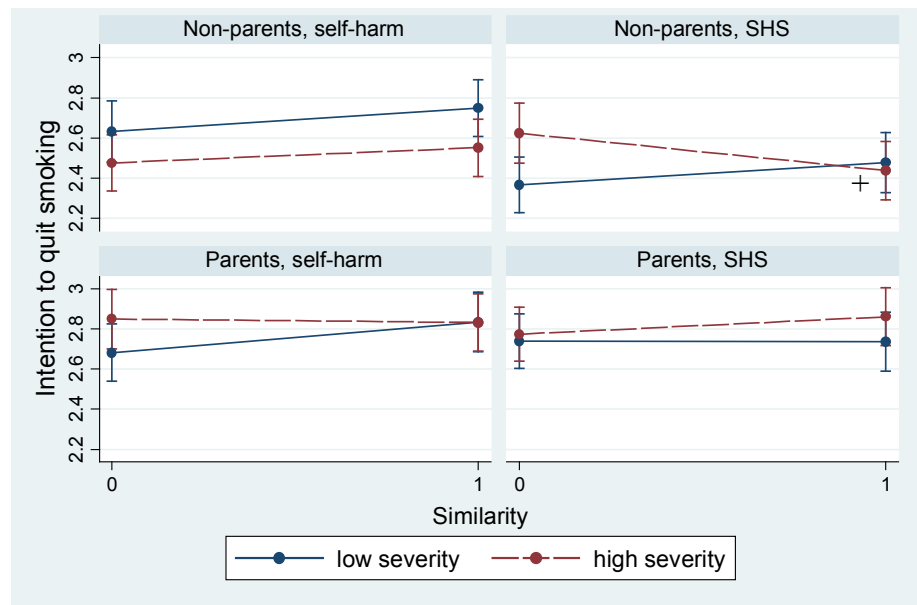
Figure 17. Effect of Similarity, Severity, Theme and parental status on intention to quit smoking (H6e). Estimated means and 95% *CI*s are shown based on ANOVA model. Statistical significance of the simple main effect of similarity in each condition is marked when applicable: *** *p* < .001, ** *p* < .01, * *p* < .05, + *p* < .10.

Hypotheses testing (4-3): Race. H7a-f are based on the expectation that Black smokers would be more sensitive toward smoker-audience similarity, because racial tailoring would be more salient to Blacks as a social minority group, and therefore will show stronger interaction between Similarity and message features on message effectiveness. White and Black smokers showed some notable differences on PE in terms

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of the main effect of Similarity, although only for the first evaluation. Race significantly

interacted with Similarity ($F(1, 1526) = 4.92$, $p = .03$, partial $\eta^2 = .003$; see Figure 18),

which was further qualified by a three-way interaction effect between Similarity, Severity

and Race ($F(1, 1526) = 4.43$, $p = .04$, partial $\eta^2 = .003$). The significant two-way

interaction between Similarity and Race showed that the effect of Similarity was stronger

for Black smokers. Seeing a similar smoker increased PE for Black smokers in the first

evaluation (similar: $M = 4.21$, $SD = .63$; dissimilar: $M = 4.05$, $SD = .66$), but not for

White smokers (similar: $M = 3.73$, $SD = .79$; dissimilar: $M = 3.76$, $SD = .77$); however,

the simple main effect of Similarity is not significant among either racial group.
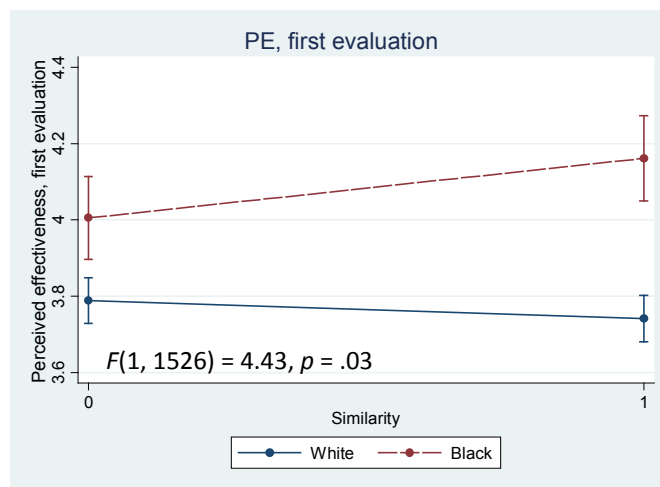
Figure 18. Effect of Similarity and race on PE (first evaluation). Estimated means and
95% *CI*s are shown based on ANOVA model. Statistical significance of the simple main
effect of similarity in each condition is marked when applicable: *** $p < .001$, ** $p < .01$,
* $p < .05$, + $p < .10$.

In the 2nd evaluation, Similarity x Race ($p = .11$) as well as Similarity x Severity x

Race interaction effects ($p = .70$) failed to reach significant level. These effects were also

not replicated in the multi-level regression model (Similarity x Black: $b = .17$, $SE = .09$, $p = .05$; Similarity x Severity x Black: $b = .33$, $SE = .17$, $p = .14$). No other higher-order interaction effect involving Similarity and race were significant (1st message: all $ps > .21$; 2nd message: all $ps > .20$). Therefore, H7a was not supported.

For attitude and intention variables, Black smokers reported more negative attitude toward SHS ($F(1, 1526) = 16.70$, $p < .001$) and smoking ($F(1, 1526) = 10.90$, $p = .001$), as well as higher intention to quit smoking ($F(1, 1526) = 24.61$, $p < .001$) and anti-SHS policy support ($F(1, 1526) = 20.65$, $p < .001$). Black and White smokers did not show significant differences in terms of the main effect of Similarity (all $ps > .15$), the two-way interaction effect between Similarity and Theme (all $ps > .15$), nor the three-way interaction effect between Similarity, Severity and Theme (all $ps > .13$) on any of the attitude or intention variables.

However, some outcome variables showed racial differences in terms of the two-way interaction effect between Similarity and Severity (attitude toward smoking, H7c: $F(1, 1526) = 4.03$, $p = .04$, partial $\eta^2 = .002$; intention to quit smoking, H7e: $F(1, 1526) = 4.89$, $p = .03$, partial $\eta^2 = .003$; anti-SHS policy support, H7f: $F(1, 1526) = 7.15$, $p = .01$, partial $\eta^2 = .005$). Black smokers did show stronger interaction effect than White smokers; however, unlike what was hypothesized, Black smokers showed greater Similarity effect when the character is associated with more severe consequences (i.e. greater intention to quit smoking and anti-SHS policy support; see Figure 19). Therefore, H7b-f were not supported.
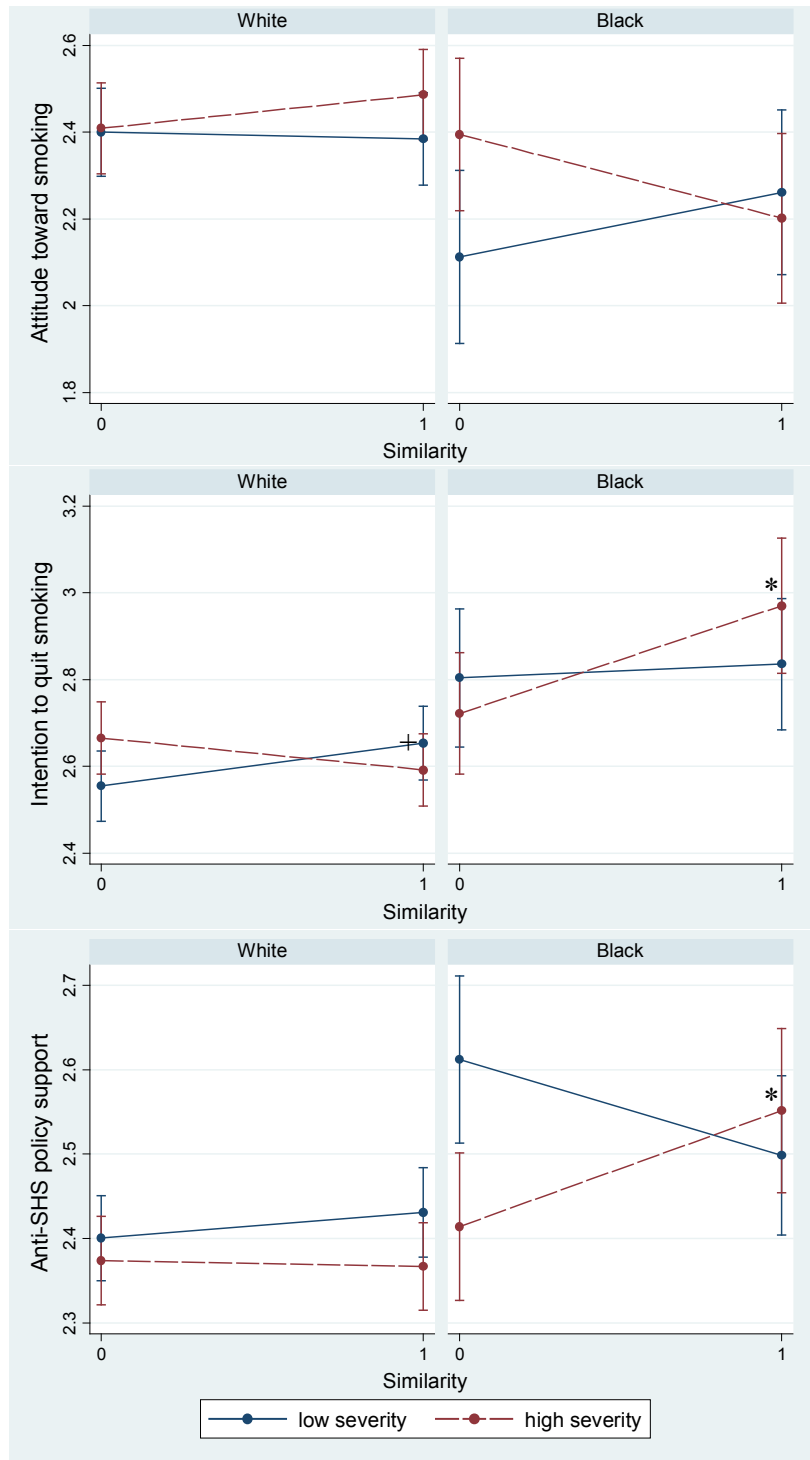
Figure 19. Effect of Similarity, Severity and race on attitude toward smoking (H7c), intention to quit smoking (H7e) and anti-SHS policy support (H7f). Estimated means and 95% *CI*s are shown based on ANOVA models. Statistical significance of the simple main effect of similarity in each condition is marked when applicable: *** *p* < .001, ** *p* < .01, * *p* < .05, + *p* < .10.

Summary of hypotheses testing. In sum, the most consistent results lie on the difference in the effect of Similarity between the self-harm and the SHS conditions. Seeing a similar smoker character enhances persuasion in the self-harm condition, but causes boomerang effect in the SHS condition. Most of the three-way interaction effects were not significant, but when there was a noticeable pattern (anti-SHS policy support), the result suggested that the aforementioned two-way interaction was driven by the low-severity condition.

Engagement and identification were consistently significant mediators of the interaction effect of Similarity and Theme on PE; reactance showed similar pattern but the results were not consistently significant, as did perceived similarity and empathy toward the victim.

Demographic variables (gender, parental status and race) mostly failed to further moderate the effect of Similarity, Severity and Theme; although it should be noted that these tests were somewhat underpowered to detect the four-way interaction effect with small effect size. Females were less subject to the boomerang effect of character-audience similarity than males. Regarding race, when a significant interaction effect was found (e.g. Similarity x Severity x Race), the pattern of the results was different from what was expected, failing to support the hypotheses. See Table 12 and Table 13 for summaries of hypotheses testing results.

Table 12. Summary of hypotheses testing (1): direct effect and moderated mediation

Direct effect hypotheses

DVs		Similarity x Theme	Similarity x Severity x Theme
PE		H1a (Y)	H2a (N)
Attitude: Smoking when others are around		H1b (y)	H2b (N)
Attitude: Smoking	H1 & H2	H1c (Y)	H2c (N)
Intention to avoid smoking when others are around		H1d (N)	H2d (N)
Intention to quit smoking		H1e (N)	H2e (N)
Anti-SHS policy support		H1f (N)	H2f (NE)

Moderated mediation hypotheses/research questions

Mediators		Similarity x Theme	Similarity x Severity x Theme	Mediation
Engagement	H3	H3a (Y)	H3b (N)	H3c (Y)
Reactance	H4	H4a (y)	H4b (N)	H4c (y)
Identification	RQ1	(Y)	(N)	(Y)
Perceived similarity	RQ2	(N)	(N)	(N)
Empathy	RQ3	(N)	(N)	(N)

Table 13. Summary of hypotheses testing (2): demographic moderators

Moderating role of demographic variables

DVs		Gender (Female < Male)	Parental status (Parents < Non-parents)	Race (Black > White)
PE		H5a (N)	H6a (N)	H7a (N)
Attitude: Smoking when others are around		H5b (Y): Sim. x Sev.	H6b (N)	H7b (N)
Attitude: Smoking	H5 & H6 & H7	H5c (N)	H6c (N)	H7c (NE): Sim. x Sev.
Intention to avoid smoking when others are around		H5d (N)	H6d (N)	H7d (N)
Intention to quit smoking		H5e (y): Sim. x Theme	H6e (y): Sim. x Sev. x Theme	H7e (NE): Sim. x Sev.
Anti-SHS policy support		H5f (Y): Sim. x Sev	H6f (N)	H7f (NE): Sim. x Sev.

Note. (Y) Results are in the expected direction and significant; (y) Results are in the expected direction but $.05 < p < .10$; (N) Not significant; (NE) Results are opposite from expected direction, and significant.

Discussion

The current study examined the effect of smoker-audience similarity, one of the easiest tactics of tailoring and targeting strategy, in anti-smoking messages. In general, tailored health communication is believed to achieve greater effects (Kreuter & Wray, 2003; Noar et al., 2007). Among the tactics of tailoring and targeting, using a similar character within the message has shown some positive effect on message effectiveness (e.g. Curtis, 2010), but sometimes null effect (e.g. De Graaf & Hustinx, 2011) or even boomerang effect (e.g. McKinley, 2010). The results from current study suggest that the effect of smoker-audience similarity is more nuanced, and examines what message features work as boundary conditions, sometimes obscuring the effect.

The theme of the message (self-harm vs. SHS) turned out to be a significant boundary condition: Seeing a similar smoker character whose health is threatened by his/her own smoking (in the self-harm condition) significantly increased the audience's identification with the smoker character, which in turn was significantly associated with higher PE, as well as negative attitude toward smoking, greater intention to avoid smoking when others are around and greater intention to quit smoking. On the other hand, seeing a similar smoker character harming an innocent non-smoker victim via secondhand smoking (in the SHS condition) reduced identification. The effect of character-audience similarity was significantly undermined and turned negative on many persuasive outcomes and mediator variables, although the simple main effects were not statistically significant. Engagement was also a significant mediator of the indirect effect of Similarity x Theme interaction on PE, albeit with weaker and non-significant simple main effects in both conditions.

Empathy toward the victim did not show consistent results in terms of the moderated mediation, therefore it seems that disidentification from a similar but socially undesirable character is more likely to be the mechanism underlying this phenomenon, rather than moral disengagement (i.e. justifying the similar character's immoral behavior).

Although it was hypothesized that the severity of consequences would also interact with character-audience similarity, Similarity x Severity and Similarity x Severity x Theme interaction effects failed to yield significant results on most of the outcome variables. A marginally significant three-way interaction emerged on anti-SHS policy support. The results showed that a pattern opposite to what was hypothesized emerged in the SHS condition. While the low-severity SHS-themed messages produced boomerang effects of smoker-audience similarity, the high-severity SHS-themed messages showed no difference between similar and dissimilar condition. It was originally hypothesized that the high-severity SHS condition would cause a stronger boomerang effect of character-audience similarity than the low-severity SHS condition; in the high-severity SHS condition, the smoker character encounters severe moral challenges as his/her smoking is causing an asthma attack on his/her own child. On the other hand, in the low-severity condition, a stranger adult is having an unpleasant experience (e.g. bad smell) due to the secondhand smoke. Here, the victim is less close to the character and less vulnerable to the harms caused by the cigarette smoke; and the consequences are less serious than in the high-severity SHS condition. However, the results on anti-SHS policy support suggest that while the low-severity SHS-themed messages produced boomerang effects of character-audience similarity, high-severity SHS-themed messages showed no difference between the similar vs. dissimilar conditions.

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These results should be interpreted with a grain of salt considering the fact that only one out of many outcome and mediator variables yielded significant effect. However, while not significant, PE and reactance also showed a similar pattern of Similarity x Severity x Theme interaction effect. These results suggest that the greater severity of victimization in the SHS-themed messages may not necessarily be a more threat to the social identity. It is possible that close other, such as a family member, is regarded as an extension of self (Aron, Aron, Tudor, & Nelson, 1991), therefore the messages featuring a family victim may be perceived as if discussing harms to the smoker oneself and thus, somewhat ironically, mitigate the social identity threats.

The difference between parents and non-parents in terms of the Similarity x Theme interaction on intention to quit smoking may provide some insight on this conjecture. For non-parents, Similarity in the high-severity SHS condition caused marginally lower intention to quit, while the parents showed positive effect (although not significant). Parents, who have experienced having a child in their real life, may be more likely to extend their concept of self to include the child, thus more likely to accept the high-severity SHS-themed messages regardless of whether the smoker character is similar (and thus poses identity threat) or not. On the other hand, non-parents may be more clearly distinguishing the "self" and "victim," and thus be more subject to the boomerang effect of Similarity in the high-severity SHS condition.

Another interesting result emerged on knowledge test scores, which were used as a control variable in all analyses. The knowledge test score can be interpreted as the audiences' attention to the message; the score was significantly predicted by all three of the manipulated message features, as well as some of their interaction terms. Seeing a

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similar character, reading about more severe consequences of first- and secondhand smoking, as well as reading the self-harm themed messages (vs. the SHS-themed messages) all were associated with significantly higher knowledge test scores. When decomposed, low-severity SHS condition yielded the lowest scores regardless of the similarity manipulation. According to McGuire (1989), attention is the prerequisite to comprehending and accepting the message, and eventually changing behavior. Therefore, while not exactly one of the persuasive outcome variables, the knowledge test score seems to have yielded another important set of results.

   Limitation. This study was designed with three factors – similarity between the smoker character and the audience (similar vs. dissimilar), severity of the consequences (high vs. low), and the theme of the message (self-harm vs. SHS). When asked to report perceived seriousness, self-harm condition messages failed to yield significant differences between high- (stroke, oral/neck cancer) vs. low-severity (high blood pressure, gum disease) messages. While this may pose some concern in terms of experimental design, the severity factor is actually an intrinsic message feature (O'Keefe, 2003). According to O'Keefe, the perceived seriousness measures can be understood as a mediating state rather than a 'check' for manipulation success. Also, the fact that each participant saw messages in one condition only (either high- or low-severity message) may explain the small difference. When compared to oral cancer, gum disease and premature teeth loss are indeed less serious; smokers who were asked to rank-order different diseases caused by smoking evaluated oral/neck cancer and stroke as significantly more serious than gum disease, premature tooth loss, high blood pressure and poor blood circulation (see Study 3 – Pilot 3). However, when seen alone, a disease

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not lethal at all can be perceived as to be quite negative and unfortunate event, especially if factually and effectively described as it would in any campaign messages produced to be persuasive.

The manipulation of high- vs. low-severity in the SHS condition in the present study is confounded with the smoker character being a parent. The high-severity SHS-themed message described the smoker's own child having an asthma attack, making the smoker character a parent. Participants who have kids may have found it as another similarity cue on top of the manipulated demographics and quitting status. Indeed, when having children was taken into account as another similarity cue, participants in the SHS condition[9] showed significant interaction between Similarity and Severity on PE with a moderate effect size (1st evaluation: $F(2, 776) = 7.05$, $p = .001$, partial $\eta^2 = .018$; 2nd evaluation: $F(2, 776) = 7.72$, $p < .001$, partial $\eta^2 = .020$). In the 1st evaluation, the PE of low-severity SHS-themed message decreased as the character is more similar to the audience (no similarity: $M = 3.88$, $SD = .70$; one similarity: $M = 3.78$, $SD = .79$; both similarities: $M = 3.51$, $SD = .92$); in the high-severity condition, PE increased as similarity score increased (no similarity: $M = 3.75$, $SD = .80$; one similarity: $M = 3.85$, $SD = .73$; both similarities: $M = 3.97$, $SD = .64$). The results were similar in the 2nd evaluation as well (low-severity condition - no similarity: $M = 3.86$, $SD = .78$; one similarity: $M = 3.65$, $SD = .83$; both similarities: $M = 3.36$, $SD = .97$; high-severity condition - no similarity: $M = 3.72$, $SD = .88$; either demographic or parental status similarity: $M = 3.86$, $SD = .77$; both similarities: $M = 3.88$, $SD = .75$). The results are in

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[9] Self-harm condition was not included in this analysis as no information about parental status of the smoker character was provided in the message.

line with the three-way interaction between (demographic) Similarity x Severity and Theme on anti-SHS policy support: in the low-severity SHS condition, when the smoker character is similar to the audience, PE decreased significantly ($p = .002$); in the high-severity SHS condition, Similarity increased PE but the effect was not significant ($p = .19$).

Future study need to disentangle the effect of parental status from that of the Severity within the SHS condition. Further examination of message features that may influence severity (e.g. closeness of the victim to the smoker character, vulnerability of victim character, extent of suffering) may shed a light on achieving successful manipulation of severity not confounded with the role similarity (e.g. parental status) between the audience and the smoker character.

While Study 1 found a significant positive main effect of smoker-audience similarity on engagement which in turn is associated with higher PE, the main experiment was not able to find a significant overall main effect of Similarity; the simple main effects of Similarity in many cases also were not significant at $p < .05$ level. As mentioned in the Pilot 2 discussion section, the differences in the format as well as the distribution of the message theme may explain the differential main effect of Similarity in the two studies. 50%-50% distribution of the self-harm (positive effect of Similarity) and SHS-themed messages (negative or null effect of Similarity) would have canceled each other out to produce overall null effect of Similarity when lumped together. The format difference (video PSA: the visual information of the smoker character is shown throughout the message vs. text + picture message: the visual information is shown only in the first part)

would have rendered the character-audience similarity less salient, thus weakening its effect in Study 3 than in Study 1.

Another message feature that might be responsible for the differences in the results is how the first paragraphs of the textual messages were written in all conditions. As shown in the appendix, all the messages started with an introduction of the character, with a sentence "Like millions of other [young/mature] [African Americans/White] [males/females], [she/he] is also a smoker". This sentence was written to repeat the race and age, and to reinforce the demographic (dis)similarity between the smoker character and the participant. However, at the same time, the sentence might have suggested stronger descriptive norm about smoking among the similar or dissimilar demographic subgroup. This negative descriptive norm might have weakened whatever anti-smoking message effects the message might have achieved otherwise.

While an attempt was made to overcome case-category confounding by using multiple contexts (home and outside café) in the stimuli, the stories were still limited within the spectrum of gain vs. loss frame (Kahneman & Tversky, 1979). All messages were written based on loss frame, where the aversive consequences of cigarette smoking (e.g. negative health consequences on oneself or another person) were discussed. The last paragraph of the message urges the readers to call the quitline to avoid such aversive consequences in their own lives, but the narrative does not discuss the smoker character's behaviors to avoid or overcome such consequences. The decision was made to maximize the social identity threat, but future study needs to examine whether different frames might achieve different effect - for example, whether providing efficacy information to minimize negative consequences within the narrative (e.g. showing the smoker character

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calling a quitline and get help to quit smoking) changes the extent to which character-audience similarity backfires in the SHS condition.

Identification to the smoker character and engagement with the message emerged as significant mediators in the moderated mediation effect of Similarity and Theme on PE. However, it should be noted that PE, identification and engagement were all measured right after the message exposure, and therefore the possibility for reverse causality between the mediators and PE cannot be completely ruled out. However, identification theory (Cohen, 2006) would dictate that identification with the character would precede the message's persuasive effect. Also, theory of narrative persuasion (Green & Brock, 2000) also argues that transportation into the narrative, similar to the construct of message engagement used in this study, is a predictor of persuasion. A longitudinal study, where actual quitting behaviors are measured as the ultimate dependent variable, will be able to better clarify the causal direction.

The current study attempted to explore the moderating role of demographic variables, such as race, gender and parental status. Unfortunately, these four-way interaction effect analyses were somewhat underpowered, especially in the case of the race. The prevalence of non-Hispanic Black smokers was quite low within the panels provided by Qualtrics; a 50%-50% block design was not feasible, resulting in a significantly less number of Blacks than Whites in the sample. Nevertheless, the proportion of African American in the main experiment (23.6%) was much higher than the proportion of non-Hispanic African Americans among total US population (13.2%; United States Census Bureau, 2015), even considering that the smoking rate is higher among African Americans than overall population (Center for Disease Control and Prevention, 2015a).

The low statistical power may have been responsible for many of the interaction term being not significant. Still, White and Black smokers showed different patterns of results in terms of the two-way interaction between Similarity and Severity on some outcome variables. Black smokers showed stronger interaction, but in a way that the higher severity messages yielded more positive effect of character-audience similarity. Therefore, while Black smokers were indeed more sensitive toward demographic tailoring, as indicated by the significant two-way interaction between character-audience similarity and race, the hypothesis that this salience of demographic matching will result in stronger boomerang effect of character-audience similarity when the similar character is depicted in a negative light (i.e. causing more serious and severe consequences of smoking) was not supported.

Although the three-way interaction effect between Similarity, Theme and Race was not statistically significant on any outcome variables, White and Black smokers showed different pattern in terms of the Similarity effect across the two themes (self-harm vs. SHS) on attitude toward smoking ($F(1,1526) = 2.06$, $p = .15$, partial $\eta^2 = .001$). When exposed to a similar (vs. dissimilar) smoker character, White smokers reported less favorable attitude toward smoking in the self-harm condition (mean difference = -.14, *SE* = .08, $p = .07$), but more favorable attitude toward smoking (mean difference = .19, *SE* = .07, $p = .01$; i.e. boomerang effect) in the SHS condition. On the other hand, seeing a similar smoker character did not change the Black smokers' attitude toward smoking in either condition (mean difference = -.02 ~ -.01, all ps > .85). Similar patterns, albeit not significant as well, were observed in attitude toward smoking when others are around and

intention to avoid smoking when others are around – again, unlike what was
hypothesized, the boomerang effect was more pronounced among white smokers.

It is possible that Blacks, who tend to be more collectivistic than Whites (Gaines Jr et
al., 1997), are more sensitive toward others' suffering, and therefore less subject to the
boomerang effect in the SHS condition. A future study where individual collectivistic
tendency is measured and examined as a potential moderator may shed some light on this,
overcoming the current study's limited sample size for Black smokers. A cross-cultural
study conducted in both individualistic (e.g. United States) and collectivistic (e.g. Korea)
countries may also be another way to further explore this question.

Implications for Message Design

This dissertation explored the effect of character-audience similarity, focusing on its nuanced effect interacting with different message features. While many studies have found positive effect of character-audience similarity on persuasion, there is mixed empirical evidence (e.g. Brosius, 1999; McKinley, 2010). There are many potential reasons for this: First, this could be due to the subtle and indirect effect of character-audience similarity. Second, who the target of similarity assessment is may be more important than the sheer existence of similarity cues. In this light, a secondary data analysis (Study 1) found a positive effect of similarity between the audience and the smoker character (but not the persuader character) in anti-smoking video PSAs; the similarity effect on perceived effectiveness (PE) was indirect, mediated via message engagement. Lastly, it is possible that there are boundary conditions for the similarity effect, which were not specifically examined in the previous body of research. Studies 2 & 3 suggest an important boundary condition – the presence and the extent of moral transgression of the similar smoker character. A secondary data analyses (Study 2) found a marginally significant interaction effect between character-audience similarity and severity among the anti-secondhand smoking (SHS) themed video PSAs. Then, an experiment (Study 3) was conducted where the similarity (matching in demographics and quitting status) between the smoker character and the audience, as well as the theme of the message (self-harm vs. SHS) and severity of consequences discussed in the message (high vs. low) were systematically manipulated. The experiment yielded consistently

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significant two-way interaction between character-audience similarity and theme of the message: The direction of the similarity effect on message effectiveness is positive in the self-harm condition, but negative in the SHS condition. Engagement with the message and Identification with the smoker character significantly mediated the two-way interaction effect on PE.

This set of result provides an insight on how to effectively use the character-audience similarity as a message feature in designing effective anti-smoking campaigns. First, character-audience similarity should be actively employed in anti-smoking campaign with self-harm themed messages. The effect size of character-audience similarity on PE in the self-harm themed message was quite small (e.g. Main experiment: .09 point increase in PE on a 5-point scale; .08 point increase in intention to quit smoking and intention to avoid smoking when others are around on a 4-point scale), but it should be noted that this small but significant effect was achieved after exposure to just one or two messages featuring a similar (vs. dissimilar) smoker character. Federal and state expenditure in tobacco control continues (U.S. Department of Health and Human Services, 2010), running anti-smoking campaigns with sizable exposure (e.g. McAfee, Davis, Alexander Jr, Pechacek, & Bunnell, 2013). A single exposure may only yield a small effect, but the effect will be substantial when accumulated over multiple exposures during a prolonged period of time.

Second, when the planned campaign discusses the harmful effect of secondhand smoking on others, character-audience similarity (between the smoker character and the audience) may undermine the message persuasiveness and potentially create boomerang

effects. This is especially true in the low-severity condition, i.e. when the victim of the secondhand smoking is distant other.

Anti-smoking campaigns may use various anti-smoking arguments. Many anti-smoking messages argue that smoking is bad for the smoker, causing negative cosmetic (e.g. aging skin), health (e.g. lung cancer) and life (e.g. academic failure) consequences. Other messages use moral appeals, focusing on the negative consequences on other non-smokers – namely secondhand smoking on close and distant others, and emotional burden on family members due to the smoker's premature death. The harmful effect of secondhand smoking on non-smokers is a very important and widely used anti-smoking argument (Beaudoin, 2002; Goldman & Glantz, 1998). In itself, secondhand smoking themes can be strong arguments encouraging smokers to consider quitting or at least refrain from smoking around others. For example, Massachusetts' environmental tobacco smoke campaigns, in conjunction with policy changes in clean air acts that bans smoking in workplaces and other public places, have contributed to reducing smoking in the states (e.g. Koh et al., 2005).

However, the results of current study suggest that these arguments can be undermined and even backfire when combined with character-audience similarity. When a similar exemplar character is shown to engage in immoral or borderline immoral actions, this may cause a boomerang effect and damage the message's effectiveness due to excessive guilt, psychological reactance and social identity threats. While both the secondhand smoking-related arguments and the character-audience similarity may be independently used to achieve persuasive goals to promote smoking cessation, this study suggests that health communication practitioners should be careful in using them in the same message.

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The three-way interaction effect between Similarity, Severity and Theme on anti-SHS policy support found in Study 3 – Main Experiment suggests that the low-severity SHS condition is where the boomerang effect of character-audience similarity emerges in the strongest manner. The two-way interaction between Similarity and Severity on PE found in Study 3 – Pilot 2 which was opposite from the original hypotheses, although not significant, also suggests the same conclusion.

Generalizability of the Results

This study used anti-smoking campaigns as the stimuli. Are the results relevant to other topics, such as physical activity or purchasing decisions? It is likely that the unique nature of tobacco smoking, where both the smoker and those who are around the smoker are exposed to the harmful smoke, was the main driver of observed effect. To replicate the current study's results, the behavior at hand should be able to be seen along the moral-immoral continuum: A possibility that the actor's performing the discouraged behavior (or not performing the promoted behavior) brings about negative consequences onto others, especially those who are unrelated to the actor.

Drunk driving is a very dangerous behavior. In 2014, 9,967 persons died in car crashes involving drunk driving in the US (National Highway Traffic Safety Administration, 2015). These deaths include not only the drunk drivers but also other non-drunk drivers and pedestrians. Drunk driving is similar to secondhand smoking in that one's behavior ends up harming innocent others who did not engage in the behavior. Many anti-drunk driving campaigns have powerful arguments about the potential danger of drunk driving. However, if the campaign shows a drunk driver who harms other drivers or pedestrians

who did not consume alcohol, and the driver is similar to the audience, the strong arguments might backfire due to the lower identification, engagement and greater reactance against the message.

Campaigns targeting behaviors that threatens environment (e.g. littering, wasting water) may also be subject to the similar boomerang effect if not designed carefully. Some marketing messages in this line (e.g. promoting environmentally sustainable purchases while framing not engaging in the behavior as negatively affecting environment) might also be subject to the boomerang effect of character-audience similarity.

At the same time, simply avoiding any similarity between the character and the audience could allow the audience to distance itself from the context seeing the character's actions as irrelevant to them. So the trade-off between identification produced by similarity and the distancing produced by morally questionable acts is a subtle one requiring perhaps a framing of action in a way that maintains identification.

On the other hand, the results from the current study may not be generalized to other health-related campaigns (e.g. discouraging the consumption of unhealthy food) where the consequences are limited to the actor. Future studies employing various types of moral appeals and its effect on persuasion are necessary to further examine this issue.

It should be noted that all three studies were focused on the character-audience similarity. While similarity is a tactic that is widely used in targeting and tailoring strategy, results from the current study may not be generalized to content tailoring (e.g. providing different information based on baseline stages of change toward smoking cessation or self-efficacy). Both seeing information that addresses individual-specific

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circumstances and seeing a similar exemplar character that one can identify with will affect message effectiveness via enhanced self-relevance. However, because content tailoring would appeal to a different source of self-relevance, the effect of content tailoring and its boundary condition may be different from what was found in the current study.

Also, this study is focused on the similarity between the audience and the smoker, i.e. exemplar, character. As mentioned earlier, a persuasive message can utilize various types of characters, such as exemplar and persuader. Previous study (using the same data as Study 1) found that while smoker-audience similarity significantly increased the audience's engagement with anti-smoking PSAs, persuader-audience similarity did not (M. Kim, Shi, & Cappella, 2016). Therefore, neither the presence of persuader character nor its similarity to the audience was not in the scope of this dissertation, and not considered in the stimuli design process. Whether persuader-audience similarity is also subject to the same boundary condition, or whether the exemplar character at hand being the persuader as well (which is not the case in the messages used in the current study) affects message effectiveness in a different way, is a topic for future studies.

Conclusion

The effect of character-audience similarity on persuasion is not a mono-directional effect. Depending on the context and message features, the character-audience similarity may exerts positive or negative effect on persuasive outcomes. This might explain some boomerang effects of character-audience similarity found in existing literature (e.g. McKinley, 2010; Taylor & Metee, 1971).

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The current study showed that the effect of character-audience similarity between the smoker character and the audience in anti-smoking campaign significantly interacted with the theme of the message on message engagement and effectiveness, so that the direction of the similarity effect is positive in the self-harm condition, but negative in the SHS condition. Seeing a similar smoker character harming oneself via firsthand smoking increased identification with the smoker character, which in turn is significantly associated with higher PE; seeing a similar smoker character harming others via secondhand smoking, however, undermined the audience's identification with the character. It seems that, in spite of the objective character-audience similarity which would otherwise enhance the identification with the character, the audiences choose to distant themselves from an immoral character to protect their social identity.

This study provides meaningful guideline for effective anti-smoking message design strategy using character-audience similarity. While the development of media technology might have afforded relatively easier tailoring and targeting in message delivery, collecting information of target audience and creating multiple versions of the persuasive message to match the audience's characteristics still requires additional resources. Considering this, this study suggest that message designers considering SHS-themed campaign would be better off avoiding the use of character-audience similarity as their persuasion strategy – to prevent the potential boomerang effects as well as saving the additional cost.

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APPENDICES

Appendix 1. 80 smoker images used in Study 3 – Pilot 1

Younger Black Female

BF1_01.jpg   BF1_02.jpg   BF1_03.jpg   BF1_04.jpg   BF1_05.jpg

BF1_06.jpg   BF1_07.jpg   BF1_08.jpg   BF1_09.jpg   BF1_10.jpg

Older Black Females

BF2_01.jpg

BF2_02.jpg

BF2_03.jpg

BF2_04.jpg

BF2_05.jpg

BF2_06.jpg

BF2_07.jpg

BF2_08.jpg

BF2_09.jpg

BF2_10.jpg

Younger Black Males

BM1_01.jpg

BM1_02.jpg

BM1_03.jpg

BM1_04.jpg
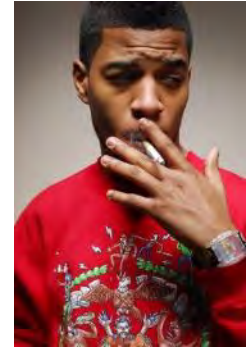
BM1_05.jpg

BM1_06.jpg

BM1_07.jpg

BM1_08.jpg

BM1_09.jpg

BM1_10.jpg

Older Black Males

BM2_01.jpg

BM2_02.jpg

BM2_03.jpg

BM2_04.jpg

BM2_05.jpg

BM2_06.jpg

BM2_07.jpg

BM2_08.jpg

BM2_09.jpg

BM2_10.jpg

Younger White Females

WF1_01.jpg   WF1_02.jpg   WF1_03.jpg   WF1_04.jpg   WF1_05.jpg

WF1_06.jpg   WF1_07.jpg   WF1_08.jpg   WF1_09.jpg   WF1_10.jpg
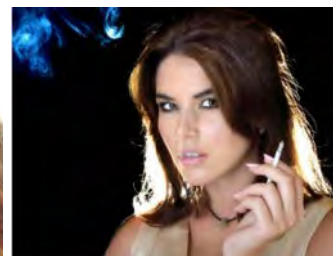
Older White Females

WM2_01.jpg

WM2_02.jpg

WF2_03.jpg

WF2_04.jpg

WF2_05.jpg

WM2_06.jpg

WM2_07.jpg

WM2_08.jpg

WM2_09.jpg

WM2_10.jpg

Younger White Males

WM1_01.jpg

WM1_02.jpg

WM1_03.jpg

WM1_04.jpg

WM1_05.jpg

WM1_06.jpg

WM1_07.jpg

WM1_08.jpg

WM1_09.jpg

WM1_10.jpg

Older White Males

WM2_01.jpg

WM2_02.jpg

WM2_03.jpg

WM2_04.jpg

WM2_05.jpg

WM2_06.jpg

WM2_07.jpg

WM2_08.jpg

WM2_09.jpg

WM2_10.jpg

Appendix 2. Final 40 smoker images selected for Study 3 – Main Experiment

Numbers indicate mean ratings. A: Attractiveness, L: Likability, S = SES (z-score). Age ratings show mean with *SD* in parentheses.

Younger Black Females (A = 3.29, L = 3.09, S = .03; Age = 30.46 years old)

BF1_1.jpg	**BF1_2.jpg**	**BF2_3.jpg**	**BF2_4.jpg**	**BF1_5.jpg**
A = 2.85, L = 2.96,	A = 3.53, L = 3.01,	A = 3.57, L = 3.41,	A = 3.13, L = 3.33,	A = 3.36, L = 2.75
S = .09	S = .26	S = .11	S = .03	S = -.34
Age=30.1 (4.64)	Age = 31.8 (3.55)	Age = 31.4 (3.96)	Age = 32.65 (4.55)	Age = 26.38 (4.44)

Older Black Females (A = 2.90, L = 3.16, S = -.36; Age = 36.63 years old)

BF2_1.jpg	**BF2_2.jpg**	**BF2_3.jpg**	**BF2_4.jpg**	**BF2_5.jpg**
A = 2.75, L = 3.04,	A = 2.70, L = 3.39,	A = 3.05, L = 3.16,	A = 3.73, L = 3.57,	A = 2.27, L = 2.66,
S = -.39	S = -.44	S = -.23	S = -.02	S = -.71
Age=35.1 (6.39)	Age = 40.1 (7.46)	Age = 34.1 (6.21)	Age = 34.6 (7.23)	Age = 39.2 (7.47)

Younger Black Males (A = 3.18, L = 3.20, S = -.03; Age = 30.35 years old)

BM1_1.jpg
A = 3.23, L = 2.93,
S = 1.01
Age=30.5 (5.01)
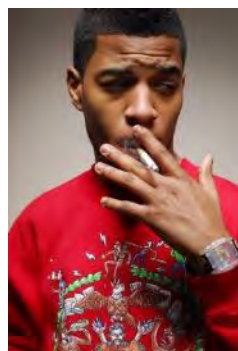
BM1_2.jpg
A = 3.01, L = 3.13,
S = -.52
Age = 27.2 (5.77)

BM1_3.jpg
A = 2.69, L = 2.94,
S = -.85
Age = 32.9 (7.83)

BM1_4.jpg
A = 3.50, L = 3.26,
S = .47
Age = 32.9 (5.47)

BM1_5.jpg
A = 3.38, L = 3.73,
S = -.25
Age = 28.3 (3.74)

Older Black Males (A = 2.96, L = 2.99, S = .10; Age = 40.39 years old)

BM2_1.jpg
A = 3.14, L = 2.89,
S = .92
Age=38.4 (5.75)

BM2_2.jpg
A = 3.72, L = 3.26,
S = 1.02
Age = 37.4 (5.02)

BM2_3.jpg
A = 2.70, L = 2.82,
S = -.73
Age = 38.6 (6.23)

BM2_4.jpg
A = 2.64, L = 3.14,
S = -.46
Age = 51.1 (7.22)
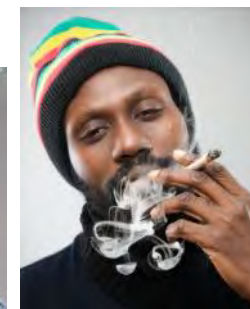
BM2_5.jpg
A = 2.60, L = 2.84,
S = -.25
Age = 36.5 (6.09)

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Younger White Females (A = 3.58, L = 3.13, S = .11; Age = 28.81 years old)

WF1_1.jpg
A = 3.89, L = 3.42,
S = -.38;
Age=24.83 (4.98)

WF1_2.jpg
A = 3.34, L = 2.85,
S = -.04;
Age = 31.6 (5.82)

WF1_3.jpg
A = 3.50, L = 3.63,
S = -.04;
Age = 27.6 (5.27)

WF1_4.jpg
A=3.48, L=2.44,
S=1.10;
Age = 33.3 (6.08)

WF1_5.jpg
A = 3.71, L = 3.32,
S = -.11
Age = 26.8 (3.33)

Older White Females (A = 3.34, L = 3.28, S = .40; Age = 43.45 years old)

WF2_1.jpg
A = 3.73, L = 3.49,
S = .75;
Age = 44.3 (4.64)

WF2_2.jpg
A = 3.39, L = 3.36,
S = .67;
Age = 44.31 (4.64)

WF2_3.jpg
A = 3.26, L = 3.10,
S = -.29;
Age = 37.5 (7.83)

WF2_4.jpg
A = 2.73, L = 3.12,
S = -.02;
Age = 52.8 (6.35)

WF2_5.jpg
A = 3.60, L = 3.36
S = .90
Age = 38.5 (5.11)

167

Younger White Males (A = 3.03, L = 3.04, S = -.32; Age = 25.48 years old)

WM1_1.jpg
A = 3.62, L = 3.11,
S = .77;
Age=30.9 (4.14)

WM1_2.jpg
A = 2.46, L = 2.97,
S = -.43;
Age = 23.7 (5.04)

WM1_3.jpg
A = 2.45, L = 2.79,
S = -.60;
Age = 26.3 (7.60)

WM1_4.jpg
A = 3.3, L = 3.26,
S = -.57;
Age = 24.6 (5.07)

WM1_5.jpg
A = 3.30, L = 3.07
S = -.77
Age = 21.9 (2.88)

Older White Males (A = 2.91, L = 3.03, S = .55; Age = 43.54 years old)

WM2_1.jpg
A = 3.06, L = 3.30,
S = .99;
Age = 48.9 (4.80)

WM2_2.jpg
A = 2.24, L = 3.03,
S = .35;
Age = 40.2 (6.47)

WM2_3.jpg
A = 3.73, L = 3.30,
S = 1.28;
Age = 47.7 (4.29)

WM2_4.jpg
A = 3.14, L = 2.77,
S = .36;
Age = 36.9 (3.91)

WM2_5.jpg
A = 2.36, L = 2.74
S = -.22
Age = 44.1 (5.54)

168

Appendix 3. SHS-themed anti-smoking messages used in Study 3 – Pilot 2

Home
High severity: Family, Child, Disease (Word count: 211)

It is well past the usual time to get up for school, but Chris, <u>Michael/Jennifer</u>'s 8-year-old son, is still lying in bed. Chris has asthma; he carries an inhaler with him all the time for when he has difficulty breathing. This morning Chris is having yet another asthma attack. The wheezing began soon after <u>Michael/Jennifer</u> lit up the first cigarette of the day. Seeing that the coughing won't stop anytime soon, <u>Michael/Jennifer</u> calls the school; Chris will have to miss school again. Glancing at Chris's bedroom, <u>Michael/Jennifer</u> reaches into <u>his/her</u> pocket, and takes out another cigarette. <u>Michael/Jennifer</u> lights up and draws deeply on the cigarette. As <u>Michael/Jennifer</u> is talking with the school's secretary over the phone, the smoke from <u>Michael/Jennifer</u>'s cigarette builds thickly around <u>him/her</u>. The smoke seeps into Chris's room as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The secondhand smoke is responsible for Chris's asthma episode, causing his airway to swell.

When you smoke, so does everyone around you. Each year, secondhand smoking-related illnesses are responsible for 7 million lost schooldays among children in the US. Your smoking threatens your children's health and their future. Call 1-800-quit-now and learn how to quit endangering your loved ones.

Low severity: Stranger, Adult, Threat/unpleasant experience (Word count: 211)

It is well past the usual time to get up for work, but Chris, <u>Michael/Jennifer</u>'s new neighbor, is still lying in bed. Chris has a day off; he had planned to work on setting up his new apartment. But he's woken up to strong smell of cigarette smoke. It is floating in from next door, where <u>Michael/Jennifer</u> has just lit up the first cigarette of the day. Feeling his head heavy, Chris frowns and opens his windows to clear the air. Next door, pouring coffee, <u>Michael/Jennifer</u> reaches into <u>his/her</u> pocket, and takes out another cigarette. <u>Michael/Jennifer</u> lights up and draws deeply on the cigarette. The smoke from <u>Michael/Jennifer</u>'s cigarette builds thickly around <u>him/her</u>. The smoke seeps into Chris's apartment as well; the air can transfer between houses in multiunit housing. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The secondhand smoke is responsible for the smell in the house; it can also trigger headaches.

When you smoke, so does everyone around you. Each year, almost half of non-smokers in the US are exposed to secondhand smoke. Your smoking threatens your neighbors' health and their right to breathe clean air. Call 1-800-quit-now and learn how to quit endangering people around you.

Public place – Outdoor Café

High severity: Family, Child, Disease (Word count: 211)

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. Michael/Jennifer is sitting in an outdoor café with his/her family, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As Michael/Jennifer passes the time peacefully, the smoke from Michael/Jennifer's cigarette builds over the patio and everyone else in the café. Chris, Michael/Jennifer's 7-year-old son, is the first to be affected, letting out a heavy cough. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. Chris has asthma, and secondhand smoke can case the airway to swell and trigger asthma attacks. Chris's cough continues, but A hardly seems to notice. "Should I ask him/her to put that out?", thinks Chris – but he doesn't want to get into an argument with his parent. It would just ruin their Saturday. As Chris keeps wheezing, he feels his chest tighten. Short of breath and with a tearful, pale face, he reaches for his inhaler.

When you smoke, so does everyone around you. Nobody wants to breathe that smoke coming from your cigarette; but they won't want to turn it into a fight, either. Be considerate of your family.Call 1-800-quit-now and learn how to quit endangering your loved ones.

Low severity: Stranger, Adult, Threat/unpleasant experience (Word count: 211)

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. Michael/Jennifer is sitting in an outdoor café by himself/herself, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As Michael/Jennifer's peaceful time passes on, the smoke from Michael/Jennifer's cigarette builds over the patio and everyone else in the café. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. Chris, sitting at the table next to Michael/Jennifer, is the first to be affected, letting out a heavy cough. Chris frowns, trying to turn away from the smell and the smoke, but Michael/Jennifer hardly seems to notice. "Should I ask him/her to put that out?", thinks Chris – but he doesn't want to get into an argument with a stranger. It would just ruin his Saturday. Chris coughs a couple of times, but as Michael/Jennifer's smoking continues, he has no choice but to walk away to another table inside the café.

When you smoke, so does everyone around you. Nobody wants to breathe that smoke coming from your cigarette; but they won't want to turn it into a fight, either. Be considerate of those around you. Call 1-800-quit-now and learn how to quit endangering people around you.

Appendix 4. JavaScript function to randomly select pictures from a subgroup

The example below is shown as used in Study 3 – Pilot 2 (randomly selecting two out of five pictures in a pre-selected demographic subgroup based on the participants' demographic information and condition assignment (similar vs. dissimilar).

```
Qualtrics.SurveyEngine.addOnload(function()
{
      function shuffle(array) {
            for (var i = array.length-1; i > 0; i--) {
                  var j = Math.floor(Math.random() * (i+1));
                  var temp = array[i];
                  array[i] = array[j];
                  array[j] = temp;
            }
            return array;
      }
      var myArray=['1', '2', '3', '4', '5'
];
      shuffle(myArray);
      Qualtrics.SurveyEngine.setEmbeddedData("imgnum1",myArray[0]);
      Qualtrics.SurveyEngine.setEmbeddedData("imgnum2",myArray[1]);


});
```

Appendix 5. Textual stimuli used in Study 3 – Main experiment

Home
SHS, High severity: Family, Child, Disease (Word count: 211)

Base stimuli
It is well past the usual time to get up for school, but Chris, [NAME]'s 8-year-old son, is still lying in bed. Chris has asthma; he carries an inhaler with him all the time for when he has difficulty breathing. This morning Chris is having yet another asthma attack. The wheezing began soon after [NAME] lit up [his/her] first cigarette of the day. Seeing that the coughing won't stop anytime soon, [NAME] calls the school; Chris will have to miss school again. Glancing at Chris's bedroom, [NAME] reaches into [his/her] pocket, and takes out another cigarette. [NAME] lights up and draws deeply on the cigarette. As [NAME] is talking with the school's secretary over the phone, the smoke from [NAME]'s cigarette builds thickly around [him/her]. The smoke seeps into Chris's room as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The secondhand smoke is responsible for Chris's asthma episode, causing his airways to swell.

When you smoke, so does everyone around you. Each year, secondhand smoking-related illnesses are responsible for 7 million lost schooldays among children in the US. Your smoking threatens your family's health and their future. Call 1-800-quit-now and learn how to quit endangering your loved ones.

Actual stimuli
(Male subject in similar condition – Female subject in dissimilar condition, First message)

It is well past the usual time to get up for school, but Chris, Michael's 8-year-old son, is still lying in bed. Chris has asthma; he carries an inhaler with him all the time for when he has difficulty breathing. This morning Chris is having yet another asthma attack. The wheezing began soon after Michael lit up his first cigarette of the day. Seeing that the coughing won't stop anytime soon, Michael calls the school; Chris will have to miss school again. Glancing at Chris's bedroom, Michael reaches into his pocket, and takes out another cigarette. Michael lights up and draws deeply on the cigarette. As Michael is talking with the school's secretary over the phone, the smoke from Michael's cigarette builds thickly around him. The smoke seeps into Chris's room as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The secondhand smoke is responsible for Chris's asthma episode, causing his airways to swell.

When you smoke, so does everyone around you. Each year, secondhand smoking-related illnesses are responsible for 7 million lost schooldays among children in the US. Your smoking threatens your family's health and their future. Call 1-800-quit-now and learn how to quit endangering your loved ones.

Base stimuli

It is well past the usual time to get up for work, but Chris, [NAME]'s new neighbor, is still lying in bed. Chris has a day off; he had planned to work on setting up his new apartment. But he's woken up to the strong smell of cigarette smoke. The smoke floats in from next door, where [NAME] has just lit up [his/her] first cigarette of the day. Feeling his own lung filled with smoke, Chris frowns and opens his windows to clear the air. Next door, pouring coffee, [NAME] reaches into [his/her] pocket, and takes out another cigarette. [NAME] lights up and draws deeply on the cigarette. The smoke from [NAME]'s cigarette builds thickly around [him/her]. The connected air ducts in their multi-unit building allow the smoke to seep into Chris's apartment as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The secondhand smoke is responsible for the smell in Chris's house.

When you smoke, so does everyone around you. Each year, almost half of non-smokers in the US are exposed to secondhand smoke. Your smoking threatens your neighbors' health and their right to breathe clean air. Call 1-800-quit-now and learn how to quit endangering people around you.

Actual stimuli
(Female subject in similar condition – Male subject in dissimilar condition, First message)

It is well past the usual time to get up for work, but Chris, Jennifer's new neighbor, is still lying in bed. Chris has a day off; he had planned to work on setting up his new apartment. But he's woken up to the strong smell of cigarette smoke. The smoke floats in from next door, where Jennifer has just lit up her first cigarette of the day. Feeling his own lung filled with smoke, Chris frowns and opens his windows to clear the air. Next door, pouring coffee, Jennifer reaches into her pocket, and takes out another cigarette. Jennifer lights up and draws deeply on the cigarette. The smoke from Jennifer's cigarette builds thickly around her. The connected air ducts in their multi-unit building allow the smoke to seep into Chris's apartment as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The secondhand smoke is responsible for the smell in Chris's house.

When you smoke, so does everyone around you. Each year, almost half of non-smokers in the US are exposed to secondhand smoke. Your smoking threatens your neighbors' health and their right to breathe clean air. Call 1-800-quit-now and learn how to quit endangering people around you.

Self-harm, High-severity: Stroke, death (Word count: 214)

Base stimuli
It is well past the usual time to get up for work, but [NAME] is still lying in bed. [NAME] bhas a day off; [he/she] had planned to work on setting up [his/her] new apartment. [NAME] eventualy gets up, lights up the first cigarette of the day, and opens the window. In the kitchen, pouring coffee, [NAME] reaches into [his/her] pocket, and takes out another cigarette. [NAME] lights up and draws deeply on the cigarette. The smoke from [NAME]'s cigarette builds thickly around [him/her]. The smoke seeps into [his/her] body as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The occasional dry coughs are just the beginning; smoking makes [NAME]'s blood more likely to clot. When clots block blood flow to [his/her] brain, a stroke occurs – Brain cells cannot get oxygen and begin to die. After a stroke, many people suffer from paralysis, making walking and grasping difficult. Some end up with slurred speech or reduced memory. Almost 130,000 Americans die from a stroke each year.

Every cigarette you smoke damages your body. Smokers are up to four times more likely to have a stroke than non-smokers. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

Actual stimuli
(Male subject in similar condition – Female subject in dissimilar condition, Second message)

It is well past the usual time to get up for work, but David is still lying in bed. David has a day off; he had planned to work on setting up his new apartment. David eventualy gets up, lights up the first cigarette of the day, and opens the window. In the kitchen, pouring coffee, David reaches into his pocket, and takes out another cigarette. David lights up and draws deeply on the cigarette. The smoke from David's cigarette builds thickly around him. The smoke seeps into his body as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The occasional dry coughs are just the beginning; smoking makes David's blood more likely to clot. When clots block blood flow to his brain, a stroke occurs – Brain cells cannot get oxygen and begin to die. After a stroke, many people suffer from paralysis, making walking and grasping difficult. Some end up with slurred speech or reduced memory. Almost 130,000 Americans die from a stroke each year.

Every cigarette you smoke damages your body. Smokers are up to four times more likely to have a stroke than non-smokers. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

Self-harm, Low-severity: High blood pressure (Word count: 213)

Base stimuli
It is well past the usual time to get up for work, but [NAME] is still lying in bed. [NAME] has a day off; [he/she] had planned to work on setting up [his/her] new apartment. [NAME] eventualy gets up, lights up the first cigarette of the day, and opens the window. In the kitchen, pouring coffee, [NAME] reaches into [his/her] pocket, and takes out another cigarette. [NAME] lights up and draws deeply on the cigarette. The smoke from [NAME]'s cigarette builds thickly around [him/her]. The smoke seeps into [his/her] body as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The occasional dry coughs are just the beginning; nicotine in cigarettes causes an immediate increase in blood pressure and heart rate, making the heart work harder than normal. In the long run, smoking damages the cells lining the smokers' blood vessels so that the vessels become narrower and less flexible. This will limit the blood flow, and lead to poor blood circulation throughout the body.

Every cigarette you smoke damages your body. Smokers are up to four times more likely to get blood vessel diseases than non-smokers. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

Actual stimuli
(Female subject in similar condition – Male subject in dissimilar condition, Second message)

It is well past the usual time to get up for work, but Jennifer is still lying in bed. Jennifer has a day off; she had planned to work on setting up her new apartment. Jennifer eventualy gets up, lights up the first cigarette of the day, and opens the window. In the kitchen, pouring coffee, Jennifer reaches into her pocket, and takes out another cigarette. Jennifer lights up and draws deeply on the cigarette. The smoke from Jennifer's cigarette builds thickly around her. The smoke seeps into her body as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The occasional dry coughs are just the beginning; nicotine in cigarettes causes an immediate increase in blood pressure and heart rate, making the heart work harder than normal. In the long run, smoking damages the cells lining the smokers' blood vessels so that the vessels become narrower and less flexible. This will limit the blood flow, and lead to poor blood circulation throughout the body.

Every cigarette you smoke damages your body. Smokers are up to four times more likely to get blood vessel diseases than non-smokers. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

SHS, High severity: Family, Child, Disease (Word count: 211)

Base stimuli

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. [NAME] is sitting in an outdoor café with [his/her] family, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As [NAME] passes the time peacefully, the smoke from [his/her] cigarette builds over the patio and everyone else in the café. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. Sarah, [NAME]'s 8-year-old daughter, is the first to be affected, letting out a heavy cough. Sarah has asthma, and secondhand smoke can cause the airways to swell and trigger asthma attacks. Sarah's cough continues, but [NAME] hardly seems to notice. "Should I ask [NAME] to put that out?", thinks Sarah – but she doesn't want to get into an argument with her parent. It would just ruin their Saturday. As Sarah keeps wheezing, she feels her chest tighten. Short of breath and with a tearful, pale face, she reaches for her inhaler.

When you smoke, so does everyone around you. Nobody wants to breathe that smoke coming from your cigarette; but they won't want to turn it into a fight, either. Be considerate of your family. Call 1-800-quit-now and learn how to quit endangering your loved ones.

Actual stimuli
(Male subject in similar condition – Female subject in dissimilar condition, First message)

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. Michael is sitting in an outdoor café with his family, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As Michael passes the time peacefully, the smoke from his cigarette builds over the patio and everyone else in the café. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. Sarah, Michael's 8-year-old daughter, is the first to be affected, letting out a heavy cough. Sarah has asthma, and secondhand smoke can cause the airways to swell and trigger asthma attacks. Sarah's cough continues, but Michael hardly seems to notice. "Should I ask Michael to put that out?", thinks Sarah – but she doesn't want to get into an argument with her parent. It would just ruin their Saturday. As Sarah keeps wheezing, she feels her chest tighten. Short of breath and with a tearful, pale face, she reaches for her inhaler.

When you smoke, so does everyone around you. Nobody wants to breathe that smoke coming from your cigarette; but they won't want to turn it into a fight, either. Be considerate of your family. Call 1-800-quit-now and learn how to quit endangering your loved ones.

Base stimuli

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. [NAME] is sitting in an outdoor café alone, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As [NAME]'s peaceful time passes on, the smoke from [his/her] cigarette builds over the patio and everyone else in the café. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. Sarah, sitting at the table next to [NAME], is the first to be affected, letting out a heavy cough. Sarah frowns, trying to turn away from the smell and the smoke, but [NAME] hardly seems to notice. "Should I ask that person to put that out?", thinks Sarah – but she doesn't want to get into an argument with a stranger. It would just ruin her Saturday. Sarah coughs a couple of times, but as [NAME]'s smoking continues, she has no choice but to walk away to another table inside the café.

When you smoke, so does everyone around you. Nobody wants to breathe that smoke coming from your cigarette; but they won't want to turn it into a fight, either. Be considerate of those around you. Call 1-800-quit-now and learn how to quit endangering people around you.

Actual stimuli
(Female subject in similar condition – Male subject in dissimilar condition, First message)

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. Jennifer is sitting in an outdoor café alone, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As Jennifer's peaceful time passes on, the smoke from her cigarette builds over the patio and everyone else in the café. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. Sarah, sitting at the table next to Jennifer, is the first to be affected, letting out a heavy cough. Sarah frowns, trying to turn away from the smell and the smoke, but Jennifer hardly seems to notice. "Should I ask that person to put that out?", thinks Sarah – but she doesn't want to get into an argument with a stranger. It would just ruin her Saturday. Sarah coughs a couple of times, but as Jennifer's smoking continues, she has no choice but to walk away to another table inside the café.

When you smoke, so does everyone around you. Nobody wants to breathe that smoke coming from your cigarette; but they won't want to turn it into a fight, either. Be considerate of those around you. Call 1-800-quit-now and learn how to quit endangering people around you.

Base stimuli

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. [NAME] is sitting in an outdoor café alone, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As [NAME] passes the time peacefully, the smoke from [his/her] cigarette builds over the patio. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. [NAME]'s mouth and throat are the first to be affected, causing dry coughs. However, it's just the beginning. Smoking is the main reason people get oral and throat cancer. If [NAME] gets throat cancer, [he/she] may lose [his/her] larynx (voice box) and be forced to breathe through an opening in [his/her] neck. If the cancer spreads to the jaw bones, they may need to be cut away. 40% of throat cancer patients die within 5 years of diagnosis. [NAME] hardly seems to notice what's happening inside [his/her] body. However, [NAME] is about 7 times more likely to get throat cancer than a non-smoker.

Every cigarette you smoke damages your body. Smoking is the leading cause of deaths in the US, killing 480,000 people each year. Be considerate of your own body. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

Actual stimuli
(Male subject in similar condition – Female subject in dissimilar condition, Second message)

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. David is sitting in an outdoor café alone, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As David passes the time peacefully, the smoke from his cigarette builds over the patio. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. David's mouth and throat are the first to be affected, causing dry coughs. However, it's just the beginning. Smoking is the main reason people get oral and throat cancer. If David gets throat cancer, he may lose his larynx (voice box) and be forced to breathe through an opening in his neck. If the cancer spreads to the jaw bones, they may need to be cut away. 40% of throat cancer patients die within 5 years of diagnosis. David hardly seems to notice what's happening inside his body. However, David is about 7 times more likely to get throat cancer than a non-smoker.

Every cigarette you smoke damages your body. Smoking is the leading cause of deaths in the US, killing 480,000 people each year. Be considerate of your own body. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

Self-harm, Low severity: Gum disease, premature teeth loss (Word count: 211)

Base stimuli
A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. [NAME] is sitting in an outdoor café alone, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As [NAME] passes the time peacefully, the smoke from [his/her] cigarette builds over the patio. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. [NAME]'s mouth and throat are the first to be affected, causing dry coughs. However, it's just the beginning. Tobacco stains the teeth and causes bad breath. Plaque and tartar (hardened plaque) are more easily formed on the teeth. Smoking also weakens the immune system, increasing the chance of gum infections. When gum diseases get worse, the bone and tissue that support the teeth break down – which leads to loose teeth, and some might even fall out. Smokers may not notice what's happening inside their bodies. However, a smoker is about twice as likely to get a gum disease than a non-smoker.

Every cigarette you smoke damages your body. Smoking can harm any organ in the human body, diminishing the smokers' overall health. Be considerate of your own body. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

Actual stimuli
(Female subject in similar condition – Male subject in dissimilar condition, Second message)

A gentle breeze and a warm dazzling sun make this Saturday afternoon especially beautiful. Amy is sitting in an outdoor café alone, enjoying a cup of coffee. An afternoon cigarette completes the relaxing moment. As Amy passes the time peacefully, the smoke from her cigarette builds over the patio. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. Amy's mouth and throat are the first to be affected, causing dry coughs. However, it's just the beginning. Tobacco stains the teeth and causes bad breath. Plaque and tartar (hardened plaque) are more easily formed on the teeth. Smoking also weakens the immune system, increasing the chance of gum infections. When gum diseases get worse, the bone and tissue that support the teeth break down – which leads to loose teeth, and some might even fall out. Smokers may not notice what's happening inside their bodies. However, a smoker is about twice as likely to get a gum disease than a non-smoker.

Every cigarette you smoke damages your body. Smoking can harm any organ in the human body, diminishing the smokers' overall health. Be considerate of your own body. Call 1-800-quit-now, learn more about the benefits of quitting smoking and get help to quit.

Appendix 6. Example of full stimuli shown to the subject in Study 3

Similarity: Young White female – similar / Mature Black male – dissimilar;

Theme: Secondhand smoking;

Severity: High-severity condition (family, child victim, disease)

Meet Jennifer (28 years old). Like millions of other Young White Females in the US, she is a smoker. Jennifer's been smoking for more than five years; she usually goes through a pack a day. People often tell her she should quit, but, she would reply - what's the big deal, really?

It is well past the usual time to get up for school, but Chris, Jennifer's 8-year-old son, is still lying in bed. Chris has asthma; he carries an inhaler with him all the time for when he has difficulty breathing. This morning Chris is having yet another asthma attack. The wheezing began soon after Jennifer lit up her first cigarette of the day. Seeing that the coughing won't stop anytime soon, Jennifer calls the school; Chris will have to miss school again. Glancing at Chris's bedroom, Jennifer reaches into her pocket, and takes out another cigarette. Jennifer lights up and draws deeply on the cigarette. As Jennifer is talking with the school's secretary over the phone, the smoke from Jennifer's cigarette builds thickly around her. The smoke seeps into Chris's room as well. Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and about 70 that can cause cancer. The secondhand smoke is responsible for Chris's asthma episode, causing his airways to swell.

When you smoke, so does everyone around you. Each year, secondhand smoking-related illnesses are responsible for 7 million lost schooldays among children in the US. Your smoking threatens your family's health and their future. Call 1-800-quit-now and learn how to quit endangering your loved ones.

Appendix 7. Questionnaire for Study 3 – Main Experiment

You have been invited to participate in a research study conducted by the researchers at the Annenberg School for Communication, University of Pennsylvania. The purpose of this study is to evaluate health campaign messages.   If you decide to participate, you will be shown messages comprised of texts and still, color images containing health-related messages, and asked about your reactions to them during a 15 minute survey. Your participation in this study is completely voluntary. You will be compensated according to your panel's normal compensation options.   Please note that this study requires a diverse group of participants, and it is possible that under some circumstances you may NOT be eligible to take part in the survey, or the quota you are in has already been filled.   If you have any questions about the study, you may contact the investigator, Minji Kim (mkim@asc.upenn.edu).   As a reminder, this study is meant to be taken on a computer. Please do not try to participate in this study from a smart phone. Also, we ask that you please complete the survey in one sitting.   By clicking the "I agree" button below, you are agreeing to take part in this study.   If you would not like to participate, please close the browser now.

[Eligibility screening] (randomize order)
Have you been vaccinated against flu - e.g. by receiving the influenza vaccine, or a flu shot?
❍ Yes (1)
❍ No (2)
❍ Not sure (3)

Have you been screened to see if you have cancer or a malignancy of any kind?
❍ Yes (1)
❍ No (2)
❍ Not sure (3)

Have you been tested to see if you have Hepatitis C?
❍ Yes (1)
❍ No (2)
❍ Not sure (3)

Have you smoked at least 100 tobacco cigarettes in your entire life?
- ○ Yes (1)
- ○ No (2)
- ○ Not sure (3)
    - ➔ *Terminate if NOT "Yes"*

Have you been vaccinated against Ebola within the US?
- ○ Yes (1)
- ○ No (2)
- ○ Not sure (3)
    - ➔ *Terminate if "Yes"*

Do you currently smoke cigarettes every day, some days, or not at all?
- ○ Every day (1)
- ○ Some days (2)
- ○ Not at all (3)
    - ➔ *Terminate if 2 or 3*

During the past 7 days, how many tobacco cigarettes have you smoked on a typical day? Please limit your response to tobacco cigarettes (NO electronic cigarettes).

During the last 3 months, how many times have you completed an online survey about cigarette smoking or other tobacco products?

What is your gender?
- ○ Male (1)
- ○ Female (2)

How old are you?

What is your race? (One or more categories may be selected)
- ❑ White/Caucasian (1)
- ❑ Black or African American (2)
- ❑ American Indian or Alaska Native (3)
- ❑ Asian (4)
- ❑ Native Hawaiian or Other Pacific Islander (5)
- ❑ Other (please specify) (6) _____
    - ➔ *Terminate if NOT 1 or 2*

Are you Hispanic, Latino/a, or Spanish origin? (One or more categories may be selected)

❑ No, not of Hispanic, Latino/a, or Spanish origin (1)
❑ Yes, Mexican, Mexican American, Chicano/a (2)
❑ Yes, Puerto Rican (3)
❑ Yes, Cuban (4)
❑ Yes, another Hispanic, Latino, or Spanish origin (5)
➔ *Terminate if NOT 1*

What is your current marital status?

❍ Single, never married (1)
❍ Married without children (2)
❍ Married with children (3)
❍ Divorced (4)
❍ Separated (5)
❍ Widowed (6)
❍ Living with partner (7)

How many children under 18 years old live in your household?

❍ None (0)
❍ 1 (1)
❍ 2 (2)
❍ 3 (3)
❍ 4 or more (4)

How old were you when you first started smoking cigarettes?

[Fagerström Test of Nicotine Dependence]

How soon after you wake up do you smoke your first cigarette?
❍ Less than 5 minutes (3)
❍ 6 to 30 minutes (2)
❍ 31 to 60 minutes (1)
❍ More than 60 minutes (0)

Do you find it difficult to refrain from smoking in places where it is forbidden, e.g., in church, at the library, at the movies, etc?
❍ Yes (1)
❍ No (0)

Which cigarette would you hate the most to give up?
❍ First one in the morning (1)
❍ All others (0)

Do you smoke more frequently during the first hours after waking than during the rest of the day?
❍ Yes (1)
❍ No (0)

Do you smoke if you are so ill that you are in bed most of the day?
❍ Yes (1)
❍ No (0)

How many times have you previously quit smoking on purpose for more than one full day?

[Stage of Change]

Choose the number that indicates where you are at now in terms of quitting smoking.

❍ 10: I am taking action to quit smoking. (10)
❍ 9 (9)
❍ 8: I am starting to think about how to reduce the number of cigarettes I smoke a day. (8)
❍ 7 (7)
❍ 6 (6)
❍ 5: I think I should quit smoking but I am not quite ready. (5)
❍ 4 (4)
❍ 3 (3)
❍ 2: I think I need to consider quitting smoking someday. (2)
❍ 1 (1)
❍ 0: I have no thoughts about quitting smoking. (0)

You are going to see two stories on smoking and its consequences. After reading one story, you will be asked to answer some questions about your reactions while reading the story. Then another story will be shown, and you will be asked a similar set of questions about the second story.

It may take a few seconds for the image and text to completely load.

Please pay full attention while reading the story. Click the ">>" button below to proceed.

[1st message displayed – See Appendix 6 for illustrative example]

Were you able to clearly see the image and the text? Note: The text should have been about ~300 words long.

❍ Yes (1)
❍ No (2)

➔ *Terminate if "Yes"*

Below are questions about the story that you just read. Please indicate how much you agree or disagree with the following statements about the message.
[Perceived effectiveness (PE)] (randomize order)

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
This message was convincing.	○	○	○	○	○
This message was believable.	○	○	○	○	○
This message was important to me.	○	○	○	○	○
Reading this message helped me feel confident about how to best deal with smoking.	○	○	○	○	○
This message made me concerned about my smoking.	○	○	○	○	○
This message made me stop and think.	○	○	○	○	○
This message put thoughts in my mind about quitting smoking.	○	○	○	○	○
This message put thoughts in my mind about continuing to smoke.	○	○	○	○	○

Below are questions about the story that you just read. Please indicate how much you agree or disagree with the following statements about the message.
[Engagement] (Randomize order)

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I could picture myself in the scene of the events shown in the message.	○	○	○	○	○
The message affected me emotionally.	○	○	○	○	○
I was mentally involved while reading the message.	○	○	○	○	○
My attention was fully captured while reading the message.	○	○	○	○	○
The events in the message are relevant to my everyday life.	○	○	○	○	○
This is to confirm you are paying close attention. Please select "Strongly agree."*	○	○	○	○	○

→ *Terminate if NOT "Strongly agree"*

Below are questions about the story that you just read. Please indicate how much you agree or disagree with the following statements about the message:

[Psychological reactance] (randomize order)

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
This message tried to make a decision for me	○	○	○	○	○
This message tried to pressure me	○	○	○	○	○
This message is dishonest	○	○	○	○	○
This message is stupid	○	○	○	○	○
While reading this message, I felt irritated	○	○	○	○	○
While reading this message, I felt annoyed	○	○	○	○	○

Below are questions about the character shown in the story that you just read. Think about the smoker, [Michael/Jennifer], in the story you just read. Please indicate how much you agree or disagree with the following statements about the character: *[Identification with the character] (randomize order)*

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I was able to understand the events in the story in a manner similar to that in which [Michael/Jennifer] understood them	○	○	○	○	○
I think I have a good understanding of [Michael/Jennifer]	○	○	○	○	○
I tend to understand the reason why [Michael/Jennifer] does what [he/she] does	○	○	○	○	○
While reading the story, I could feel the emotions [Michael/Jennifer] portrayed	○	○	○	○	○
While reading, I felt I could get inside [Michael/Jennifer] 's head	○	○	○	○	○
At key moments in the story, I felt I knew what [Michael/Jennifer] was going through	○	○	○	○	○

Think about the smoker, [Michael/Jennifer], in the story you just read.
What do you think of the person?
Please evaluate the person according to the five criteria shown below.
[Perceived similarity] (randomize order)

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)
Does NOT think like me: Thinks like me	○	○	○	○	○
Does NOT behave like me: Behaves like me	○	○	○	○	○
Different from me: Similar to me	○	○	○	○	○
Unlike me: Like me	○	○	○	○	○
Has morals unlike mine: Has morals like mine	○	○	○	○	○

Below are questions about [the smoker/the non-smoker] shown in the story that you just read. Please indicate how much you agree or disagree with the following statements about the character: *[empathy toward the victim] (randomize order)*

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I felt no concern for people like him/her	○	○	○	○	○
I did not feel emotionally involved while reading the story	○	○	○	○	○
The story just seemed illogical to me	○	○	○	○	○
I felt sorry for him/her	○	○	○	○	○
I felt angry on behalf of him/her	○	○	○	○	○

How much do you agree or disagree with the following statement about your reactions to the story that you just read? *(randomize order)*

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly agree (5)
I felt afraid	○	○	○	○	○
I felt guilty	○	○	○	○	○
I felt disgusted	○	○	○	○	○
I felt hopeful	○	○	○	○	○
I felt proud	○	○	○	○	○

[Manipulation check: Similarity]
Questions below are about the smoker character in the story you have just read. Please read the statement carefully, and respond what you think of the character.

When compared to my age, the smoker character was:
○ Significantly younger (1)
○ About my age (2)
○ Significantly older (3)
○ Do not remember (99)

When compared to my race/ethnicity, the smoker character was:
○ Same race (1)
○ Different race (2)
○ Do not remember (99)

When compared to my gender, the smoker character was:
○ Same gender (1)
○ Different gender (2)
○ Do not remember (99)

[Manipulation check: Perceived seriousness]

The effect of [smoking/secondhand smoking] on [the smoker/the non-smoker] discussed in the story I just read was ...

❍ 1: Not serious at all (1)
❍ 2 (2)
❍ 3 (3)
❍ 4 (4)
❍ 5 (5)
❍ 6 (6)
❍ 7 (7)
❍ 8 (8)
❍ 9 (9)
❍ 10 (10)
❍ 11: Extremely serious (11)

In the story I just read, [the smoker/the non-smoker] was experiencing...

❍ 1: No suffering at all (1)
❍ 2 (2)
❍ 3 (3)
❍ 4 (4)
❍ 5 (5)
❍ 6 (6)
❍ 7 (7)
❍ 8 (8)
❍ 9 (9)
❍ 10 (10)
❍ 11: Extreme suffering (11)

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[Knowledge test 1]
In the story you just read, there was a smoker character smoking tobacco cigarettes. Where was he/she smoking? *(randomize order)*
❍ His/her home (1)
❍ Outside cafe (2)
❍ Bar (indoors) (3)
❍ Park (4)
❍ Street (5)

[Knowledge test 2]
In the story you just read, one of the consequences of [smoking/secondhand smoking] below was mentioned. What was it? *(randomize order)*
❍ Asthma attack (1)
❍ Oral and throat cancer (2)
❍ Gum disease (3)
❍ None of the above (4)
❍ Stroke (5)
❍ Increase in blood pressure (6)

Thank you for evaluating the first story; now, you will see the second story. Please pay full attention while reading the story. Click the ">>" button below to proceed.

[2nd message displayed]

[Questions repeated: PE ~ Knowledge test]

How likely is it that in the next 30 days you will:
[Intention to avoid smoking when others are around]

	Definitely will not (1)	Probably will not (2)	Probably will (3)	Definitely will (4)
Smoke outside the house to protect my family's health	○	○	○	○
Refrain from smoking in an enclosed indoor space when others are around	○	○	○	○
Refrain from smoking in any public spaces, such as an outside park	○	○	○	○

How likely is it that in the next 30 days you will: *[Intention to quit smoking]*

	Definitely will not (1)	Probably will not (2)	Probably will (3)	Definitely will (4)
Call a quitline	○	○	○	○
Quit smoking completely and permanently	○	○	○	○
Reduce the number of cigarettes you smoke in a day	○	○	○	○
Talk to someone (friend, family, spouse) about quitting smoking	○	○	○	○

My smoking in general is: *[Attitude toward smoking] (randomize order)*

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)
Bad:Good	○	○	○	○	○
Unenjoyable: Enjoyable	○	○	○	○	○
Unpleasant: Pleasant	○	○	○	○	○
Foolish:Wise	○	○	○	○	○
Harmful: Beneficial	○	○	○	○	○

My smoking when other people are around is:
[Attitude toward smoking when others are around] (randomize order)

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)
Bad:Good	○	○	○	○	○
Unenjoyable: Enjoyable	○	○	○	○	○
Unpleasant: Pleasant	○	○	○	○	○
Foolish:Wise	○	○	○	○	○
Harmful: Beneficial	○	○	○	○	○

The next question is about WHAT YOU THINK ABOUT smoking in some places. Please read the questions and choose an answer that is the closest to your opinion, regardless of what the current policies are in your workplace or your home.
[anti-SHS policy support (1)] (randomize order)

	NOT allowed at all (1)	Allowed in some areas (2)	Allowed in all areas (3)
In bars, cocktail lounges, and clubs, smoking should be...	○	○	○
Inside casinos, smoking should be...	○	○	○
On outdoor children's playgrounds and outdoor children's sports fields, smoking should be...	○	○	○

The next question is about WHAT YOU THINK ABOUT smoking in some places. Please read the questions and choose an answer that is the closest to your opinion, regardless of what the current policies are in your workplace or your home.
[anti-SHS policy support (2)] (randomize order)

	NOT allowed at all (1)	Allowed under some conditions (2)	Always be allowed (3)
When there are other people present, smoking inside the car should be...	○	○	○
If children are present inside the car, smoking inside the car should be...	○	○	○

What are the current tobacco cigarette smoking rules in your household, if any?
- ❍ Smoking is not allowed anywhere inside my home (1)
- ❍ Smoking is allowed in some rooms or at some times (2)
- ❍ Smoking is allowed anywhere in my home (3)
- ❍ There are no rules about smoking in my home (4)

What is the highest level of school you completed or the highest degree you received?
- ❍ Never attended school (1)
- ❍ Elementary or grade school (2)
- ❍ Some high school (3)
- ❍ High school graduate or GED (4)
- ❍ Some college (5)
- ❍ College graduate (6)
- ❍ Postgraduate/masters/doctorate/law/MD (7)

Thinking about members of your family living in this household, what is your combined annual income, meaning the total pre-tax income from all sources earned in the past year?
- ❍ Less than $25,000 (1)
- ❍ Between $25,000 and $49,999 (2)
- ❍ Between $50,000 and $74,999 (3)
- ❍ Between $75,000 and $99,000 (4)
- ❍ Between $100,000 and $149,999 (5)
- ❍ $150,000 or more (7)

In what state do you currently reside?

- ❍ Alabama (1)
- ❍ Arizona (2)
- ❍ Arkansas (3)
- ❍ California (4)
- ❍ Colorado (5)
- ❍ Connecticut (6)
- ❍ Delaware (7)
- ❍ District of Columbia (8)
- ❍ Florida (9)
- ❍ Georgia (10)
- ❍ Idaho (11)
- ❍ Illinois (12)
- ❍ Indiana (13)
- ❍ Iowa (14)
- ❍ Kansas (15)
- ❍ Kentucky (16)
- ❍ Louisiana (17)
- ❍ Maine (18)
- ❍ Maryland (19)
- ❍ Massachusetts (20)
- ❍ Michigan (21)
- ❍ Minnesota (22)
- ❍ Mississippi (23)
- ❍ Missouri (24)
- ❍ Montana (25)
- ❍ Nebraska (26)
- ❍ Nevada (27)
- ❍ New Hampshire (28)
- ❍ New Jersey (29)
- ❍ New Mexico (30)
- ❍ New York (31)
- ❍ North Carolina (32)
- ❍ North Dakota (33)
- ❍ Ohio (34)
- ❍ Oklahoma (35)
- ❍ Oregon (36)
- ❍ Pennsylvania (37)
- ❍ Rhode Island (38)
- ❍ South Carolina (39)
- ❍ South Dakota (40)
- ❍ Tennessee (41)
- ❍ Texas (42)
- ❍ Utah (43)
- ❍ Vermont (44)

- ❍ Virginia (45)
- ❍ Washington (46)
- ❍ West Virginia (47)
- ❍ Wisconsin (48)
- ❍ Wyoming (49)
- ❍ Puerto Rico (50)
- ❍ Alaska (51)
- ❍ Hawaii (52)

Appendix 8. Full ANOVA tables for Study 3 hypothese testing (1)

Below are Full ANOVA tables for models including the main effect of Similarity (similar vs. dissimilar smoker character), Severity (high vs. low severity), Theme (SHS vs. self-harm), Context (Home vs. outside café), all possible interaction terms and the covariate (knowledge test score). Message evaluation variables show first and second evaluation results separately; attitudes and intention variables show one set of results because they were measured only once.

Table_A 1. Analysis of Variance (ANOVA) results of Perceived effectiveness (H1a and H2a): The effect of Similarity, Severity, and Theme

	First evaluation			Second evaluation		
	df	*F*	*p*	*df*	*F*	*p*
Model	16	1.47	.10	16	2.38	.00
Similarity	1	0.00	.98	1	0.04	.85
Severity	1	1.38	.24	1	7.41	.01
Theme: SHS (vs. self-harm)	1	4.08	.04	1	12.08	.00
Similarity x Theme	**1**	**4.54**	**.03**	**1**	**4.41**	**.04**
Similarity x Severity	1	0.84	.36	1	0.12	.73
Severity x Theme	1	4.20	.04	1	7.02	.01
Similarity x Theme x Severity	1	0.58	.45	1	0.88	.35
Context: Home (vs. outside café)	1	0.01	.94	1	1.66	.20
Similarity x Context	1	0.33	.57	1	0.00	1.00
Severity x Context	1	0.25	.62	1	0.08	.77
Theme x Context	1	3.36	.07	1	0.70	.40
Similarity x Theme x Context	1	0.09	.76	1	0.44	.51
Similarity x Severity x Context	1	0.08	.78	1	0.20	.65
Severity x Theme x Context	1	4.06	.04	1	0.23	.63
Sim. x Sev. X Theme x Context	1	0.37	.54	1	0.82	.36
Knowledge score	1	0.75	.39	1	5.40	.02
Residual	1542			1542		
Total	1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Table_A 2. Analysis of Variance (ANOVA) results of engagement (H3): The effect of Similarity, Severity, and Theme

	First evaluation			Second evaluation		
	df	*F*	*p*	*df*	*F*	*p*
Model	16	2.27	.00	16	2.26	.00
Similarity	1	0.09	.77	1	0.01	.91
Severity	1	0.12	.73	1	1.61	.21
Theme: SHS (vs. self-harm)	1	12.40	.00	1	17.03	.00
Similarity x Theme	**1**	**5.03**	**.03**	**1**	**4.50**	**.03**
Similarity x Severity	1	0.09	.76	1	0.18	.67
Severity x Theme	1	2.29	.13	1	0.93	.34
Similarity x Theme x Severity	1	0.80	.37	1	0.02	.89
Context: Home (vs. outside café)	1	1.25	.26	1	3.76	.05
Similarity x Context	1	0.12	.73	1	0.17	.68
Severity x Context	1	0.10	.75	1	0.02	.89
Theme x Context	1	10.19	.00	1	0.90	.34
Similarity x Theme x Context	1	0.14	.71	1	0.35	.55
Similarity x Severity x Context	1	0.04	.84	1	0.39	.53
Severity x Theme x Context	1	2.13	.14	1	0.18	.67
Sim. x Sev. X Theme x Context	1	1.22	.27	1	0.53	.47
Knowledge test score	1	0.6	.44	1	6.73	.01
Residual	1542			1542		
Total	1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Table_A 3. Analysis of Variance (ANOVA) results of reactance (H4): The effect of Similarity, Severity, and Theme

	First evaluation			Second evaluation		
	df	*F*	*p*	*df*	*F*	*p*
Model	16	5.64	.00	16	4.99	.00
Similarity	1	0.44	.51	1	1.59	.21
Severity	1	0.44	.51	1	0.44	.51
Theme: SHS (vs. self-harm)	1	4.35	.04	1	13.33	.00
Similarity x Theme	**1**	**3.03**	**.08**	**1**	**3.86**	**.05**
Similarity x Severity	1	0.03	.86	1	1.00	.32
Severity x Theme	1	3.30	.07	1	7.15	.01
Similarity x Theme x Severity	1	2.02	.16	1	0.65	.42
Context: Home (vs. outside café)	1	0.59	.44	1	0.00	1.00
Similarity x Context	1	0.10	.75	1	0.39	.53
Severity x Context	1	0.24	.62	1	0.01	.92
Theme x Context	1	0.01	.94	1	0.23	.63
Similarity x Theme x Context	1	0.45	.50	1	0.68	.41
Similarity x Severity x Context	1	1.84	.17	1	0.05	.82
Severity x Theme x Context	1	4.05	.04	1	2.22	.14
Sim. x Sev. X Theme x Context	1	3.1	.08	1	2.17	.14
Knowledge test score	1	60.59	.00	1	44.43	.00
Residual	1542			1542		
Total	1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Table_A 4. Analysis of Variance (ANOVA) results of identification with the smoker character (RQ1): The effect of Similarity, Severity, and Theme

	First evaluation			Second evaluation		
	df	*F*	*p*	*df*	*F*	*p*
Model	16	5.82	.00	16	8.26	.00
Similarity	1	0.12	.73	1	0.90	.34
Severity	1	11.08	.00	1	14.15	.00
Theme: SHS (vs. self-harm)	1	20.88	.00	1	56.05	.00
Similarity x Theme	**1**	**9.16**	**.003**	**1**	**6.50**	**.01**
Similarity x Severity	1	0.02	.89	1	1.90	.17
Severity x Theme	1	0.93	.34	1	14.01	.00
Similarity x Theme x Severity	1	0.39	.53	1	0.13	.72
Context: Home (vs. outside café)	1	0.12	.73	1	0.00	.99
Similarity x Context	1	0.18	.68	1	0.23	.63
Severity x Context	1	1.82	.18	1	0.43	.51
Theme x Context	1	10.69	.00	1	1.46	.23
Similarity x Theme x Context	1	0.03	.87	1	1.04	.31
Similarity x Severity x Context	1	0.11	.74	1	0.08	.78
Severity x Theme x Context	1	0.49	.48	1	0.01	.93
Sim. x Sev. X Theme x Context	1	1.92	.17	1	0.05	.83
Knowledge test score	1	28.62	.00	1	28.18	.00
Residual	1542			1542		
Total	1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Table_A 5. Analysis of Variance (ANOVA) results of perceived similarity to the smoker character (RQ2): The effect of Similarity, Severity, and Theme

	First evaluation			Second evaluation		
	df	F	p	df	F	p
Model	16	14.10	.00	16	16.96	.00
Similarity	1	0.00	1.00	**1**	**5.87**	**.02**
Severity	1	19.71	.00	1	36.74	.00
Theme: SHS (vs. self-harm)	1	147.76	.00	1	171.88	.00
Similarity x Theme	**1**	**4.03**	**.04**	1	0.82	.36
Similarity x Severity	1	0.02	.88	1	0.18	.67
Severity x Theme	1	15.45	.00	1	26.27	.00
Similarity x Theme x Severity	1	0.61	.44	1	0.58	.45
Context: Home (vs. outside café)	1	0.00	.98	1	1.38	.24
Similarity x Context	1	0.46	.50	1	0.18	.67
Severity x Context	1	2.39	.12	1	4.60	.03
Theme x Context	1	0.07	.79	1	0.11	.74
Similarity x Theme x Context	1	0.07	.79	1	0.08	.78
Similarity x Severity x Context	1	0.15	.70	1	0.14	.71
Severity x Theme x Context	1	8.42	.00	1	0.11	.74
Sim. x Sev. X Theme x Context	1	0.62	.43	1	0.35	.55
Knowledge test score	1	19.63	.00	1	11.82	.00
Residual	1542			1542		
Total	1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Table_A 6. Analysis of Variance (ANOVA) results of empathy toward the victim character (RQ3): The effect of Similarity, Severity, and Theme

	First evaluation			Second evaluation		
	df	F	p	df	F	p
Model	16	5.45	.00	16	4.49	.00
Similarity	1	1.67	.20	**1**	**4.04**	**.04**
Severity	1	0.70	.40	1	1.95	.16
Theme: SHS (vs. self-harm)	1	1.97	.16	1	0.08	.78
Similarity x Theme	**1**	**3.99**	**.05**	1	0.47	.49
Similarity x Severity	1	0.25	.62	1	1.24	.27
Severity x Theme	1	1.85	.17	1	4.87	.03
Similarity x Theme x Severity	1	0.00	.99	1	1.24	.26
Context: Home (vs. outside café)	1	0.00	.96	1	0.09	.76
Similarity x Context	1	0.92	.34	1	0.06	.80
Severity x Context	1	0.83	.36	1	0.14	.71
Theme x Context	1	0.00	.97	1	0.14	.71
Similarity x Theme x Context	1	2.51	.11	1	4.73	.03
Similarity x Severity x Context	1	0.65	.42	1	0.41	.52
Severity x Theme x Context	1	0.26	.61	1	0.58	.45
Sim. x Sev. X Theme x Context	1	0.05	.81	1	0.01	.92
knowledge test score	1	70.01	.00	1	49.43	.00
Residual	1542			1542		
Total	1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Table_A 7. Analysis of Variance (ANOVA) results of attitudes and intention (H1b-f and H2b-f): The effect of Similarity, Severity, and Theme

	Attitude toward smoking when others are around			Attitude toward smoking		
	df	*F*	*p*	*df*	*F*	*p*
Model	16	11.10	.00	16	8.38	.00
Similarity	1	0.36	.55	1	0.08	.78
Severity	1	8.15	.00	1	1.47	.23
Theme: SHS (vs. self-harm)	1	4.42	.04	1	2.15	.14
Similarity x Theme	1	3.13	.08	**1**	**7.91**	**.01**
Similarity x Severity	1	0.22	.64	1	0.09	.76
Severity x Theme	1	0.35	.56	1	0.12	.73
Similarity x Theme x Severity	1	0.87	.35	1	0.84	.36
Context: Home (vs. outside café)	1	2.09	.15	1	1.99	.16
Similarity x Context	1	3.87	.05	1	4.15	.04
Severity x Context	1	0.10	.76	1	0.19	.67
Theme x Context	1	0.11	.74	1	0.04	.85
Similarity x Theme x Context	1	0.81	.37	1	1.04	.31
Similarity x Severity x Context	1	0.93	.34	1	3.44	.06
Severity x Theme x Context	1	2.09	.15	1	3.69	.05
Sim. x Sev. X Theme x Context	1	4.28	.04	1	6.84	.01
Knowledge test score	1	155.3	.00	1	100.93	.00
Residual	1542			1542		
Total	1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Table_A 7 (continued). Analysis of Variance (ANOVA) results of attitudes and intention (H1b-f and H2b-f): The effect of Similarity, Severity, and Theme

	Intention to avoid smoking when others are around			Intention to quit smoking			Policy support		
	df	*F*	*p*	*df*	*F*	*p*	*df*	*F*	*p*
Model	16	1.12	.33	16	3.93	.00	16	4.93	.00
Similarity	1	0.16	.69	1	1.59	.21	1	0.26	.61
Severity	1	0.00	.95	1	0.40	.53	1	4.24	.04
Theme: SHS (vs. self-harm)	1	2.27	.13	1	3.25	.07	1	0.68	.41
Similarity x Theme	1	1.33	.25	1	1.48	.22	1	2.37	.12
Similarity x Severity	1	0.20	.65	1	1.70	.19	1	0.08	.78
Severity x Theme	1	9.41	.00	1	4.37	.04	1	0.00	.97
Similarity x Theme x Severity	1	0.23	.63	1	0.00	.99	**1**	**3.50**	**.06**
Context: Home (vs. outside café)	1	0.12	.72	1	0.05	.83	1	0.00	.97
Similarity x Context	1	0.37	.55	1	1.66	.20	1	1.22	.27
Severity x Context	1	0.21	.65	1	2.20	.14	1	0.92	.34
Theme x Context	1	0.00	.99	1	4.79	.03	1	1.01	.31
Similarity x Theme x Context	1	1.29	.26	1	0.55	.46	1	0.11	.74
Similarity x Severity x Context	1	0.84	.36	1	0.44	.51	1	0.14	.70
Severity x Theme x Context	1	1.19	.28	1	0.48	.49	1	0.09	.76
Sim. x Sev. X Theme x Context	1	0.1	.76	1	1.32	.25	1	0.72	.39
Knowledge test score	1	0.14	.71	1	43.17	.00	1	64.35	.00
Residual	1542			1542			1542		
Total	1558			1558			1558		

Note. All *p*-values are one-tailed. Key interaction terms of interest are labeled with bold typeface. Significant results of interest are shown in bold.

Appendix 9. Observed means across the conditions in Study 3 - Main Experiment

The tables below show the observed means and standard deviations across the 8 condition, determined by Similarity, Severity and Theme manipulation. Message evaluation variables show first and second evaluation results separately; attitudes and intention variables show one set of results because they were measured only once.

Table_A 8. Observed means and *SD*s of perceived effectiveness (H1a and H2a) across the conditions

	First evaluation												
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.83	0.80	3.85	0.68	3.84	0.74	3.78	0.78	3.90	0.71	3.84	0.75	3.84	0.75
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.97	0.68	3.87	0.82	3.92	0.75	3.71	0.84	3.81	0.75	3.76	0.79	3.84	0.78
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

	First evaluation												
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.83	0.80	3.84	0.73	3.84	0.76	3.70	0.84	3.85	0.80	3.77	0.82	3.80	0.79
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.92	0.73	3.90	0.75	3.91	0.74	3.57	0.89	3.81	0.78	3.69	0.84	3.80	0.80
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 9. Observed means and *SD*s of attitude toward smoking when others are around (H1b and H2b) across the conditions

| | Self-harm | | | | | | SHS | | | | | | Total | |
| | Low-severity | | High-severity | | Subtotal | | Low-severity | | High-severity | | Subtotal | | | |
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	1.98	1.08	1.95	1.12	1.96	1.10	1.77	0.94	1.83	0.96	1.80	0.95	1.88	1.03
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	1.79	0.97	1.91	1.05	1.85	1.01	1.91	1.05	1.82	1.03	1.86	1.04	1.86	1.02
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 10. Observed means and *SD*s of attitude toward smoking in general (H1c and H2c) across the conditions

	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Dissimilar	2.52	0.96	2.45	1.02	2.49	0.99	2.31	0.87	2.32	0.91	2.31	0.89	2.39	0.94
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	2.30	0.94	2.35	0.97	2.32	0.96	2.48	0.98	2.34	0.93	2.41	0.96	2.36	0.96
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 11. Observed means and *SD*s of intention to avoid smoking when others are around (H1d and H2d) across the conditions

	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Dissimilar	3.24	0.60	3.16	0.72	3.20	0.66	3.24	0.70	3.35	0.67	3.29	0.69	3.25	0.68
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.29	0.64	3.16	0.75	3.23	0.70	3.18	0.74	3.30	0.70	3.24	0.72	3.23	0.71
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 12. Observed means and *SD*s of intention to quit smoking (H1e and H2e) across the conditions

	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Dissimilar	2.69	0.76	2.64	0.79	2.66	0.77	2.60	0.79	2.69	0.72	2.64	0.76	2.65	0.76
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	2.79	0.62	2.66	0.76	2.73	0.70	2.65	0.73	2.61	0.75	2.63	0.74	2.68	0.72
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 13. Observed means and *SD*s of anti-SHS policy support (H1f and H2f) across the conditions

	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Dissimilar	2.38	0.47	2.39	0.48	2.38	0.48	2.46	0.46	2.40	0.46	2.43	0.46	2.41	0.47
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	2.48	0.43	2.41	0.47	2.45	0.45	2.39	0.48	2.46	0.47	2.42	0.47	2.44	0.46
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 14. Observed means and *SD*s of engagement (H3) across the conditions

	First evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.95	0.79	3.83	0.80	3.89	0.80	3.79	0.84	3.88	0.85	3.83	0.85	3.86	0.82
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	4.01	0.78	3.96	0.83	3.99	0.80	3.76	0.80	3.75	0.84	3.75	0.82	3.87	0.82
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

	Second evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.87	0.87	3.87	0.82	3.87	0.84	3.73	0.81	3.83	0.88	3.78	0.85	3.82	0.85
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.94	0.82	3.94	0.81	3.94	0.81	3.65	0.85	3.70	0.88	3.68	0.87	3.81	0.85
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 15. Observed means and *SD*s of reactance (H4) across the conditions

	First evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	2.14	0.95	2.17	0.98	2.15	0.97	2.22	0.93	2.15	0.95	2.19	0.94	2.17	0.95
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	2.01	0.82	2.15	0.98	2.08	0.91	2.41	1.02	2.16	0.93	2.28	0.98	2.18	0.95
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

	Second evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	1.96	0.96	2.10	0.98	2.03	0.97	2.15	0.97	2.09	0.98	2.12	0.98	2.08	0.97
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	1.88	0.88	2.04	1.05	1.96	0.97	2.38	1.04	2.11	0.94	2.24	1.00	2.10	0.99
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 16. Observed means and *SD*s of identification with the smoker character (RQ1) across the conditions

	First evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.74	0.77	3.59	0.87	3.66	0.83	3.71	0.78	3.51	0.87	3.61	0.83	3.64	0.83
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.84	0.76	3.73	0.80	3.78	0.78	3.63	0.78	3.34	0.97	3.48	0.89	3.63	0.85
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

	Second evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.64	0.88	3.64	0.88	3.64	0.88	3.57	0.85	3.26	1.03	3.42	0.95	3.52	0.92
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.79	0.80	3.74	0.82	3.77	0.81	3.56	0.87	3.07	1.10	3.31	1.02	3.54	0.95
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 17. Observed means and *SD*s of perceived similarity to the smoker character (RQ2) across the conditions

	First evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.69	0.87	3.59	1.00	3.64	0.94	3.33	1.18	2.86	1.22	3.10	1.22	3.36	1.12
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.75	0.94	3.72	0.93	3.73	0.93	3.27	1.11	2.68	1.34	2.97	1.26	3.36	1.17
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

	Second evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.61	1.01	3.46	1.11	3.53	1.07	3.15	1.27	2.47	1.30	2.82	1.33	3.16	1.26
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.70	1.01	3.71	1.00	3.71	1.00	3.25	1.18	2.52	1.33	2.88	1.31	3.30	1.24
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Table_A 18. Observed means and *SD*s of empathy toward the victim (RQ3) across the conditions

	First evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.63	0.80	3.54	0.83	3.58	0.82	3.67	0.77	3.74	0.80	3.70	0.78	3.65	0.80
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.64	0.77	3.62	0.82	3.63	0.80	3.50	0.88	3.67	0.83	3.59	0.86	3.61	0.83
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

	Second evaluation													
	Self-harm						SHS						Total	
	Low-severity		High-severity		Subtotal		Low-severity		High-severity		Subtotal			
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Dissimilar	3.64	0.82	3.55	0.77	3.60	0.80	3.53	0.76	3.73	0.82	3.62	0.79	3.61	0.79
	n = 186		*n* = 196		*n* = 382		*n* = 215		*n* = 200		*n* = 415		*n* = 797	
Similar	3.54	0.77	3.60	0.80	3.57	0.79	3.43	0.89	3.65	0.82	3.54	0.86	3.56	0.82
	n = 191		*n* = 196		*n* = 387		*n* = 183		*n* = 192		*n* = 375		*n* = 762	

Appendix 10. Full regression table for moderated mediation models using PROCESS macro (Hayes, 2013)

Table_A 19. Full regression table for moderated mediation models on perceived effectiveness (PE): First evaluation ($n = 1,559$)

DV	Engagement		Reactance		Identificaton		Perceived similarity		Empathy		PE	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Contstant	3.90 ***	0.05	2.58 ***	0.06	3.87 ***	0.05	3.62 ***	0.07	3.26 ***	0.05	1.58 ***	14.38
Engagement											0.60 ***	28.85
Reactance											-0.14 ***	-8.63
Identification											0.08 ***	3.98
Perceived similarity											-0.06 ***	-4.06
Empathy											0.07 ***	3.40
Similarity	0.01	0.04	0.03	0.05	0.01	0.04	0.00	0.05	-0.05	0.04	0.00	0.01
Severity	-0.01	0.04	0.03	0.05	-0.14 ***	0.04	-0.25 ***	0.06	-0.03	0.04	0.06 *	2.39
Theme: SHS (vs. self-harm)	-0.15 ***	0.04	0.10 *	0.05	-0.19 ***	0.04	-0.67 ***	0.05	0.06	0.04	0.00	-0.13
Similarity x Theme	**-0.19 ***	**0.08**	0.16 +	0.09	**-0.25 **	**0.08**	**-0.22 ***	**0.11**	**-0.16 ***	**0.08**	-0.01	-0.24
Similarity x Severity	-0.03	0.08	0.02	0.09	-0.01	0.08	0.02	0.11	0.04	0.08	-0.05	-1.13
Severity x Theme	0.13	0.08	-0.17 +	0.09	-0.08	0.08	-0.43 ***	0.11	0.11	0.08	0.03	0.70
Similarity x Theme x Severity	-0.15	0.17	-0.27	0.19	-0.10	0.17	-0.17	0.22	0.00	0.16	0.17 +	1.73
Context: Home (vs. outside café)	-0.05	0.04	0.04	0.05	-0.01	0.04	0.00	0.05	0.00	0.04	0.04	1.52
Similarity x Context	-0.03	0.08	-0.03	0.09	-0.03	0.08	-0.07	0.11	0.08	0.08	-0.04	-0.78
Severity x Context	-0.03	0.08	-0.05	0.09	-0.11	0.08	-0.17	0.11	0.07	0.08	0.04	0.88
Theme x Context	-0.26 **	0.08	-0.01	0.09	-0.27 **	0.08	-0.03	0.11	0.00	0.08	0.04	0.74
Similarity x Severity x Context	0.03	0.17	-0.26	0.19	-0.06	0.17	0.08	0.22	0.13	0.16	-0.01	-0.13
Similarity x Theme x Context	0.06	0.17	-0.13	0.19	0.03	0.17	-0.06	0.22	0.26	0.16	-0.03	-0.32
Severity x Theme x Context	0.24	0.17	-0.38 *	0.19	-0.12	0.17	-0.64 **	0.22	0.08	0.16	0.08	0.84
Sim. x Sev. X Theme x Context	-0.37	0.33	0.66 +	0.38	-0.46	0.33	-0.35	0.44	0.08	0.32	0.14	0.71
Knowledge test score	-0.02	0.03	-0.27 ***	0.03	-0.16 ***	0.03	-0.18 ***	0.04	0.25 ***	0.03	-0.06 **	-3.29

Note. Similarity, Severity, Theme and Context variables were effect coded (-0.5 vs. 0.5). $+p < .10$, $*p < .05$, $**p < .01$, $***p < .001$

Table_A 20. Full regression table for moderated mediation models on perceived effectiveness (PE): Second evaluation ($n = 1,559$)

DV	Engagement		Reactance		Identificaton		Perceived similarity		Empathy		PE	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Contstant	3.97 ***	0.06	2.54 ***	0.07	3.87 ***	0.07	3.52 ***	0.09	3.19 ***	0.06	1.51 ***	14.76
Engagement											0.61 ***	32.36
Reactance											-0.16 ***	-11.35
Identification											0.12 ***	6.45
Perceived similarity											-0.06 ***	-4.79
Empathy											0.05 **	2.92
Similarity	0.00	0.04	0.06	0.05	0.04	0.05	0.14 *	0.06	-0.08 *	0.04	0.03	1.26
Severity	0.05	0.04	0.03	0.05	-0.17 ***	0.05	-0.36 ***	0.06	0.06	0.04	0.08 ***	3.34
Theme: SHS (vs. self-harm)	-0.18 ***	0.04	0.18 ***	0.05	-0.34 ***	0.05	-0.77 ***	0.06	0.01	0.04	-0.01	-0.42
Similarity x Theme	**-0.18 ***	**0.09**	**0.19 ***	**0.10**	**-0.23 ***	**0.09**	-0.11	0.12	-0.06	0.08	-0.003	-0.05
Similarity x Severity	-0.04	0.09	-0.10	0.10	-0.13	0.09	0.05	0.12	0.09	0.08	0.05	1.05
Severity x Theme	0.08	0.09	-0.26 **	0.10	-0.34 ***	0.09	-0.61 ***	0.12	0.18 *	0.08	0.11 *	2.47
Similarity x Theme x Severity	-0.02	0.17	-0.16	0.20	-0.07	0.18	-0.18	0.24	-0.18	0.16	0.15	1.61
Context: Home (vs. outside café)	-0.08 +	0.04	0.00	0.05	0.00	0.05	-0.07	0.06	-0.01	0.04	0.00	-0.20
Similarity x Context	0.04	0.09	0.06	0.10	0.04	0.09	0.05	0.12	-0.02	0.08	-0.01	-0.29
Severity x Context	-0.01	0.09	-0.01	0.10	0.06	0.09	-0.25 *	0.12	0.03	0.08	0.00	0.10
Theme x Context	0.08	0.09	0.05	0.10	0.11	0.09	0.04	0.12	-0.03	0.08	0.02	0.36
Similarity x Severity x Context	0.11	0.17	0.05	0.20	0.05	0.18	-0.09	0.24	-0.10	0.16	0.01	0.09
Similarity x Theme x Context	-0.10	0.17	0.16	0.20	-0.19	0.18	0.06	0.24	-0.35 *	0.16	0.03	0.29
Severity x Theme x Context	-0.07	0.17	0.29	0.20	-0.02	0.18	0.08	0.24	-0.12	0.16	0.03	0.32
Sim. x Sev. X Theme x Context	0.25	0.34	-0.58	0.39	-0.08	0.37	0.28	0.47	0.03	0.32	0.07	0.39
Knowledge test score	-0.09 **	0.04	-0.28 ***	0.04	-0.21 ***	0.04	-0.17 ***	0.05	0.24 ***	0.03	-0.07 **	-3.31

Note. Similarity, Severity, Theme and Context variables were effect coded (-0.5 vs. 0.5). $+p < .10$, $*p < .05$, $**p < .01$, $***p < .001$

Appendix 11. Full ANOVA table for hypotheses testing (2)

Below are Full ANOVA tables for models examining the moderating role of demographic variables (Gender, Parental status and Race).

Table_A 21. Analysis of Variance (ANOVA) results for the moderating role of gender on perceived effectiveness (PE; H5a)

DV = PE	1st evaluation			2nd evaluation		
	df	F	p	df	F	p
Model	32	1.64	.01	32	2.19	.00
Gender	**1**	**8.28**	**.004**	**1**	**18.64**	**.00**
Similarity x Gender	1	0.95	.33	1	1.46	.23
similarity x Theme x Gender	1	1.56	.21	1	0.02	.88
Similarity x Severity x Gender	1	0.40	.53	1	0.17	.68
Similarity x Severity x Theme x Gender	1	0.27	.60	1	0.12	.73
Similarity	1	0.00	.95	1	0.05	.82
Severity	1	1.42	.23	1	7.22	.01
Similarity x Severity	1	0.86	.35	1	0.1	.75
Theme: SHS (vs. self-harm)	1	3.98	.05	1	12.54	.00
Similarity x Theme	1	3.95	.05	1	3.85	.05
Severity x Theme	1	4.44	.04	1	8.17	.00
Similairty x Severity x Theme	1	0.78	.38	1	1.07	.30
Severity x Gender	1	1.71	.19	1	1.14	.29
Theme x Gender	1	2.09	.15	1	0.13	.72
Severity x Theme x Gender	1	0.21	.65	1	0.58	.45
Context (home vs. outside café)	1	0.01	.91	1	1.88	.17
Similarity x Context	1	0.47	.49	1	0.01	.94
Severity x Context	1	0.26	.61	1	0.02	.89
Similarity x Severity x Context	1	0.01	.92	1	0.54	.46
Theme x Context	1	2.92	.09	1	0.66	.42
Similarity x Theme x Context	1	0.25	.62	1	0.67	.41
Severity x Theme x Context	1	4.56	.03	1	0.2	.65
Similarity x Severity x Theme x Context	1	0.25	.62	1	0.56	.46
Gender x Context	1	2.03	.15	1	2.51	.11
Similarity x Gender x Context	1	0.63	.43	1	0.26	.61
Severity x Gender x Context	1	0.89	.35	1	3.26	.07
Similarity x Severity x Gender x Context	1	0.01	.94	1	0	.94
Theme x Gender x Context	1	2.15	.14	1	0	1.00
Similarity x Theme x Gender x Context	1	0.52	.47	1	0.33	.57
Severity x Theme x Gender x Context	1	3.16	.08	1	2.09	.15
Similarity x Severity x Theme x Gender x Context	1	3.08	.08	1	0.08	.78
Knowledge test score	1	1.51	.22	1	8.25	.00
Residual	1526			1526		
Total	1558			1558		

Table_A 22. Analysis of Variance (ANOVA) results for the moderating role of gender on attitudes (H5b-c)

	Attitude toward smoking when others are around			Attitude toward smoking		
	df	F	p	df	F	p
Model	32	7.23	.00	32	5.23	.00
Gender	**1**	**34.01**	**.00**	**1**	**17.76**	**.00**
Similarity x Gender	1	0.12	.73	1	0.09	.76
similarity x Theme x Gender	1	0.01	.91	1	1.48	.22
Similarity x Severity x Gender	**1**	**7.13**	**.01**	1	0.82	.37
Similarity x Severity x Theme x Gender	1	0.09	.77	1	0.33	.57
Similarity	1	0.25	.62	1	0.11	.74
Severity	1	7.80	.01	1	1.52	.22
Similarity x Severity	1	0.22	.64	1	0.23	.64
Theme: SHS (vs. self-harm)	1	4.34	.04	1	1.93	.17
Similarity x Theme	1	2.20	.14	1	6.74	.01
Severity x Theme	1	0.04	.84	1	0.00	.97
Similairty x Severity x Theme	1	1.13	.29	1	1.24	.27
Severity x Gender	1	0.20	.65	1	0.37	.54
Theme x Gender	1	0.50	.48	1	3.06	.08
Severity x Theme x Gender	1	1.44	.23	1	1.56	.21
Context (home vs. outside café)	1	2.27	.13	1	2.28	.13
Similarity x Context	1	3.29	.07	1	4.06	.04
Severity x Context	1	0.02	.90	1	0.18	.67
Similarity x Severity x Context	1	1.23	.27	1	4.53	.03
Theme x Context	1	0.05	.83	1	0.10	.75
Similarity x Theme x Context	1	0.67	.41	1	0.78	.38
Severity x Theme x Context	1	2.78	.10	1	4.24	.04
Similarity x Severity x Theme x Context	1	3.61	.06	1	5.68	.02
Gender x Context	1	1.52	.22	1	5.67	.02
Similarity x Gender x Context	1	0.01	.93	1	0.01	.92
Severity x Gender x Context	1	0.56	.45	1	0.06	.81
Similarity x Severity x Gender x Context	1	1.49	.22	1	0.05	.82
Theme x Gender x Context	1	0.01	.94	1	0.02	.89
Similarity x Theme x Gender x Context	1	0.00	.96	1	0.79	.37
Severity x Theme x Gender x Context	1	0.66	.42	1	0.26	.61
Similarity x Severity x Theme x Gender x Context	1	2.05	.15	1	0.03	.87
Knowledge test score	1	128.04	.00	1	85.59	.00
Residual	1526			1526		
Total	1558			1558		

Table_A 23. Analysis of Variance (ANOVA) results for the moderating role of gender on intentions and anti-SHS policy support (H5d-f)

	Intention to avoid smoking when others are around			Intention to quit smoking			Anti-SHS policy support		
	df	F	p	df	F	p	df	F	p
Model	32	1.05	.40	32	2.3	.00	32	3.43	.00
Gender	**1**	**6.57**	**.011**	**1**	**2.3**	**.13**	**1**	**17.71**	**.00**
Similarity x Gender	1	0.00	.96	1	0.5	.48	1	0.26	.61
similarity x Theme x Gender	1	1.85	.17	**1**	**3.49**	**.06**	1	0.33	.57
Similarity x Severity x Gender	1	0.73	.39	1	0.33	.57	**1**	**6.06**	**.01**
Similarity x Severity x Theme x Gender	1	0.94	.33	1	1.24	.27	1	0.34	.56
Similarity	1	0.12	.73	1	1.55	.21	1	0.3	.58
Severity	1	0.01	.92	1	0.55	.46	1	4.07	.04
Similarity x Severity	1	0.15	.70	1	1.55	.21	1	0.1	.76
Theme: SHS (vs. self-harm)	1	2.25	.13	1	3.59	.06	1	0.8	.37
Similarity x Theme	1	1.13	.29	1	1.24	.26	1	1.78	.18
Severity x Theme	1	9.78	.00	1	4.46	.03	1	0.1	.75
Similairty x Severity x Theme	1	0.27	.61	1	0	.98	1	3.83	.05
Severity x Gender	1	0.10	.75	1	0.49	.48	1	1.27	.26
Theme x Gender	1	2.33	.13	1	0.18	.67	1	1.44	.23
Severity x Theme x Gender	1	0.01	.91	1	0.14	.71	1	0.17	.68
Context (home vs. outside café)	1	0.09	.76	1	0.09	.76	1	0	.96
Similarity x Context	1	0.33	.57	1	1.5	.22	1	1.2	.27
Severity x Context	1	0.10	.75	1	1.7	.19	1	1.28	.26
Similarity x Severity x Context	1	1.01	.31	1	0.54	.46	1	0.29	.59
Theme x Context	1	0.00	.99	1	4.78	.03	1	1.2	.27
Similarity x Theme x Context	1	1.57	.21	1	0.66	.42	1	0.01	.91
Severity x Theme x Context	1	1.34	.25	1	0.57	.45	1	0.21	.64
Similarity x Severity x Theme x Context	1	0.18	.67	1	1.03	.31	1	0.45	.50
Gender x Context	1	0.00	.98	1	0.63	.43	1	0.23	.64
Similarity x Gender x Context	1	0.81	.37	1	0.04	.83	1	0	.97
Severity x Gender x Context	1	0.26	.61	1	0	.97	1	0.02	.88
Similarity x Severity x Gender x Context	1	0.03	.87	1	0.44	.51	1	1.56	.21
Theme x Gender x Context	1	0.94	.33	1	0.02	.89	1	0.21	.65
Similarity x Theme x Gender x Context	1	0.02	.88	1	0	.99	1	0.16	.69
Severity x Theme x Gender x Context	1	0.44	.50	1	0.57	.45	1	0	.98
Similarity x Severity x Theme x Gender x Context	1	0.00	1.00	1	0.31	.58	1	0	.98
Knowledge test score	1	0.00	.95	1	44.76	.00	1	51.57	.00
Residual	1526			1526			1526		
Total	1558			1558			1558		

Table_A 24. Analysis of Variance (ANOVA) results for the moderating role of parental status on perceived effectiveness (PE; H6a)

DV = PE	1st evaluation			2nd evaluation		
	df	F	p	df	F	p
Model	32	2.63	.00	32	2.69	.00
Parents	**1**	**40.19**	**.000**	**1**	**30.69**	**.00**
Similarity x Parents	1	0.03	.87	1	0.04	.83
similarity x Theme x Parents	1	1.56	.21	1	0.35	.55
Similarity x Severity x Parents	1	0.54	.46	1	0.59	.44
Similarity x Severity x Theme x Parents	1	0.00	1.00	1	0.08	.77
Similarity	1	0.00	.99	1	0.07	.80
Severity	1	1.62	.20	1	7.78	.01
Similarity x Severity	1	1.13	.29	1	0.1	.75
Theme: SHS (vs. self-harm)	1	5.25	.02	1	14.4	.00
Similarity x Theme	1	4.13	.04	1	3.76	.05
Severity x Theme	1	3.54	.06	1	6.38	.01
Similairty x Severity x Theme	1	0.65	.42	1	1.03	.31
Severity x Parents	1	1.53	.22	1	0.01	.94
Theme x Parents	1	1.85	.17	1	1.78	.18
Severity x Theme x Parents	1	2.18	.14	1	4.1	.04
Context (home vs. outside café)	1	0.04	.84	1	1.65	.20
Similarity x Context	1	0.25	.62	1	0.03	.85
Severity x Context	1	0.62	.43	1	0.02	.90
Similarity x Severity x Context	1	0.07	.80	1	0.27	.60
Theme x Context	1	4.21	.04	1	1.27	.26
Similarity x Theme x Context	1	0.32	.57	1	0.76	.38
Severity x Theme x Context	1	4.18	.04	1	0.2	.66
Similarity x Severity x Theme x Context	1	0.21	.65	1	0.59	.44
Parents x Context	1	0.00	1.00	1	2.19	.14
Similarity x Parents x Context	1	0.29	.59	1	1.47	.23
Severity x Parents x Context	1	0.05	.82	1	0.11	.74
Similarity x Severity x Parents x Context	1	3.01	.08	1	2.02	.16
Theme x Parents x Context	1	0.65	.42	1	0.46	.50
Similarity x Theme x Parents x Context	1	1.88	.17	1	1.28	.26
Severity x Theme x Parents x Context	1	5.27	.02	1	1.49	.22
Similarity x Severity x Theme x Parents x Context	1	0.09	.77	1	0.04	.85
Knowledge test score	1	0.35	.56	1	4.53	.03
Residual	1526			1526		
Total	0			1558		

Table_A 25. Analysis of Variance (ANOVA) results for the moderating role of parental status on attitudes (H6b-c)

	Attitude toward smoking when others are around			Attitude toward smoking		
	df	F	p	df	F	p
Model	32	6.59	.00	32	5.14	.00
Parents	**1**	**14.64**	**.00**	**1**	**13.67**	**.00**
Similarity x Parents	1	0.02	.90	1	0.57	.45
similarity x Theme x Parents	1	0.54	.46	1	0.47	.49
Similarity x Severity x Parents	1	0.63	.43	1	0.26	.61
Similarity x Severity x Theme x Parents	1	0.53	.47	1	0.01	.93
Similarity	1	0.51	.48	1	0.13	.72
Severity	1	8.57	.00	1	1.52	.22
Similarity x Severity	1	0.31	.58	1	0.11	.74
Theme: SHS (vs. self-harm)	1	4.20	.04	1	2.14	.14
Similarity x Theme	1	3.23	.07	1	7.71	.01
Severity x Theme	1	0.46	.50	1	0.12	.73
Similairty x Severity x Theme	1	0.83	.36	1	0.70	.40
Severity x Parents	1	0.00	.94	1	0.09	.77
Theme x Parents	1	0.02	.88	1	0.30	.58
Severity x Theme x Parents	1	5.34	.02	1	3.37	.07
Context (home vs. outside café)	1	2.13	.14	1	2.00	.16
Similarity x Context	1	3.45	.06	1	3.64	.06
Severity x Context	1	0.01	.94	1	0.46	.50
Similarity x Severity x Context	1	1.16	.28	1	3.79	.05
Theme x Context	1	0.17	.68	1	0.03	.86
Similarity x Theme x Context	1	0.81	.37	1	1.06	.30
Severity x Theme x Context	1	2.07	.15	1	3.82	.05
Similarity x Severity x Theme x Context	1	4.32	.04	1	6.91	.01
Parents x Context	1	0.41	.52	1	0.70	.40
Similarity x Parents x Context	1	1.12	.29	1	1.35	.25
Severity x Parents x Context	1	2.30	.13	1	1.71	.19
Similarity x Severity x Parents x Context	1	0.35	.55	1	4.14	.04
Theme x Parents x Context	1	3.06	.08	1	0.53	.47
Similarity x Theme x Parents x Context	1	0.63	.43	1	1.17	.28
Severity x Theme x Parents x Context	1	0.12	.73	1	0.06	.80
Similarity x Severity x Theme x Parents x Context	1	0.82	.36	1	0.27	.60
Knowledge test score	1	163.37	.00	1	106.8	.00
Residual	1526			1526		
Total	1558			1558		

Table_A 26. Analysis of Variance (ANOVA) results for the moderating role of parental status on intentions and anti-SHS policy support (H6d-f)

	Intention to avoid smoking when others are around			Intention to quit smoking			Anti-SHS policy support		
	df	F	p	df	F	p	df	F	p
Model	32	2.99	.00	32	4.37	.00	32	3.13	.00
Parents	1	**60.01**	**.00**	1	**45.71**	**.00**	1	**4.36**	**.04**
Similarity x Parents	1	0.09	.76	1	0.12	.73	1	1.91	.17
similarity x Theme x Parents	1	0.88	.35	1	0.54	.46	1	0.06	.80
Similarity x Severity x Parents	1	0.93	.33	1	0.79	.38	1	1.15	.28
Similarity x Severity x Theme x Parents	1	0.56	.46	1	**3.08**	**.08**	1	0.15	.70
Similarity	1	0.18	.67	1	1.30	.26	1	0.28	.59
Severity	1	0.02	.89	1	0.39	.53	1	4.28	.04
Similarity x Severity	1	0.34	.56	1	2.05	.15	1	0.13	.72
Theme: SHS (vs. self-harm)	1	1.86	.17	1	4.08	.04	1	0.45	.50
Similarity x Theme	1	1.32	.25	1	1.17	.28	1	1.97	.16
Severity x Theme	1	8.60	.00	1	3.67	.06	1	0.01	.92
Similairty x Severity x Theme	1	0.33	.57	1	0.00	1.00	1	3.37	.07
Severity x Parents	1	0.07	.79	1	2.46	.12	1	0.53	.47
Theme x Parents	1	0.32	.57	1	1.99	.16	1	0.37	.54
Severity x Theme x Parents	1	1.86	.17	1	3.89	.05	1	1.91	.17
Context (home vs. outside café)	1	0.04	.84	1	0.10	.76	1	0.03	.87
Similarity x Context	1	0.25	.62	1	1.19	.28	1	1.05	.31
Severity x Context	1	0.03	.86	1	1.12	.29	1	1.12	.29
Similarity x Severity x Context	1	1.21	.27	1	0.64	.42	1	0.18	.67
Theme x Context	1	0.07	.79	1	5.46	.02	1	0.83	.36
Similarity x Theme x Context	1	1.68	.20	1	1.02	.31	1	0.05	.82
Severity x Theme x Context	1	1.35	.25	1	0.51	.48	1	0.02	.88
Similarity x Severity x Theme x Context	1	0.26	.61	1	0.90	.34	1	0.60	.44
Parents x Context	1	0.17	.68	1	0.05	.82	1	0.52	.47
Similarity x Parents x Context	1	0.17	.68	1	4.40	.04	1	0.88	.35
Severity x Parents x Context	1	0.64	.42	1	0.26	.61	1	0.04	.85
Similarity x Severity x Parents x Context	1	4.89	.03	1	4.60	.03	1	5.36	.02
Theme x Parents x Context	1	0.70	.40	1	3.69	.06	1	0.66	.42
Similarity x Theme x Parents x Context	1	0.02	.90	1	0.37	.54	1	0.37	.54
Severity x Theme x Parents x Context	1	1.98	.16	1	0.02	.89	1	0.06	.81
Similarity x Severity x Theme x Parents x Context	1	2.73	.10	1	1.03	.31	1	3.07	.08
Knowledge test score	1	0.62	.43	1	37.54	.00	1	66.33	.00
Residual	1526			1526			1526		
Total	1558			1558			1558		

Table_A 27. Analysis of Variance (ANOVA) results for the moderating role of race (White vs. Black) on perceived effectiveness (PE; H7a)

DV = PE	1st evaluation			2nd evlauation		
	df	F	p	df	F	p
Model	32	2.82	.00	32	2.99	.00
Race	**1**	**49.21**	**.00**	1	49.64	.00
Similarity x Race	**1**	**4.92**	**.03**	1	2.55	.11
similarity x Theme x Race	1	1.13	.29	1	0.00	.95
Similarity x Severity x Race	**1**	**4.43**	**.04**	1	0.14	.70
Similarity x Severity x Theme x Race	1	0.54	.46	1	0.01	.90
Similarity	1	1.47	.23	1	0.93	.33
Severity	1	1.95	.16	1	5.19	.02
Similarity x Severity	1	0.31	.58	1	0.54	.46
Theme: SHS (vs. self-harm)	1	4.17	.04	1	10.31	.00
Similarity x Theme	1	5.90	.02	1	3.21	.07
Severity x Theme	1	1.43	.23	1	3.24	.07
Similairty x Severity x Theme	1	0.09	.76	1	0.59	.44
Severity x Race	1	0.81	.37	1	0.01	.94
Theme x Race	1	0.30	.58	1	0.14	.70
Severity x Theme x Race	1	0.92	.34	1	0.67	.41
Context (home vs. outside café)	1	0.20	.66	1	2.27	.13
Similarity x Context	1	0.29	.59	1	0.00	.98
Severity x Context	1	0.02	.89	1	0.30	.58
Similarity x Severity x Context	1	0.69	.41	1	0.08	.78
Theme x Context	1	1.99	.16	1	0.81	.37
Similarity x Theme x Context	1	0.13	.72	1	0.00	.96
Severity x Theme x Context	1	2.28	.13	1	0.09	.77
Similarity x Severity x Theme x Context	1	0.25	.62	1	0.34	.56
Race x Context	1	0.17	.68	1	0.37	.54
Similarity x Race x Context	1	0.11	.74	1	0.00	.99
Severity x Race x Context	1	1.51	.22	1	1.52	.22
Similarity x Severity x Race x Context	1	0.36	.55	1	0.04	.85
Theme x Race x Context	1	0.27	.60	1	0.02	.89
Similarity x Theme x Race x Context	1	0.46	.50	1	0.31	.58
Severity x Theme x Race x Context	1	0.00	.98	1	0.00	.99
Similarity x Severity x Theme x Race x Context	1	0.01	.93	1	0.00	.96
Knowledge test score	1	0.42	.52	1	3.77	.05
Residual	1526			1526		
Total	1558			1558		

Table_A 28. Analysis of Variance (ANOVA) results for the moderating role of race (White vs. Black) on attitudes (H7b-c)

	Attitude toward smoking when others are around			Attitude toward smoking		
	df	F	p	df	F	p
Model	32	6.34	.00	32	5.19	.00
Race	**1**	**16.70**	**.00**	**1**	**10.9**	**.00**
Similarity x Race	1	0.00	.95	1	0.16	.69
similarity x Theme x Race	1	1.61	.20	1	2.06	.15
Similarity x Severity x Race	1	0.27	.60	**1**	**4.03**	**.04**
Similarity x Severity x Theme x Race	1	0.87	.35	1	0.84	.36
Similarity	1	0.43	.51	1	0.02	.90
Severity	1	8.04	.00	1	2.05	.15
Similarity x Severity	1	0.01	.92	1	1.14	.29
Theme: SHS (vs. self-harm)	1	0.42	.52	1	0.01	.91
Similarity x Theme	1	0.61	.43	1	2.56	.11
Severity x Theme	1	0.30	.58	1	0.22	.64
Similairty x Severity x Theme	1	0.02	.89	1	0.01	.94
Severity x Race	1	0.30	.58	1	0.24	.62
Theme x Race	1	3.51	.06	1	4.23	.04
Severity x Theme x Race	1	0.09	.76	1	0.53	.47
Context (home vs. outside café)	1	1.66	.20	1	1.90	.17
Similarity x Context	1	1.15	.28	1	0.40	.53
Severity x Context	1	0.01	.92	1	0.30	.59
Similarity x Severity x Context	1	1.54	.21	1	1.44	.23
Theme x Context	1	0.01	.94	1	1.66	.20
Similarity x Theme x Context	1	3.16	.08	1	4.51	.03
Severity x Theme x Context	1	0.65	.42	1	2.02	.16
Similarity x Severity x Theme x Context	1	1.78	.18	1	2.63	.11
Race x Context	1	0.00	.99	1	0.12	.73
Similarity x Race x Context	1	0.79	.38	1	2.96	.09
Severity x Race x Context	1	0.08	.77	1	0.08	.78
Similarity x Severity x Race x Context	1	0.59	.44	1	0.50	.48
Theme x Race x Context	1	0.18	.67	1	4.32	.04
Similarity x Theme x Race x Context	1	2.38	.12	1	3.91	.05
Severity x Theme x Race x Context	1	0.14	.71	1	0.01	.91
Similarity x Severity x Theme x Race x Context	1	0.15	.70	1	0.50	.48
Knowledge test score	1	158.62	.00	1	105.1	.00
Residual	1526			1526		
Total	1558			1558		

Table_A 29. Analysis of Variance (ANOVA) results for the moderating role of race (White vs. Black) on intentions and anti-SHS policy support (H7d-f)

	Intention to avoid smoking when others are around			Intention to quit smoking			Anti-SHS policy support		
	df	*F*	*p*	*df*	*F*	*p*	*df*	*F*	*p*
Model	32	1.00	.46	32	3.23	.00	32	3.66	.00
Race	1	0.90	.34	1	**24.61**	**.00**	1	**20.65**	**.00**
Similarity x Race	1	0.17	.68	1	2.12	.15	1	0.00	.96
similarity x Theme x Race	1	1.74	.19	1	0.33	.57	1	0.20	.65
Similarity x Severity x Race	1	1.47	.23	1	**4.89**	**.03**	1	**7.15**	**.01**
Similarity x Severity x Theme x Race	1	0.53	.47	1	0.03	.86	1	2.25	.13
Similarity	1	0.06	.81	1	3.07	.08	1	0.16	.69
Severity	1	0.32	.57	1	0.27	.61	1	4.41	.04
Similarity x Severity	1	0.10	.76	1	0.05	.82	1	3.72	.05
Theme: SHS (vs. self-harm)	1	0.04	.85	1	6.84	.01	1	0.34	.56
Similarity x Theme	1	0.12	.73	1	0.6	.44	1	1.05	.31
Severity x Theme	1	5.94	.01	1	1.54	.21	1	0.01	.92
Similairty x Severity x Theme	1	0.01	.93	1	0.02	.89	1	0.45	.50
Severity x Race	1	1.53	.22	1	0.00	.98	1	0.24	.62
Theme x Race	1	3.94	.05	1	4.32	.04	1	0.00	.99
Severity x Theme x Race	1	0.12	.73	1	1.29	.26	1	0.02	.88
Context (home vs. outside café)	1	0.08	.78	1	0.35	.55	1	0.12	.73
Similarity x Context	1	0.21	.65	1	0.77	.38	1	0.05	.82
Severity x Context	1	0.57	.45	1	1.45	.23	1	0.57	.45
Similarity x Severity x Context	1	0.44	.51	1	0.02	.90	1	0.00	.98
Theme x Context	1	0.01	.91	1	2.30	.13	1	0.14	.71
Similarity x Theme x Context	1	0.17	.68	1	0.47	.49	1	2.21	.14
Severity x Theme x Context	1	0.21	.65	1	0.69	.41	1	0.04	.83
Similarity x Severity x Theme x Context	1	0.26	.61	1	0.54	.46	1	0.01	.91
Race x Context	1	1.38	.24	1	0.35	.56	1	0.40	.53
Similarity x Race x Context	1	0.00	.99	1	0.03	.87	1	3.56	.06
Severity x Race x Context	1	0.90	.34	1	0.30	.58	1	0.50	.48
Similarity x Severity x Race x Context	1	0.04	.83	1	0.33	.56	1	0.33	.57
Theme x Race x Context	1	0.05	.83	1	0.53	.47	1	1.08	.30
Similarity x Theme x Race x Context	1	0.53	.47	1	0.27	.61	1	3.06	.08
Severity x Theme x Race x Context	1	0.42	.52	1	0.02	.89	1	0.04	.84
Similarity x Severity x Theme x Race x Context	1	0.11	.74	1	0.06	.80	1	0.83	.36
Knowledge test score	1	0.26	.61	1	38.74	.00	1	66.79	.00
Residual	1526			1526			1526		
Total	1558			1558			1558		

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