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The Attitudinal and Motivational Effects of Anti-Waterpipe Messages

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Abstract

Objectives: Waterpipe smoking can lead to negative health outcomes. This study examined responses to anti-waterpipe smoking public service announcements (PSAs).

Methods: In a pilot study, current waterpipe smokers ($N = 20$) and susceptible waterpipe never smokers ($N = 25$) were randomized to view either 3 anti-waterpipe PSAs, created by the *Truth* campaign, or 3 control videos. Participants answered questions pertaining to message acceptance at 3 time points and perceived risk and motivation to quit or avoid waterpipe at 4 time points.

Results: Participants were recruited from the community ($N = 45$; $M_{age} = 22.4$). While waterpipe smokers and never smokers who viewed the PSAs significantly increased in acceptance of ($p < .05$) and positive attitudes towards the messages ($p < .05$) with increased viewing of the messages, waterpipe never smokers did so at a significantly higher rate ($ps < .05$). Waterpipe never smokers who viewed the PSAs had increased perceived severity and susceptibility of health harms of waterpipe compared to the control ($ps < .05$). Gender differences were also found.

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Human Subjects Statement

All procedures were approved by the Institutional Review Board for the University of Oklahoma.

Conflict of Interest

Authors have no conflicts of interest.

Conclusions: The 3 tested PSAs from the *Truth* campaign show promise for the effects of anti-waterpipe PSAs, suggesting that they are effective.

Keywords

waterpipe; public service announcements; hookah

Similar to cigarette smoking, waterpipe or hookah smoking, produces carcinogenic toxicants,^{1,2} leading to many of the same negative health outcomes as cigarette smoking.^{3,4} While cigarette use among American youth has shown patterns of decrease over the past 4 years,⁵ waterpipe smoking remains higher than other tobacco products.⁵ In order to educate and dissuade this population from waterpipe use, mass media campaigns have been implemented, but little research has examined their effects. Even though little research has evaluated these campaigns, mass media campaigns are often recommended as a “best practices” technique to dissuade young people from using tobacco.⁶ The development of these messages are heavily funded by the Centers for Disease Control and Prevention (CDC) and individual states spend approximately \$175 million on anti-tobacco messaging yearly.⁷ One organization in particular, *Truth*, was one of the first to design and implement anti-tobacco mass media campaigns targeted at young people using hard-hitting tactics informed by formative research.^{8,9} Such tactics typically include portraying young people as rejecting the tobacco industry.⁹ Studies have shown that *Truth*’s approach has had a positive impact on young people’s attitudes and youth initiation of tobacco use.^{9–11}

The primary goal of anti-tobacco campaigns, like the one’s put out by *Truth*, is to reduce the prevalence of tobacco use.¹² According to the message impact framework,¹³ message characteristics signifying a warning result in more attention to the message, which in turn leads individuals to react to the message and form attitudes and beliefs about the health behavior that later can result in adopting the health behavior promoted in the campaign. Little research has examined how anti-waterpipe public service announcements (PSAs) affect audiences and there has been a call for research to examine the effectiveness of these interventions.¹⁴ The goal of the current pilot study is to examine changes in attitudes and motivations to use waterpipe after viewing anti-waterpipe PSAs.

For anti-tobacco messages, a fundamental challenge lies in how smokers and non-smokers respond to messages. Non-smokers are often positively affected by counter-marketing of tobacco. For instance, in a review of studies spanning 37 years, researchers found that mass media campaigns helped curb youth from experimenting with and initiating cigarette use.¹² Another study found that anti-cigarette campaigns aided in reducing relapse in quitters.¹⁵ Yet, smokers can react in different ways. For example, one study showed that smokers feel annoyed, insulted, and defensive as a result of viewing anti-tobacco campaigns.¹⁶ These negative emotions can be explained through psychological reactance theory, which posits that when individuals are faced with a threat of not being able to make their own decisions about a behavior, they respond in a negative and, in the context of anti-tobacco messaging, counterproductive way.¹⁷ This makes it imperative that studies not only measure positive reactions to health messages, but also measure negative reactions such as participants’ perceived threat to freedom. However, other research suggests that anti-tobacco campaigns

have overwhelmingly positive effects. For example, one meta-analysis on the effectiveness of fear appeals found no evidence of messages backfiring¹⁸ and another found that even when initial defense reactions are present, smokers still engage in a greater number of quit attempts in the long term.¹⁹ While this evidence exists for anti-tobacco messages generally, it remains unclear as to how waterpipe smokers and waterpipe never smokers will respond to campaigns aimed at preventing waterpipe initiation and use.

The current pilot study examined how waterpipe smokers and susceptible waterpipe never smokers react to PSAs. In this study, we test the reactions to 3 anti-waterpipe smoking PSAs with waterpipe smokers and waterpipe never smokers. We hypothesize that both waterpipe smokers and waterpipe never smokers will react positively to the PSAs, but the waterpipe never smokers at a higher rate. Additionally, we examine how waterpipe smokers and waterpipe never smokers who saw the PSAs react differently than those who see control videos. We hypothesize that, those who view the PSAs will perceive greater susceptibility and severity of health harms related to waterpipe and greater motivations to quit or avoid waterpipe in the future compared to those who view control videos.

METHODS

Procedures and Participants

Participants were recruited through advertisements via online and public locations from a midsize city in the Midwest. Participants were community members and college students from the university at which the study was conducted. Eligible participants were at least 18 years old and able to read and speak English. In an effort to recruit participants who may be susceptible to waterpipe use, waterpipe never smokers had to report using (even a puff of) a tobacco/nicotine product (cigarettes, e-cigarette/vape, cigars, little cigars, cigarillo, or blunt) over the previous 3 months to participate but also report never smoking waterpipe (even a puff). The criteria for inclusion in this group was adapted from Villanti and colleagues who found that individuals who were tobacco users but waterpipe never users were more likely to initiate use of waterpipe after 6 months than those who were not tobacco users.²⁰ Waterpipe smokers had to report smoking waterpipe monthly for at least 6 months. Six months was chosen to guard against including individuals who were very infrequent users but who had happened to have used waterpipe once in the past month. After screening for waterpipe use status, participants were scheduled for an in-laboratory visit. Participants came to the lab, provided informed consent, and were randomly assigned 2:1 (PSA:Control) to view either a series of 3 different anti-waterpipe PSAs (N= 28) or 3 different control videos (nature scenes) (N = 17) in a counterbalanced fashion. A larger PSA group was included to allow for more fine-grained analyses of participants' attitudes towards the PSAs. Participants completed self-report measures including sociodemographic questions and tobacco use history, as well as pre-video measures including perceived susceptibility, perceived severity, and motivations to quit or avoid waterpipe. After viewing each video, participants then answered questions on each of the pre-video measures and measures on post-only questions. This means that for all outcomes asked pre- and post-each video, participants were asked at 4 time points. For all outcome variables just asked post each video (perceived threat to freedom, counter-arguing, message acceptance, and positive attitude toward the message),

participants were asked at 3 time points. Participants were compensated with a \$20 gift card. All procedures were approved by the Institutional Review Board for the University of Oklahoma.

Hookah PSAs and Control Videos

Three anti-waterpipe PSAs were used from the Truth campaign. Messages focused on the harmful effects of or false beliefs about waterpipe smoking. Message #1 (30 seconds) was an animated video focusing on a squid that morphs into a waterpipe. This image was followed by a written fact shown on screen that explained that one session of waterpipe is equivalent to smoking 200 cigarettes. Message #2 (60 seconds) featured individuals at a party where incorrect statements were made about waterpipe and cigarette smoking, which were followed by the line “It’s a trap.” These messages were intended to clear up commonly held misperceptions of cigarette and waterpipe use. Message #3 (60 seconds) was high-paced with fast music and on-screen text about the harms of waterpipe and the manipulative practices of the tobacco industry. Three control videos depicted nature scenes for the same amount of seconds as their corresponding PSAs. These strategic messages are created using previous research and established health communication theories^{11,21} as well as formative research about the target population’s tobacco use and other beliefs.²² The *Truth* campaign’s formative research often consists of focus groups and quantitative copy testing in order to design the most effective messages possible.²²

Measures

Time.—For the post-only measures (explained below) participants were asked at 3 time points: post 1 (after the first message), post 2 (after the second message), and post 3 (after the third message). For the pre- and post-measures (explained below), participants were asked about those measures pre (pre-viewing any videos), post 1 (after the first message), post 2 (after the second message), and post 3 (after the third message). Time was then used as a variable in the analysis (see data analytic section).

Sociodemographic variables.—Participants were asked their sex, age, race/ethnicity, income, and marital status.

Perceived threat to freedom.—Stemming from psychological reactance theory, perceived threat to freedom is a state that occurs when freedom has been threatened or eliminated¹⁷ such as social influence threats often found in persuasive health messaging.²³ Perceived threat to freedom was measured by averaging 4 items¹⁷ scaled from 1 (strongly disagree) to 7 (strongly agree), and included statements such as, “The message threatened my freedom to choose” (Cronbach’s $\alpha = .77$).

Counter-arguing.—Counter-arguing was measured with 3 adapted items²⁴ that included items pertaining to criticism, skepticism, and arguments against the messages. Counter-arguing was measured from 1 (strongly disagree) to 7 (strongly agree), and scores were averaged, and included items such as “Did you think of points that went against what was being said while you were watching the message?” (Cronbach’s $\alpha = .59$).

Message acceptance.—Message acceptance was assessed by averaging 3 items on a scale from 1 (not at all) to 5 (very much) that asked participants the extent to which the message made strong arguments, was convincing, and if they would adopt the message recommendations (Cronbach's $\alpha = .87$).

Positive attitude toward the message.—Positive attitude toward the message was assessed with 3 items.²⁵ Participants rated the message on bad/good, negative/positive, and dislike/like on 7-point semantic differential scales. Scores were averaged with higher scores reflecting more positive attitudes (Cronbach's $\alpha = .89$).

Perceived susceptibility.—Perceived susceptibility was assessed before any of the videos were shown and after each exposure using 3 items²⁶ that asked participants how susceptible they would be to cancer, heart disease, or worsened health if they smoked waterpipe. Participants rated each on a 1 (not at all) to 5 (very much) scale, and scores were averaged at each time point, and included items such as “I am at risk of getting cancer if I smoke hookah” (Cronbach's $\alpha = .89$).

Perceived severity.—Perceived severity was measured with 3 items²⁶ before any of the videos were shown and after each exposure and assessed participants' perceptions about the significance, severity, and seriousness of health threats from smoking waterpipe on a scale from 1 (not at all) to 5 (very much). Scores were averaged, and included items such as “I believe that the health threat from smoking hookah is severe” (Cronbach's $\alpha = .93$).

Motivation to quit or avoid.—Motivations were assessed before any of the videos were shown and after each exposure with 4 items measured on a 0 (not at all) to 10 (extremely) scale for perceived importance, confidence, readiness, and commitment to quit or avoid (for waterpipe never smokers) waterpipe.

Sociodemographic variables.—Participants were asked their sex, age, race/ethnicity, income, and marital status.

Data Analytic Plan

Descriptive statistics and frequency analyses were conducted on sociodemographic variables. Biological sex was the only sociodemographic variable that was significantly different among groups, thus, we included biological sex in our models. In order to examine the outcome variables associated with attitudes towards the PSAs, analyses were conducted first comparing waterpipe smokers versus waterpipe never smokers for only those who viewed the PSAs. Second, analyses compared waterpipe smokers who viewed the PSAs to those who viewed the control videos. Third, analyses compared waterpipe never smokers who viewed the PSAs to those who viewed the control videos on the outcome variables associated with waterpipe harms and motivations for the future.

First, we examined individuals' attitudes towards the PSAs by only looking at waterpipe smokers and waterpipe never smokers *who viewed the PSAs*. To do this, we used a MIXED procedure in SAS 9.4 (SAS Institute, Cary, North Carolina) to model the relationship between waterpipe smoking status (smoker vs. never-smoker), time (post 1 vs. post 2 and

post 3, respectively) and biological sex with repeated outcome measures using a Type III test of fixed effects to assess significance. When sex was within a significant interaction, we stratified the model to further probe the association. The final models included an interaction term of smoking status and time to allow the estimate of the effect of smoking status to vary across time points and to evaluate the associations between smoking status and the attitudes at each time point and in the time points within each smoking status group. To measure effect sizes, we used omega squared.

Second, we examined condition (PSA vs. control), time (baseline vs. post each of the exposures) and biological sex on perceived susceptibility, perceived severity, and motivations to quit or avoid waterpipe. To do so, we analyzed the waterpipe smokers and waterpipe never smokers *separately*. Again, we used a MIXED procedure in SAS 9.4 (SAS Institute, Cary, North Carolina) with repeated outcome measures using a Type III test of fixed effects to assess significance. For each of our primary outcomes, no significant interaction between condition and PSA/control video order was found ($p > .05$). Therefore, no order effects were found. When sex was within a significant interaction, we stratified the model to further probe the association. The final models included an interaction term of smoking status and time to allow the estimate of the effect of condition to vary across time points and to evaluate the associations between condition and the outcomes at each time point and in the time points within each condition group. To measure effect sizes, we used omega squared.

RESULTS

Participants

Participants ($N = 45$) were 49% male, and ages ranged from 18 to 47 years ($M = 22.4$). Participants were 65% White/Caucasian, 15% Asian, 12% multiracial, 2% Black/African American, 2% Native American/Alaskan Native, and 4% identified as “other.” About 8% of the sample identified as Hispanic/Latino/Latina. Almost one-third (32%) of the sample had a total yearly household income below \$20,000 and 29% had a household income of \$100,000 or more. The majority of the sample was single and had never been married (82%). For waterpipe never smokers, 9 (36%) viewed the control videos and 16 (64%) viewed the PSAs. For waterpipe smokers, 8 (40%) viewed the control videos and 12 (60%) viewed the PSAs.

Results Among Participants Who Viewed the PSAs Only

Perceived threat to freedom.—There was a significant interaction of sex and time on perceived threat to freedom ($estimate = 3.22$, $p < .05$, $\omega^2 = .04$). After stratifying the model, we found that women had increased perceived threat to freedom after each time point ($estimate = 3.94$, $p < .05$, $\omega^2 = .13$). See Figure 1. There were no significant main effects for waterpipe smoking status or time.

Counter-arguing.—There were no significant associations between waterpipe smoking status, time, sex, and counter-arguing.

Message acceptance.—There was a significant main effect of waterpipe smoking status and message acceptance ($estimate = 17.87$, $p < .001$, $\omega^2 = .12$), such that waterpipe never smokers had greater message acceptance than waterpipe smokers. There was also a significant main effect for time on message acceptance ($estimate = 6.88$, $p < .01$, $\omega^2 = .08$), finding that message acceptance increased after each time point for all participants who viewed the PSAs. See Figure 2 and Table 1. The interaction was not significant.

Positive attitude toward the message.—There was a significant main effect of waterpipe smoking status on positive attitude toward the message ($estimate = 12.08$, $p < .01$, $\omega^2 = .09$), suggesting that waterpipe never smokers had significantly higher positive attitudes toward the messages than waterpipe smokers. There was also a significant main effect for time on positive attitude toward the message ($estimate = 6.61$, $p < .01$, $\omega^2 = .09$), suggesting that positive attitude toward the message increased after each time point for all participants who viewed the PSAs. See Table 1. No interactions were significant.

Results Among Waterpipe Smokers Exposed to the PSA or Control

Perceived susceptibility.—There were no significant associations between condition, time, sex, and perceived susceptibility.

Perceived severity.—There was a significant main effect of time on perceived severity ($estimate = 3.79$, $p < .05$, $\omega^2 = .10$), suggesting that all waterpipe smokers regardless of condition increased in perceived severity over the time points. See Table 2. There were no other significant associations with condition or sex on perceived severity for waterpipe smokers.

Perceived importance to quit waterpipe.—There was a significant interaction between sex and time on perceived importance to quit among waterpipe smokers ($estimate = 3.79$, $p < 0.05$, $\omega^2 = .07$). After stratifying the model, we found that female waterpipe smokers had increased perceived importance to quit waterpipe over each of the time points regardless of condition ($estimate = 3.49$, $p < .05$, $\omega^2 = .21$). No other main effects or interactions were significant.

Confidence in quitting or avoiding waterpipe.—There was a significant interaction between sex and condition on confidence in quitting for waterpipe smokers ($estimate = 9.59$, $p < 0.01$, $\omega^2 = .05$). After stratifying the model, we found that male waterpipe smokers who saw the PSAs had elevated perceived confidence in quitting over those who saw the control videos ($estimate = 19.46$, $p < .01$, $\omega^2 = .14$). See Figure 3 and Table 2. There were no significant results concerning female waterpipe smokers. No other main effects or interactions were significant.

Readiness to quit waterpipe.—There was a significant main effect of sex on readiness to quit ($estimate = 7.37$, $p < .05$, $\omega^2 = .06$). Specifically, female waterpipe smokers were significantly more ready to quit than male waterpipe smokers. No other associations were significant.

Commitment to quit waterpipe.—There was a significant interaction of sex and time on commitment to quit waterpipe ($estimate = 3.91$, $p < 0.05$, $\omega^2 = .06$). After stratifying the model, results revealed female waterpipe smokers had increased commitment to quit after each time point ($estimate = 3.76$, $p < .05$, $\omega^2 = .23$). Additionally, for female waterpipe smokers, there was a significant interaction of time and condition, indicating that there is a difference between the condition groups after each time point, but they are not parallel ($estimate = 3.62$, $p < .05$, $\omega^2 = .21$). See Figure 4 and Table 2. No other associations were significant.

Results Among Waterpipe Never Smokers Exposed to the PSA or Control

Perceived susceptibility.—There was a significant main effect of condition on perceived susceptibility among waterpipe never smokers ($estimate = 6.53$, $p < .05$, $\omega^2 = .04$), showing that waterpipe never smokers who viewed the PSAs had significantly higher perceived susceptibility. There was also a significant main effect of time on perceived susceptibility, ($estimate = 3.01$, $p < .05$, $\omega^2 = .05$), showing that perceived susceptibility increased over the course of time. No other associations were significant.

Perceived severity.—There was a significant main effect of condition ($estimate = 17.08$, $p < .001$, $\omega^2 = .09$) and time ($estimate = 4.03$, $p < .05$, $\omega^2 = .05$) on perceived severity as well as a significant interaction between condition and time ($estimate = 3.12$, $p < .05$, $\omega^2 = .04$). These results show that waterpipe never smokers who viewed the PSAs had significantly higher perceived severity across time and that the condition groups are both changing after each time point. No other main effects or interactions were significant.

Perceived importance, confidence, readiness, and commitment to avoid waterpipe.—There were no significant associations of time or condition among never waterpipe smokers on any of these outcomes ($ps > .05$).

DISCUSSION

The present study examined how waterpipe smokers and susceptible waterpipe never smokers responded to anti-waterpipe PSAs. 3 PSAs from the *Truth* campaign were tested and participants were asked about their attitudes towards the messages, perceived risk of harm from waterpipe, and motivations to quit or avoid waterpipe. While this study was exploratory in nature, it did provide evidence that anti-waterpipe messages may have a dose response and, unlike other anti-tobacco messages, may not cause reactance among waterpipe smokers. Specifically, we found that although all participants who viewed the PSAs had increased message acceptance and positive attitudes toward the message over the course of additional PSA viewings, waterpipe never smokers did so at a higher rate than waterpipe smokers. Among waterpipe smokers, men exposed to the PSAs had increased confidence in quitting waterpipe. Women had increased readiness and commitment to quit, regardless of condition suggesting assessment reactivity. Assessment reactivity can be defined as “being present where measurement results in changes in the people being measured (p. 454).²⁷ The means that simple assessment of a behavior or attitude can result in changes in the behavior/attitude as a function of assessment rather than to the intervention or treatment to which they

were assigned. We also found that waterpipe never smokers that were exposed to the PSAs had increased perceived severity of health threats from waterpipe over the course of time points and significantly higher perceived susceptibility to cancer, heart disease, and worsened health than those who viewed the control videos.

The examination of anti-waterpipe campaigns on waterpipe smokers and waterpipe never smokers is lacking in tobacco research, therefore the results of this study are unique to the literature. Specifically, we saw that while waterpipe smokers accept the messages significantly less than waterpipe never smokers, they still have increased acceptance and positive attitudes when exposed to the PSAs. Thus, while it may seem that they might be a bit less accepting or defensive,¹⁶ they do improve with repeated exposure. This furthers the literature on anti-smoking campaigns that shows positive effects on tobacco users.¹⁸

Interestingly, the PSAs were effective in increasing male waterpipe smokers confidence to quit and female waterpipe smokers readiness and commitment to quit, which may suggest that waterpipe smokers already are aware of the severity and susceptibility of health harms due to smoking but may have seen these messages as a motivator. This may correspond to literature that suggests mass media campaigns can positively affect adult cigarette smokers.¹⁵ While, it is still unclear as to how gender may affect reactions to anti-tobacco messages, 2 reviews concluded that message effectiveness does not consistently differ by gender.^{28,29} On the contrary, this study may suggest that female smokers already have high importance and readiness in quitting in general, regardless of whether they see a PSA or control. For male smokers, confidence in quitting only have increased when they saw a PSA, meaning future campaigns may want to target different aspects of motivation by gender. From the perspective of these data, it seems women may be highly motivated without having to view a PSA while men may not be as motivated but PSAs increase their confidence in quitting. The current study has extended this research to waterpipe smokers. While we saw significant increases after each time point for motivation items in just one laboratory visit, the CDC²¹ recommends that campaigns run for 3 to 6 months to gain awareness among the target audience, 6 to 12 months to change attitudes, and 12 to 18 months to change behaviors. Therefore, testing anti-waterpipe PSAs over a longer period of time might show an even greater impact on outcomes of importance such as quit rates after each time point with greater exposure. This should be explored in future studies. Furthermore, anti-tobacco message fatigue can also occur due to the number of messages and information contained in those messages (eg, quitting resources) and not necessarily the amount of time that a campaign runs. One study found that smokers reported greater message fatigue than non-smokers,³⁰ making this another important area to explore in the context of waterpipe. This study also found that these 3 PSAs were effective for prevention for susceptible waterpipe never smokers, showing promise for other anti-waterpipe messages to dissuade young people from use.

This is a preliminary step towards understanding how waterpipe smokers and waterpipe never smokers respond to anti-waterpipe PSAs. While our study did make important first steps in examining anti-waterpipe PSAs, it is not without limitations. Although significant differences were found, the sample may not be representative of all waterpipe smokers. Because it was a self-report study and our control group saw nature videos, participants in

the PSA condition could have been vulnerable to social desirability bias when answering questions about waterpipe. Additionally, we only examined the effects of 3 real-world PSAs making it difficult to study different communication strategies in a controlled, laboratory setting. Lastly, even though the mean age of our sample was early twenties, we did have a wide range of ages participate and older age individuals are not the target for *Truth*. Future work should expand the sample size, examine the age range targeted by *Truth*, test different communication strategies, and test more messages after each time point in the real world. In addition, future work should explore how people with different levels of use react to messages to understand how long time waterpipe smokers compare in their reactions to messages versus those who have only been current waterpipe smokers for a short time. Nevertheless, this work broadens the tobacco literature by being one of the first to explore how individuals react to anti-waterpipe messages.

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Figure 1. Significant Interaction of Sex and Time on Perceived Threat to Freedom

Note.

Perceived threat to freedom was measured on a 7-point scale. Smoker and never smoker refer to waterpipe smoking status.

Figure 2. Significant Main Effect of Waterpipe Smoking Status and Message Acceptance and Significant Main Effect for Time on Message Acceptance

Note.

Message acceptance was measured on a 5-point scale. Smoker and never smoker refer to waterpipe smoking status.

Figure 3. Significant Interaction Between Sex and Condition on Confidence in Quitting for Waterpipe Smokers

Note.

Confidence in quitting waterpipe was measured on an 11-point scale.

Figure 4. Significant Interaction of Sex and Time on Commitment to Quit for Waterpipe Smokers

Note.

Commitment to quitting waterpipe was measured on an 11-point scale.

Table 1

Means and Standard Deviations of Post-Only Measures

Smoking Status	Measure	Condition	Post 1 <i>M</i> (<i>SD</i>)	Post 2 <i>M</i> (<i>SD</i>)	Post 3 <i>M</i> (<i>SD</i>)
Smoker	Threat to freedom ^A	Control	1.53(.65)	2.00(.80)	1.72(.86)
	Threat to freedom	PSA	2.27(.85)	2.33(.83)	2.58(.91)
Non-Smoker	Threat to freedom	Control	1.50(.78)	1.31(.46)	1.33(.56)
	Threat to freedom	PSA	1.95(.81)	2.20(.93)	2.41(.92)
Smoker	Counter-arguing ^B	Control	1.71(.65)	1.71(1.19)	1.88(.71)
	Counter-arguing	PSA	3.44(1.71)	2.78(.98)	2.72(1.52)
Non-Smoker	Counter-arguing	Control	2.19(1.44)	1.85(1.08)	1.63(.81)
	Counter-arguing	PSA	2.35(.86)	2.32(1.00)	2.44(1.39)
Smoker	Message acceptance ^C	Control	2.46(1.01)	2.46(1.10)	2.63(.74)
	Message acceptance	PSA	2.00(.90)	2.61(1.22)	2.81(.97)
Non-Smoker	Message acceptance	Control	2.26(.97)	2.04(.89)	2.19(.91)
	Message acceptance	PSA	3.52(.81)	3.77(.96)	4.19(.82)
Smoker	Positive attitude ^D	Control	5.71(1.44)	5.71(1.17)	5.04(1.17)
	Positive attitude	PSA	2.92(1.92)	3.61(1.77)	4.11(1.15)
Non-Smoker	Positive attitude	Control	5.04(1.66)	4.93(1.72)	5.26(1.98)
	Positive attitude	PSA	4.73(1.19)	5.31(1.64)	5.77(1.71)

Note.

^A Perceived threat to freedom and^B counter-arguing were measured on 7-point scales ranging from 1 (strongly disagree) to 7 (strongly agree).^C Message acceptance was measured on a scale ranging from 1 (not at all) to 5 (very much).^D Positive attitude toward the message was measured using 7-point semantic differential scales 1 (bad, negative, dislike) to 7 (good, positive, like). Results reflect participants who viewed the PSAs only.

Table 2

Means and Standard Deviations for Pre- and Post-Measures

Smoking Status	Measure	Condition	Pre <i>M</i> (SD)	Post 1 <i>M</i> (SD)	Post 2 <i>M</i> (SD)	Post 3 <i>M</i> (SD)
Smoker	Susceptibility ^A	Control	4.04(0.49)	4.29(0.65)	4.30(0.65)	4.25(0.73)
	Susceptibility	PSA	3.67(0.84)	3.92(1.01)	3.89(1.29)	4.19(0.96)
Non-Smoker	Susceptibility	Control	3.67(0.69)	3.49(1.30)	3.70(0.70)	3.81(0.71)
	Susceptibility	PSA	3.96(0.56)	4.40(0.71)	4.33(0.56)	4.58(0.54)
Smoker	Severity ^B	Control	3.71(0.81)	3.96(0.98)	3.88(1.15)	3.92(1.14)
	Severity	PSA	3.19(1.02)	3.81(1.04)	3.69(1.33)	4.08(0.91)
Non-Smoker	Severity	Control	3.15(1.06)	3.19(1.08)	3.15(0.99)	3.22(1.11)
	Severity	PSA	4.02(0.43)	4.44(0.67)	4.58(0.45)	4.56(0.50)
Smoker	Importance ^C	Control	3.39(3.18)	3.14(3.28)	3.59(3.39)	3.19(3.36)
	Importance	PSA	1.75(1.20)	1.42(0.65)	2.62(2.95)	2.91(2.95)
Non-Smoker	Importance	Control	7.34(3.28)	7.60(3.06)	6.77(3.67)	7.85(3.08)
	Importance	PSA	8.15(2.09)	8.70(2.73)	8.20(3.20)	8.71(2.76)
Smoker	Confidence ^D	Control	6.52(3.82)	6.32(3.78)	6.16(3.81)	9.66(0.98)
	Confidence	PSA	7.86(2.75)	8.54(2.68)	9.32(1.14)	9.28(1.27)
Non-Smoker	Confidence	Control	9.77(0.67)	9.75(0.70)	9.67(0.98)	6.18(3.82)
	Confidence	PSA	9.85(0.48)	9.85(0.47)	9.84(0.49)	9.40(2.24)
Smoker	Readiness ^E	Control	3.83(3.08)	3.66(3.09)	3.63(3.08)	3.64(3.08)
	Readiness	PSA	3.11(3.41)	3.03(3.26)	4.25(3.94)	3.74(3.44)
Non-Smoker	Readiness	Control	9.17(1.27)	9.15(1.32)	8.97(1.75)	9.05(1.57)
	Readiness	PSA	9.59(1.50)	9.36(2.24)	9.35(2.24)	9.64(1.10)
Smoker	Commitment ^F	Control	3.47(3.28)	3.48(3.34)	3.55(3.34)	3.55(3.34)
	Commitment	PSA	1.79(1.21)	1.77(1.19)	2.99(2.96)	3.45(3.51)
Non-Smoker	Commitment	Control	7.99(3.16)	7.87(3.22)	7.97(3.16)	7.77(3.34)
	Commitment	PSA	8.77(2.75)	8.91(2.75)	8.83(2.78)	8.84(2.75)

Note.

^A Perceived susceptibility and^B perceived severity were rated on 1 (not at all) to 5 (very much) scales.^C Importance,^D confidence,^E readiness, and^F commitment to avoid or quit were measured on 0 (not at all) to 10 (extremely) scales.