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## The Role of Motivational and Persuasive Message Factors in Changing Implicit Attitudes Toward Smoking

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### Abstract

The current work examined the extent to which nicotine level affects the receptiveness of cigarette smokers to a compelling (strong) or a specious (weak) antismoking, public service announcement (PSA). The combination of nicotine loading (i.e., having just smoked a cigarette) and a strong antismoking PSA led to significantly more negative implicit evaluations of cigarettes; however, explicit evaluations were not changed by nicotine level or PSA quality. Smokers' implicit evaluations of cigarettes were affected only by compelling PSAs when they had recently smoked but not when they were nicotine deprived or when they viewed weak PSAs. Because implicit evaluations of cigarettes predict deliberate smoking-related decisions, it is important to understand which factors can render these implicit evaluations relatively more negative.

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The concept of attitudes is an important and enduring one in social psychology because, if we have some knowledge about what people like and dislike, we can often predict how they will behave. Due to societal norms, social desirability concerns, or poor introspective access (i.e., people do not know the reasons why they like or dislike an object), however, people are sometimes unwilling or unable to accurately report their evaluations (e.g., Crowne & Marlowe, 1960; Wilson, 2002). It is, therefore, not surprising that, when examining socially sensitive topics, implicit evaluations are often better predictors of behavior than explicit evaluations (e.g., Fazio & Olson, 2003; Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Because of the social stigma against smokers and societal norms against smoking, implicit evaluations have been especially important and robust predictors of smoking-relating behaviors (e.g., Waters & Sayette, 2006). For example, recent work has demonstrated that only implicit evaluations of cigarettes are intergenerationally transmitted and predict smoking initiation (Sherman, Chassin, Presson, Seo, & Macy, 2009) and that only smokers' implicit evaluations of cigarettes prospectively predict quitting 18 months later (Chassin, Presson, Sherman, Seo, & Macy, 2010).

Antismoking public service announcements (PSAs) are intended to create or reinforce negative attitudes about smoking (American Lung Association, 2007). We know that antismoking PSAs are relatively ineffective at changing explicit evaluations of cigarettes for non-smokers as well as smokers (e.g., Flay, 1987; Wakefield, Flay, Nichter, & Giovino, 2003). However, it is unknown how PSAs impact implicit evaluations of cigarette smoking. This is especially interesting given that research comparing implicit and explicit evaluations has repeatedly demonstrated that implicit evaluations can be influenced by manipulations that do not impact explicit evaluations (e.g., Gawronski & LeBel, 2008; Rydell, McConnell, Mackie, & Strain, 2006). Thus, it is possible that PSAs could influence implicit evaluations, but not explicit evaluations, under the right circumstances.

The inability of well-crafted, compelling PSAs to influence explicit evaluations may be due to people experiencing cognitive dissonance, and dealing with this state in ways that lead smokers to continue smoking. The knowledge that smoking is unhealthy is inconsistent with smokers' past behavior and the experience of cravings and withdrawal symptoms in response to nicotine deprivation, which should produce negative arousal (Fong et al., 2004). This arousal is likely reduced by adding positive cognitions about smoking (e.g., smoking relieves anxiety; see Gibbons, Eggleston, & Benthin, 1997) or by affirming the self (e.g., Steele, 1988). In addition, dissonance reduction may be achieved by interpreting the content of PSAs in a way that is more supportive of (or at least not so negative toward) smoking. Because explicit evaluations are susceptible to the influence of cognitive dissonance reduction processes but implicit attitudes are not (Gawronski & Strack, 2004), implicit evaluations may be more likely to change in response to antismoking PSAs.

In contrast to early work indicating that implicit evaluations were relatively immutable (e.g., Fazio, Sanbonmatsu, Powell, & Kardes, 1986), implicit evaluations can be quite malleable in response to relatively large amounts of counterattitudinal information (e.g., Rydell & McConnell, 2006; Rydell, McConnell, Strain, Claypool, & Hugenberg, 2007), contextual factors (e.g., Blair, 2002; Wittenbrink, Judd, & Park, 2001), and motivational states (e.g., Ferguson & Bargh, 2004). Implicit evaluations of newly formed attitudes seem quite susceptible to change via exposure to large amounts of counterattitudinal information (e.g., Rydell et al., 2007). However, implicit evaluations of an attitude object that people have a large amount of experience with and exposure to (as is the case for smokers' implicit evaluations toward cigarettes and smoking) are far less likely to change in response to counterattitudinal information than are implicit evaluations that are newly formed (McConnell, Rydell, Strain, & Mackie, 2008). Instead, as people develop relatively heterogeneous representations of an attitude object (i.e., representations with many positive and negative pieces of information about the object that accrued across many different situations over a long period), as seems inevitable for smokers' representation of cigarettes, implicit evaluations may be altered by the activation of subsets of positive and negative information in response to the context or people's motivational states (e.g., Gawronski, Rydell, Vervliet, & De Houwer, 2010; Rydell & Gawronski, 2009).

Given this past work, we expected that differences in motivational state would affect not only the information made accessible from memory but how subsequently presented information was processed. In support of this prediction, Sherman, Rose, Koch, Presson, and Chassin (2003) found that smokers deprived of nicotine activated relatively positive information about cigarettes, whereas smokers who were not deprived of nicotine activated more negative information about cigarettes. This differential activation emerged for the implicit evaluations of smokers but not for their explicit evaluations. In fact, the implicit evaluations of smokers who had smoked very recently were even more negative than the implicit evaluations of nonsmokers.

In addition, we expected that this motivational state would also impact the extent to which smokers engaged in elaborative processing of antismoking PSAs. Nondeprived smokers should be more willing to elaborate on an antismoking PSA and should therefore be more persuaded by compelling messages but not weak messages. Nicotine-deprived smokers were not expected to engage in elaborative processing of the message presented in the PSA, and therefore their attitudes should not differ based on the arguments presented. As recent research by Briñol, Petty, and McCaslin (2009) has shown that elaborative processing of persuasive messages changes implicit evaluations, we predicted that smokers' implicit evaluations about smoking would be susceptible to change in response to strong and compelling persuasive messages.

More specifically, we propose that a combination of pharmacological (nicotine loading eliminating cravings and withdrawal symptoms; e.g., Waters et al., 2007) and psychological effects (experiencing feelings of shame and guilt about smoking; e.g., Dijkstra & Buunk, 2008) will make nicotine-loaded smokers more receptive to the strength and content of antismoking messages. Nicotine-loaded smokers are not craving cigarettes, nor are they physiologically motivated to smoke. They are also likely to be in a psychological state where they feel regretful, embarrassed, and ashamed about engaging in a hazardous and socially devalued behavior (e.g., Dijkstra & Buunk, 2008; Dijkstra & Dijker, 2005; Fong et al., 2004). It is in this nondeprived state that we expect smokers to be more attentive to and to elaborate more on arguments against smoking. Although these feelings of shame and regret and subsequent elaborative processing are unlikely to lead to changes on explicit attitude measures because of dissonance reduction processes, this work examines if strong antismoking arguments will lead to more negative implicit evaluations of smoking than weak antismoking arguments (Petty & Cacioppo, 1986). Nicotine-deprived smokers are likely to be in a very different psychological state, one where they are motivated to smoke in order to reduce cravings and receive physiological rewards—making them not susceptible to even strong persuasive antismoking appeals.

Thus, we examined whether a combination of motivational factors (i.e., nicotine level) and the strength of arguments presented in PSAs could affect smokers' implicit evaluations of cigarettes. Specifically, we presented strong or weak arguments to smokers who were deprived of nicotine or loaded with nicotine to examine whether nicotine deprivation impacts the implicit evaluations that they hold toward cigarettes. When smokers were nicotine loaded, we expected that implicit evaluations would vary as a function of argument strength, with smokers receiving strong arguments showing more negative attitudes toward cigarettes on implicit measures than smokers receiving weak arguments. As previously noted, we did not expect that nicotine-deprived smokers would elaborate on the arguments presented in the PSA. Thus, we did not expect an effect of argument strength on deprived smokers' implicitly measured evaluations of cigarettes. In line with this reasoning, recent work by Briñol et al. (2009) demonstrated that implicit evaluations can be changed through message-based, rhetorical persuasion—the type of persuasion utilized in antismoking PSAs. They provided preliminary evidence that strong (as opposed to weak) message-based arguments change implicit attitudes by causing recipients to generate more favorable thoughts about the attitude object, and thus to activate information that is consistent with the evaluation implied by those thoughts. It is important to note that Briñol et al. obtained changes in implicit evaluations only when strong and compelling messages were coupled with more elaborative processing of the message (Petty & Cacioppo, 1986). Not surprisingly, nicotine deprivation reduces smokers' cognitive resources by increasing the number of positive thoughts that they have about smoking (e.g., Bruce & Jones, 2006; Harrison, Coppola, & McKee, 2009). Combining these two lines of research suggests that nicotine-loaded smokers will be more likely to focus on the content of the PSAs than nicotine-deprived smokers and subsequently show more negative implicit evaluations of cigarettes in response to strong antismoking PSAs.

Smokers' explicit evaluations toward cigarettes are unlikely to be impacted by nicotine deprivation or viewing PSAs. Because people generally infer their attitudes from their behaviors (e.g., Bem, 1972), smokers infer that they have positive evaluations of cigarettes. In addition, smokers are often asked about why they smoke and are exposed to many different arguments that are both for and against smoking. These questions and arguments lead smokers to have well-developed explicit evaluations about smoking (e.g., Fazio, Chen, McDonel, & Sherman, 1982; Fazio, Herr, & Olney, 1984) that are resistant to persuasive attempts (e.g., Ross, McFarland, Conway, & Zanna, 1983), are relatively immune to dissonance-induced attitude change (Gibbons, Eggleston, & Benthin, 1997), and are likely to

be held with great certainty. Thus, we expected that explicit evaluations should be especially resistant to even strong persuasive attempts.

## METHOD

### Participants

Participants were 50 adults ( $M$  age = 29.6, 63% male) who smoked at least 10 cigarettes per day and were paid for their participation (US\$20). At recruitment, participants were instructed to not smoke for at least 4 hr before their session. Upon arrival at the lab, they were randomly assigned to condition in a 2 (Nicotine Deprivation: Loaded, Deprived)  $\times$  2 (PSA Strength: Strong, Weak) between-subjects factorial design. Four participants were eliminated because a bioassay (testing for carbon monoxide [CO] in expired air with a Micro CO, Micro Medical Limited; Kent, UK) indicated that they had smoked within 4 hr of their laboratory session (CO >20 ppm). Thus, there were 46 participants in our final sample.

### Procedure

To manipulate the degree of nicotine deprivation, participants in the *nicotine-loaded* condition were accompanied outside the building where they smoked a cigarette. In the *nicotine-deprived* condition, participants worked on a word search exercise for 5 min. For the word search, participants were asked to find several common words (e.g., *children*, *houses*) that were not related to smoking or cigarettes. After smoking or completing a word search, participants viewed a 30-s antismoking PSA that provided either strong or weak arguments against smoking. More specifically, the strength of the PSAs' message was manipulated through the severity of the stated negative consequences of smoking and the corresponding context within which these arguments were couched. The strong PSA was a professionally produced television commercial that discussed how smoking negatively affects the lungs and heart and could lead to death. Animated images of the lungs, heart, and dark silhouettes of people were presented along with the spoken arguments. Conversely, the weak PSA was produced in-house and discussed negative consequences of smoking that are less life threatening but still potentially bothersome to smokers (i.e., wrinkled skin, premature graying of the hair, hair loss). Participants in this condition saw a man sitting in a chair as he spoke about smoking's consequences in a monotone voice.

After viewing the PSA, participants completed a measure of cigarette craving to verify our manipulation of nicotine deprivation, as well as implicit and explicit measures of attitudes toward smoking. The order of the implicit and explicit attitude measures was counterbalanced. The manipulation check was presented with the explicit attitude measure. Thus, half of the participants responded to the cigarette craving measure before taking the Implicit Association Test (IAT), whereas half of the participants responded to this measure after taking the IAT. There were no significant effects of presentation order for any of the measures.

### Measures

**Manipulation check: cigarette craving**—To ensure that our manipulation of nicotine deprivation was received as expected, participants reported the extent to which they were craving a cigarette while they completed the study on a 5-point scale ranging from 1 (*not at all*) to 5 (*very strong craving*). We expected that participants in the nicotine-deprived condition would report stronger cravings for cigarettes than those in the nicotine-loaded condition.

**Explicit attitude measure**—Participants reported their attitudes toward smoking by responding to three semantic differential scales (awful/nice, unpleasant/pleasant, and not

fun/fun) that ranged from 1 to 5 ( $\alpha = .60$ ; Ajzen & Fishbein, 1970). Explicit evaluations were computed by averaging these items, with greater scores indicating more positive evaluations toward smoking. This specific explicit attitude measure has been utilized in past smoking attitudes research and has been shown to prospectively predict smoking transitions (Chassin, Presson, Sherman, Corty, & Olshavsky, 1984; Sherman et al., 2009).

**Implicit attitude measure**—Participants' smoking attitudes were assessed by completing an IAT (Greenwald, McGhee, & Schwartz, 1998). The same IAT as was used in Sherman et al. (2009) was administered online through Project Implicit's Virtual Laboratory (e.g., Nosek, Greenwald, & Banaji, 2005) for this study. The IAT consisted of 32 stimuli: eight pictures of smoking scenes (e.g., burning cigarette in an ashtray; a pack of cigarettes and a lighter on a table), eight pictures of geometric shapes (e.g., oval; rectangle), eight normatively positive adjectives (e.g., the words *terrific* and *nice*), and eight normatively negative adjectives (e.g., the words *stupid* and *awful*). The words *smoking*, *shape*, *good*, and *bad* were used as category labels and presented in specific combinations at the top left and top right of the computer screen. Participants responded by pressing the "e" key (for categories presented on the left side of the screen) or the "i" key (for categories presented on the right side of the screen).

Only data from the 200 critical trials (i.e., trials in which two category labels were concurrently presented on each response key) of the IAT were examined. In half of these critical trials, participants judged whether stimuli were "Smoking or Good" versus "Shape or Bad." In the remaining critical trials, participants judged whether the same stimuli were "Shape or Good" versus "Smoking or Bad." Greenwald, Nosek, and Banaji's (2003) *D* measure was used for statistical analyses. This score was derived by subtracting the mean response latencies for trials in which "Smoking" and "Good" were combined from the mean response latencies for trials in which "Smoking" and "Bad" were paired and then dividing this difference score by the standard deviation across all critical trials.

## RESULTS

### Manipulation Check: Cigarette Craving

We conducted a 2 (Nicotine Deprivation)  $\times$  2 (Message Quality) analysis of variance (ANOVA) on the cigarette-craving measure. As expected, there was a significant main effect of nicotine deprivation,  $F(1,40) = 8.47$ ,  $p = .006$ ,  $\eta_p^2 = .175$ , with those in the nicotine-deprived condition reporting a greater level of craving ( $M = 2.23$ ) than those in the nicotine-loaded condition ( $M = 1.14$ ).

### Attitude Measures

For both the implicit and explicit attitude measures, we conducted a 2 (Nicotine Deprivation)  $\times$  2 (Message Quality) ANOVA. For the explicit attitude measure, there were no significant effects ( $F_s < 2.10$ ,  $p_s > .15$ ). For the implicit attitude measure, the only significant effect was a main effect of nicotine deprivation,  $F(1, 40) = 4.22$ ,  $p = .046$ ,  $\eta_p^2 = .093$ . This main effect showed that those in the nicotine-loaded condition had more negative evaluations of smoking ( $M = -.55$ ) than those in the nicotine-deprived condition ( $M = -.38$ ). The predicted two-way interaction for the implicit attitude measure did not obtain,  $F(1, 40) = 1.20$ ,  $p = .28$ ,  $\eta_p^2 = .028$ . However, there is another way to examine our prediction that implicitly measured attitudes, but not explicitly measured attitudes, are more susceptible to strong messages when participants are loaded with nicotine. Namely, we standardized the scores from the explicit and implicit attitude measures and then conducted a 2 (Nicotine Deprivation)  $\times$  2 (Message Quality)  $\times$  2 (Attitude Measure) ANOVA. Our



predictions anticipate a three-way interaction. This analysis yielded a marginally significant three-way interaction,  $F(1, 40) = 3.71, p = .06, \eta_p^2 = .085$ .<sup>1</sup> To deconstruct this interaction, planned contrasts compared participants in the nicotine-loaded/strong message condition to participants in the three remaining conditions for the implicit attitude measure and for the explicit attitude measure. This particular comparison was utilized because we predicted that nicotine-loaded smokers would be more likely to focus on the content of the PSAs than nicotine-deprived smokers; receiving a strong message should therefore lead to more negative implicit evaluations of smoking for these participants than receiving a weak message. Nicotine-loaded smokers who saw a weak message should have implicit and explicit attitudes that are similar to nicotine-deprived smokers. As expected, a planned contrast for the implicit attitude measure indicated that smokers in the nicotine-loaded/strong message condition had relatively more negative implicit evaluations of smoking than smokers in the three other experimental conditions,  $t(41) = 2.54, p = .015, d = .79$  (see Figure 1). This contrast was not significant for the explicit attitude measure,  $t(41) = -1.53, p = .13, d = .47$  (see Figure 2).

## DISCUSSION

Measures of implicit attitudes have been shown to strongly predict a variety of behaviors that are poorly predicted by explicit measures (see Greenwald et al., 2009). These include not only nonverbal behaviors in social interactions (e.g., McConnell & Leibold, 2001) but deliberate decisions (e.g., Von Hippel, Brener, & Von Hippel, 2008). With regard to cigarette smoking in particular, recent work (Sherman et al., 2009) has reported that implicit evaluations of smoking were transmitted from mothers to children and that the children's implicit evaluations predicted subsequent smoking initiation. Other research (Chassin et al., 2010) suggests that smoking cessation is predictable from implicit but not explicit attitude measures. Because implicit evaluations are so powerful in predicting meaningful behaviors regarding smoking, it is important to gain a better understanding of the factors that impact them.

In the current study of regular smokers, we investigated the impact of a motivational factor (i.e., deprivation) and a message factor (i.e., argument strength). We predicted and found that only the combination of nicotine loading and a strong antismoking PSA, but neither factor alone, would cause implicit evaluations of smoking to become more negative. Why was this combination of a motivational and a message factor successful in changing implicit evaluations? These results could be due to two distinct factors: (a) the physiological and cognitive consequences of nicotine deprivation and (b) the psychological and emotional consequences of having just engaged in the unhealthy behavior of smoking.

At the physiological level, nicotine loading reduces craving and withdrawal symptoms (Waters et al., 2007). On the other hand, nicotine deprivation is accompanied by strong craving and withdrawal symptoms, and these may serve to greatly reduce attention to antismoking PSAs (Harrison et al., 2009; Wiers & Stacy, 2006). In addition, right after smoking, smokers may experience some degree of guilt, shame, or regret because most smokers recognize the negative health and social consequences of smoking (e.g., Dijkstra & Buunk, 2008; Fong et al., 2004), and most smokers wish that they could stop or decrease their smoking (Slovic, 2001). Although we do not have direct evidence from this study to support these potential mechanisms, the physiological and psychological effects of nicotine loading could work in combination to increase the attention smokers pay to the content of an antismoking PSA and make systematic processing more likely to occur. The fact that our

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<sup>1</sup>The implicit and explicit attitude measures were unrelated in this experiment ( $r = -.10, p = .53$ ).

nicotine-loaded smokers responded differentially to strong versus weak messages suggests that they were systematically processing message content (Petty & Cacioppo, 1986). Once these implicit evaluations are more negative, behaviors such as quit attempts, reducing the amount smoked, or eliminating certain contexts from smoking (or at least an explicit commitment to such behaviors) should become more likely. It will be important to collect longitudinal data to verify that the combination of nicotine loading and a strong PSA will have subsequent effects on smoking-relevant behaviors.

Almost all of the past work investigating the consequences of systematically processed strong persuasive messages has focused on explicit attitude measures (Petty, Haugtvedt, & Smith, 1995). The previous work on high elaboration and attitude change indicates that attitudes changed by elaborative processing are resistant to further change and are held with strength and confidence (e.g., Petty, Briñol, & Tormala, 2002). If implicit evaluations that are modified as a result of systematically processing a strong persuasive message are also resistant to further change and held with greater strength and confidence, behavior change consistent with these modified implicit evaluations is likely (Briñol et al., 2009). Of course, one might argue that, although it can be easy to get nicotine-loaded smokers to commit to quitting or cutting down, once craving and withdrawal symptoms reoccur, those behaviors may not be adopted. We agree that perhaps behaviors as significant as quitting right away are unlikely. However, the fact that implicit evaluations did change in response to the strong message is significant. This period of time could well serve as a teaching moment, during which smokers are more open to new information or new possibilities for quitting. It might be a time when smokers will commit to small steps that are associated with later abstinence or healthier behavior (e.g., cutting down by a few cigarettes or deciding not to smoke inside the home).

The current results are likely not specific to attitudes and behaviors regarding cigarette smoking. We believe that any behavior about which a person has ambivalence and about which the negative aspects of the behavior are readily apparent would show the same kind of results. That is, right after engaging in a behavior about which one has negative feelings, a person's implicit evaluations of the target behavior will be most susceptible to the impact of a strong persuasive message. Right after a bingeing-purging episode, bulimics feel elevated levels of guilt (Corstorphine, Waller, Ohanian, & Baker, 2006) and would perhaps be most susceptible to a strong message about eating disorders at this time. Right after stealing, kleptomaniacs also feel greater levels of guilt (Lowenstein, 2003) and may be especially susceptible to a strong message about the dangers of such a behavior. The same should apply to eating chocolate cake, spousal abuse, or alcohol and drug abuse (e.g., Macht, Gerer, & Ellgring, 2003). In general, the implicit evaluations of sinners toward the sinful behavior will be most changeable when the combination of a recent sinful act and a strong antisinning message coexist.

Such a suggestion might seem incompatible with current views about the optimal time and circumstances for a therapeutic intervention for problems involving craving and physical or psychological withdrawal symptoms (e.g., Beck, Wright, Newman, & Liese, 1993). This view holds that the best time for such interventions is when craving and withdrawal symptoms are strong. At that time, the feelings and desires for the unwanted behaviors can be explored and dealt with. Our findings suggest that, because implicit evaluations are most susceptible at the time right after an episode of unwanted behavior, this will be an optimal time for intervention. Such an assertion for the timing of interventions is only speculative. Therefore future research should examine whether the best intervention strategy might indeed be as follows: a strong persuasive message right after unwanted behavior, a commitment to some small behavioral act right after receiving the persuasive message, and a full-blown intervention at a time of heightened craving.

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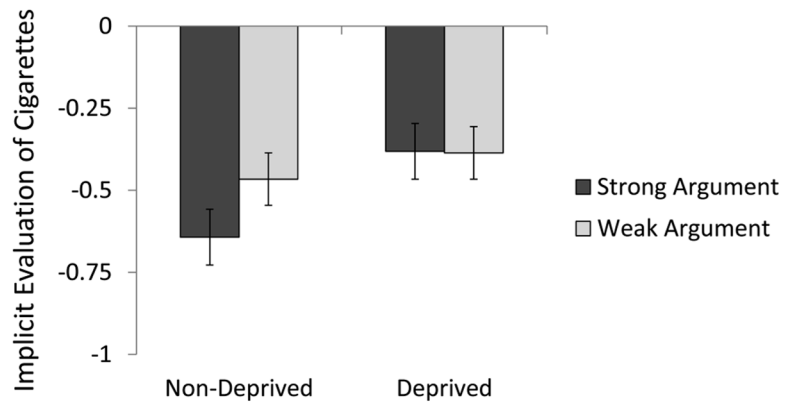
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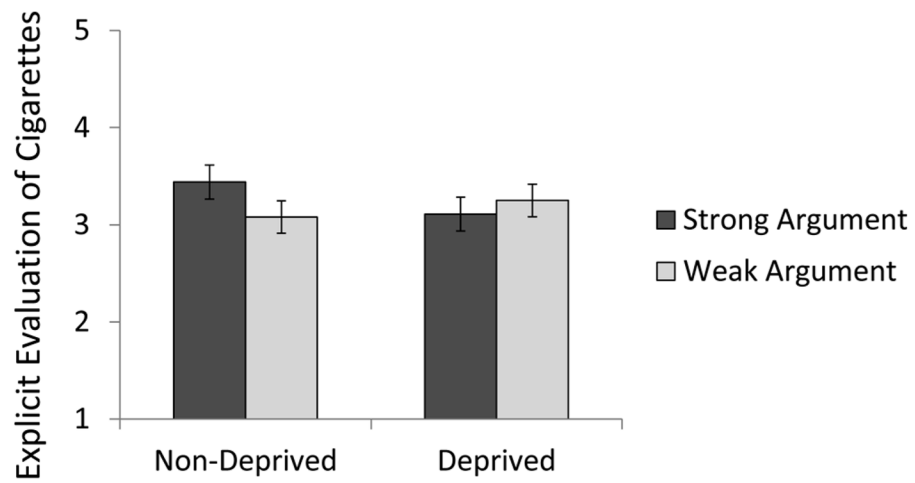


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**FIGURE 1.** Implicit evaluations of cigarettes (D score) as a function of nicotine deprivation and message strength. *Note.* Greater values indicate greater liking for cigarettes. The error bars represent the standard error of the mean.



**FIGURE 2.** Explicit evaluations of cigarettes as a function of nicotine deprivation and message strength. *Note.* Greater values indicate greater liking for cigarettes. The error bars represent the standard error of the mean.