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## Automatically-Activated Attitudes as Mechanisms for Message Effects: The Case of Alcohol Advertisements

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### Abstract

Alcohol advertisements may influence impulsive, risky behaviors indirectly, via automatically-activated attitudes toward alcohol. Results from an experiment in which participants were exposed to either four alcohol advertisements, four control advertisements, or four drunk driving public service advertisements, suggested that alcohol advertisements had more measurable effects on implicit, than on explicit attitude measures. Moreover, there were significant indirect paths from alcohol advertisement exposure through automatically-activated alcohol attitudes on willingness to engage in risky alcohol-related behaviors, notably drinking and driving. A mechanism that may explain how these advertisements activate automatic, non-deliberative alcohol attitudes was investigated. Associative evidence was found supportive of an evaluative conditioning mechanism, in which positive responses to an alcohol advertisement may lead to more positive automatically-activated attitudes toward alcohol itself.

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The apparent influence of advertising on attitudes and behavior, despite their obvious persuasive, and even manipulative intent, is an enduring mystery in media research. It seems unlikely that such influence takes place entirely via thoughtful, conscious, deliberative processes. However, efforts to understand non-deliberative paths of influence of advertising on attitudes and behaviors are in some respects still in their infancy.

The present research is an attempt to probe non-deliberative paths of influence of alcohol advertising on young adult attitudes about alcohol and professed willingness to engage in risky behaviors around alcohol. We build upon work suggesting that advertising may influence behavior in part via impact on implicit, or automatically-activated attitudes (Czyzewska & Ginsburg, 2007; Grimes & Kitchen, 2007)—attitudes that operate in an automatic and non-deliberative way (Fazio & Olson, 2003). Moreover, we seek to explore links of such automatically-activated attitudes to behavior choices (e.g., drunk driving) that are themselves often impulsive and not carefully deliberated. We also build on previous research on attitude accessibility and attitude activation (see Arpan, Rhodes, & Roskos-Ewoldsen, 2007; Roskos-Ewoldsen, Arpan-Ralstin, & St. Pierre, 2002) by exploring mechanisms that may explain how such automatically-activated attitudes are triggered by exposure to advertising.

Such research has the potential to both deepen our understanding of media and message effects, and to inform the policy debate regarding the effects of advertising on behaviors of potentially vulnerable populations such as drunk driving, behaviors with considerable

personal and social costs. It may also provide insight that may be applied to studying the impact of other socially important advertising, such as that in the service of political candidates and causes.

## Automatically-Activated Attitudes: Background and Definitions

There appears to be some disagreement and in the literature about what is meant by an “automatically-activated,” or “implicit” attitude. Thus, for clarification purposes, we briefly outline the origins of the research on this construct, and offer a definition. According to Fazio (1990), social psychologists gained an interest in automatically-activated attitudes during a period in which there was conflicting evidence of the attitude-to-behavior relationship, as some studies suggested that there was no relationship between attitudes and behavior, and others suggested that attitudes could be strong predictors of behavior (Fazio & Roskos-Ewoldsen, 2005). Accordingly, in 1981, Fazio and Zanna called for social psychologists to seek to identify *when* and *how* attitudes guide behavior, not whether they do or do not guide behavior. One particular characteristic of attitudes that contributes to the attitude-to-behavior relationship is *accessibility*, or the degree to which an attitude is automatically-activated from memory.

### Attitude Accessibility

**Accessibility** simply refers to the ease with which an attitude is activated from memory (Fazio, 1990; Fazio, Powell, & Williams, 1989; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). Some attitudes are activated easily upon encountering an attitude object, meaning that they are activated spontaneously without conscious effort. For example, when many individuals come across an object such as a cockroach, they have an immediate negative evaluative response. This response is activated automatically, beyond the individual’s control (Fazio & Roskos-Ewoldsen, 2005). Other attitudes, however, are not readily accessible from memory and require much deliberation and conscious effort to retrieve. When asked about an attitude that is not readily accessible, individuals have to think extensively about their evaluation of the object in order to respond. If no existing evaluation exists, the individual will construct an attitude on the spot (Fazio et al., 1986).

This discussion leads to the notion of attitudes existing along an **attitude/non-attitude continuum** (Fazio et al., 1986). At the non-attitude end of the continuum, no *a priori* evaluation of the object exists, possibly because the individual has not encountered the object before. Moving along the continuum, attitude accessibility increases. At the other extreme end of the continuum is a well-learned, highly accessible attitude that has strong potential to be automatically-activated from memory upon encountering the attitude object. Thus, from this perspective, an attitude is, by definition, the association between an object and one’s evaluation of that object (Fazio, 1990).

### The Influence of Automatic Attitude Activation on Behavior

Fazio’s (1990) **MODE** model articulates when and how deliberately retrieved and/or constructed attitudes will influence behavior and when and how automatically-activated attitudes will influence behavior. The model builds directly on early work on attitude accessibility and proposes that attitudes may guide behavior through either spontaneous or deliberative processes. MODE stands for **motivation and opportunity as determinants** of whether the attitude-to-behavior process is spontaneous or deliberative. According to this model, there are three types of attitude-to-behavior processes: (a) automatic, (b) mixed (automatic and deliberative), and (c) deliberative. A brief discussion of each follows.

According to the MODE (Fazio, 1990), initiation of the attitude-to-behavior process (whether it occurs through spontaneous or more deliberative processes) depends on the

attitude being activated from memory. Attitudes can be activated as a result of a number of situational cues (e.g., media exposure, contextual cues), or they can be activated simply upon exposure to the object if the object-evaluation link is sufficiently strong (also referred to as chronic accessibility). When a strong link between the object and evaluation exists in memory and the evaluation is automatically-activated, either automatic or mixed processes are possible.

Fazio's (1986) **attitude-to-behavior process** model is the basis of the automatic process in the MODE. It proposes that attitudes are capable of guiding behavior even when individuals do not actively deliberate or reflect on their attitudes. For example, consider the attitude object of "cockroach" again. As noted, for many, an encounter with this object will automatically-activate a negative evaluation due to a strong link between the object and evaluation in memory. As noted by Fazio and Roskos-Ewoldsen (2005), when individuals encounter a cockroach, they probably do not deliberate about their evaluation of the object, or think carefully about the most appropriate behavioral response. If they engaged in such cognitive processing, the cockroach would disappear before any action could be taken.

According to Fazio's (1986) process model, in such a situation, the individual's automatically-activated negative attitude defines the situation as unpleasant. Once activated, this attitude acts as a filter through which the individual views the object. This can result in a biased perception that is consistent with the valence of the attitude. If individuals lack motivation and opportunity to deliberate on the automatically-activated attitude, they will respond automatically by acting on the impulse (Fazio, 1986). This results in a spontaneous attitude-to-behavior process in which individuals do not deliberate on their decisions or engage in a reasoned process as outlined by the TRA (see Fazio, 1989 for an example).

In some situations, mixed automatic and deliberative processes emerge in which individuals "override" the influence of their automatically-activated attitudes and evaluate the situation more extensively. In order to do so, however, they must have adequate motivation. As noted by Fazio (1990), highly consequential behaviors are likely to motivate a reasoned and deliberative analysis. In order for the attitude-to-behavior relationship to be deliberative in nature, opportunity deliberate on the activated attitude must also exist. For example, sometimes situations require that individuals make quick decisions, thus denying them of the opportunity to engage in a reasoned analysis. In such situations, opportunity may not exist because the individual simply does not have the ability to deliberate (Fazio, 1990).

The deliberative process described in the MODE model is based on Ajzen and Fishbein's (1973, 1980) **Theory of Reasoned Action** (TRA). The TRA proposes that individuals consider the implications of their behavior when determining a course of action. Through this reasoned process, individuals deliberate on their attitudes and perceptions of norms and eventually develop a behavioral intention, which is an immediate precursor to behavior. Thus, the TRA assumes that attitudes guide behavior through a conscious and deliberative process in which individuals consider their attitude toward an object and make a behavioral decision.

The final potential attitude-to-behavior process is strictly deliberative in nature and is based on the TRA. It is consistent with the mixed process described above, but does not originate with an automatically-activated attitude. This may occur when individuals do not have attitudes that are sufficiently strong and capable of automatic activation. In such situations, individuals either deliberately retrieve their attitudes, or construct them on the spot. This process requires adequate motivation and opportunity. The resulting behavior is deliberative and planned.

Thus, to summarize, the MODE model (Fazio, 1990) proposes that automatically-activated attitudes will exert relatively strong influence on behavior when individuals lack motivation and/or opportunity to deliberate on what has been activated. Such behaviors will be relatively spontaneous in nature, reflecting to some extent, an uncontrolled response. If, on the other hand, individuals have sufficient motivation and opportunity to deliberate, they will be able to override their automatically-activated attitudes (and the biases such attitudes tend to elicit) and will go through a more reasoned process as outlined by the TRA in determining how to act in a given situation. In other situations, however, individuals simply do not have strong enough attitudes capable of being automatically-activated and therefore effortfully retrieve, or construct their attitudes. The resulting behavior is deliberative in nature.

In the present study, we are interested in investigating and articulating how processing and effects of mediated messages may operate at an *automatic* level. We propose that an emphasis on automatic processes may be particularly relevant to messages such as advertisements, which are often processed with little thought or motivation (Petty & Cacioppo, 1986). We also propose that such processes are particularly relevant to the study of risky health behaviors like substance use, which are not often reasoned or well thought out (see Stacy, 1997).

### The Emergence of “Implicit” Attitudes

The terms implicit and explicit attitudes also appear in the literature on attitude accessibility and activation. For reasons outlined below, we prefer to use the terms automatic and deliberative, rather than implicit and explicit.

During the late 1990s and the early 2000s, the term implicit attitude appeared in the social psychological literature. Fazio’s work on accessibility and the spontaneous attitude-to-behavior process has been influential in shaping the literature on implicit attitudes. A widely cited piece that may have prompted a wealth of literature on this topic was published by Fazio, Jackson, Dunton, and Williams (1995). The piece outlined a new unobtrusive measure of racial attitudes that assessed automatic activation. What was particularly compelling about this piece was that it demonstrated that individuals’ responses to the new unobtrusive measure, which tapped automatically-activated attitudes, differed markedly from their responses to a traditional self-report measure of racial attitudes. This was particularly true among individuals with negative automatically-activated attitudes toward Blacks, but strong motivation to control prejudiced reactions. In terms of the attitude-to-behavior relationship, consistent with the MODE model, individuals who were motivated to control their prejudiced reactions were able to override the influence of their automatically-activated attitudes toward Blacks and act in a non-prejudiced way that was consistent with their self-reported attitudes.

Such findings may lead one to question which attitude is the “real” attitude. However, as noted by Fazio and Olson (2003), if the real attitude is defined as the one that predicts behavior, then both deliberative self-reported attitudes and automatically-activated attitudes (such as those measured by Fazio et al.’s, 1995 priming measure) are “real” attitudes. Rather, the more important issue is to consider when, and through what processes, such attitudes guide behavior.

Following Fazio et al.’s (1995) influential piece, many social psychologists developed other unobtrusive measures of attitudes in order to address questions of how to assess “real” attitudes and to understand discrepancies among these “implicit” (automatically-activated) and “explicit” (deliberative) attitudes (including Greenwald, McGhee, & Schwarz, who developed the Implicit Association Test in 1998). As noted by Fazio and Olson (2003)

“despite incredible activity, research concerning implicit measures has been surprisingly atheoretical. It largely has been a methodological, empirically driven enterprise” (p. 301).

This emphasis on methodology rather than theory seems to be one of the reasons Fazio and Olson (2003) express concern over the terms “implicit” and “explicit.” The authors note that the terms were imported from cognitive psychology, and specifically the work on implicit and explicit memory. According to this literature, individuals display implicit memory when their behavior on a task suggests that they were influenced by a prior event, even though they have no memory of that event. By using the terms implicit and explicit to refer to attitudes, there is an assumption that individuals have no awareness of their “implicit” attitudes. On the contrary, research suggests that automatically-activated (or “implicit”) attitudes may be consciously known (i.e., people may experience a gut reaction when they are activated), but that they are unaware of the processes that produce them. This characteristic is referred to as “preconscious,” rather than “unconscious” (Jordan, Logel, Spencer, Zanna, & Whitfield, in press).

Thus, for clarity purposes (and using the recommendations of Fazio and Olson, 2003), we refer to implicit and explicit *measures* of attitudes, as implicit measures assess attitudes without having to explicitly ask participants. However, we refer to the attitudes such measures assess as *automatically-activated* and *deliberative* attitudes, rather than implicit and explicit.

## Summary

To summarize, implicit measures of attitudes allow researchers to assess attitudes toward objects without having to directly ask participants. These measures are useful when dealing with sensitive topics, or those likely to be influenced by social desirability biases. However, they are also useful for a variety of other topics, particularly when individuals hold evaluations that are not easily accessible to self-report. Implicit measures assess one’s automatically-activated attitudes toward objects. Such attitudes come to mind spontaneously upon exposure to the attitude object. They are described as “pre-conscious,” in that individuals may sense their activation, but remain unaware of the processes producing them. Once activated, they have the potential to influence decisions and outcomes automatically when individuals lack motivation and opportunity to engage in reasoned deliberation.

## Automatic Attitudes: Message Processing and Effects

If attitudes operate through the processes outlined by the MODE model, it seems necessary to consider the role of both automatic and deliberative attitudes when studying processing and effects of mediated messages. Specifically, communication researchers should consider how existing automatic and deliberative attitudes influence message processing and outcomes, and how messages influence both automatic and deliberative attitudes.

Although the MODE model is a useful theoretical framework for understanding when automatic attitudes are likely to be influential, it is not a persuasion model and does not address issues of message processing. Thus, the MODE explains how automatic attitudes influence behavior, but does not provide insight as to how messages activate such attitudes and how message processing occurs at an automatic, non-deliberative level.

The **Elaboration Likelihood Model** of persuasion (ELM, Petty & Cacioppo, 1986) explains how message processing can occur through central (thoughtful), or peripheral (heuristic) processing. This in some ways mirrors the discussion of automatic vs. deliberative processing, as effortful and deliberative processing will only occur when individuals are both motivated and able to process. However, the model is of limited utility for helping us



understand the mechanisms through which media messages activate existing attitudes from memory, as the ELM emphasizes attitude *change* (transient or long-lasting) rather than attitude *activation*. Additionally, although the model clearly articulates the situations in which individuals are likely to process messages centrally and thoughtfully, and when they are likely to process them more peripherally, it does not fully articulate the mechanisms through which these processes emerge. Given the conceptualization of peripheral processing, there seems to be some overlap with the concept of automatic attitude activation. The model, however, does not specify such a potential mechanism. The present study is an effort to contribute to our understanding of how message processing may occur automatically, via automatically-activated attitudes.

The media **priming** literature also informs our understanding of the mechanisms through which media messages activate automatic attitudes (see Iyengar, Peters, & Kinder, 1982; Kosicki, 2002; Roskos-Ewoldsen, Klinger, Roskos-Ewoldsen, 2007; Roskos-Ewoldsen, Roskos-Ewoldsen, Carpentier, 2002). Consistent with the work on attitude accessibility, network models of memory have been used to explain media priming. Such models assume that information is stored in memory in the form of “nodes,” with each node representing a concept. Related nodes are connected through associative pathways. When a node reaches a certain activation “threshold,” it fires, potentially activating other connected nodes (Roskos-Ewoldsen et al., 2007). Thus, the present research provides an opportunity to bridge a number of theoretical frameworks in an effort to better understand message processing and outcomes, particularly those that occur at an automatic, non-deliberative level.

## Hypotheses

The purpose of this study is to investigate whether messages, in this case advertisements, can automatically-activate one’s attitudes toward objects (i.e., alcohol). There is limited research in the advertising literature to support the notion that advertising messages can activate automatic attitudes. Although there is research on advertising and automatic/accessible attitudes, much has investigated the role of such messages in the *development* of more accessible attitudes (see Berger & Mitchell, 1989; Kardes, 1988), not on the success of such message in *activating* existing attitudes. However, research by Czyzewska and Ginsburg (2007) found that individuals exposed to anti-tobacco PSAs reported more negative automatic attitudes toward tobacco than those exposed to anti-marijuana PSAs, and those exposed to anti-marijuana PSAs reported more negative automatic attitudes toward marijuana than those exposed to anti-tobacco PSAs.

### Effect of Message Exposure on Automatically-Activated Attitudes

We expect that exposure to alcohol advertisements and alcohol PSAs will automatically-activate one’s evaluations of alcohol. This proposition is based on Fazio’s (1990) MODE model, which proposes that if a strong enough object-evaluation link exists in memory, exposure to the object will automatically-activate one’s attitude toward the object from memory. Given our sample of college students, for whom alcohol use appears to play an important role in socialization, we expect many individuals to have strong, well-learned evaluations of alcohol that are capable of automatic activation. Thus, the following hypothesis is advanced:

*H1:* Those exposed to the alcohol advertisements will report more positive automatically-activated evaluations of alcohol than those exposed to the control advertisements (non-alcohol product advertisements).

Questions arise about whether alcohol PSAs have the potential to automatically-activate *negative* evaluations of alcohol. The ability to activate such evaluations depends on the

extent to which college students have strong, well-learned negative evaluations of alcohol. Thus, the following research question is advanced:

*RQ1:* Will exposure to alcohol PSAs result in more negative automatically-activated attitudes toward alcohol than exposure to control advertisements?

### Consequences of Automatic Attitude Activation

**Impact on deliberative attitudes**—Automatically-activated attitudes may also influence deliberative attitudes and behavior. Research on evaluations and attitudes suggests they serve as a heuristic in decision-making (Finucane et al., 2000). Therefore, it is likely that automatically-activated attitudes may be used in a variety of decisions, as long as the valenced response lasts.

Explicit questionnaire assessments of attitudes represent one form of decision. That is, a research participant is asked to make a decision regarding his or her attitude on some dimension—in this case, how one feels about various types of alcohol. Both the elaboration likelihood (Petty & Cacioppo, 1986) and MODE models (Fazio, 1990; Fazio & Olson, 2003) suggest that when motivation or ability to cognitively elaborate on a message are absent, elaborated thoughts about the attitude object are unlikely. In such cases, automatically-activated attitudes should serve as a heuristic, from which one can generate the evaluative component of one's attitudes when confronted with a question about one's attitudes. Therefore, if the processing of these messages is non-deliberative, there may be an effect on deliberative attitudes through automatically-activated attitudes. If this effect is strong enough, the impact on deliberative attitudes (assessed with an explicit measure) may be detectable:

*H2:* Automatically-activated attitudes will predict deliberative attitudes.

*H3:* Automatically-activated attitudes toward alcohol will mediate message effects on deliberative attitudes (or will provide an indirect path to effects on deliberative attitudes, if such attitudes are not significantly impacted by message exposure).

**Impact on behavioral willingness**—Automatically-activated attitudes may be particularly well suited to contribute to the study of risky behaviors. As noted by Stacy, Newcomb, and Ames (2000), such behaviors often “defy explanation by deliberate weighing of pros and cons of one's actions or through other rational processes” (p. 476). Automatically-activated attitudes have been shown to predict drug and alcohol use (see Ames, Zogg, & Stacy, 2002; Stacy, 1997), and may be an even stronger predictor of alcohol use than outcome expectancies, sensation-seeking, and gender (Wiers, VanWorden, Smulders, & DeJong, 2002). Researchers suggest that when attitudes are activated automatically, the individuals' cognitive and affective states are automatic and impulsive, meaning that they are directed toward the behavior without much consideration of consequences or alternatives (Stacy et al., 2000).

Traditional behavior change models, such as the theory of reasoned action (Fishbein & Ajzen, 1975) and theory of **planned behavior** (Ajzen, 1991) rely on explicit belief and attitude measures and focus on decision rules involving the personal and social costs and benefits underlying health behaviors. Though this approach has been useful in the field of communication, a clear limitation of such theories is that they assume that behavior change is a reasoned process through which people consider a variety of factors (i.e., beliefs, attitudes, social norms, etc.), and then make a decision to act. Not all risk behaviors are deliberative, however. As Stacy (1997) notes, many health behaviors, including substance use, often involve impulsive or spontaneous action. Spontaneous behaviors seem to be

guided by automatic attitude processes more so than by deliberative processes (Olson & Fazio, in press; Rydell & McConnell 2006).

Gibbons, Gerrard, and Lane's (2003) **prototype-willingness model** may help explain the mechanisms through which automatically-activated attitudes guide risky health behaviors. Their model makes an effort to address potential problems with health behavior models assuming that the attitude to behavior relationship emerges through a reasoned process. The model proposes that there are two pathways to risk behavior, a reasoned and an unreasoned path. In the unreasoned path, behavioral willingness takes the place of behavioral intentions in earlier theories. Behavioral willingness is one's willingness to engage in a risky behavior given a particular set of circumstances (Gibbons et al., 2003). Although the prototype-willingness model proposes that behavioral willingness operates through a spontaneous process, it does not specify the potential influence of automatically-activated attitudes on behavioral willingness. Given the non-deliberative nature of behavioral willingness and the evidence that non-deliberative behaviors are particularly prone to influence by automatically-activated attitudes, we expect:

*H4: Automatically-activated alcohol attitudes will predict behavioral willingness to engage in risky alcohol-related behavior.*

Direct effects of these messages on behavioral willingness seem improbable, given the brief exposure and the extent to which alcohol-related behavior patterns are well-established in a college-aged population. However, if in fact, advertisements and/or PSAs influence automatically-activated attitudes per H1 and RQ1, then it is also reasonable to expect:

*H5: There will be a significant indirect path from message exposure through automatically-activated alcohol attitudes on willingness to engage in alcohol risk behaviors.*

**Investigation of mechanism**—We are also interested in identifying potential mechanisms through which advertising message automatically-activate evaluations of alcohol from memory. Specifically, we propose that in the alcohol advertisement condition, enjoyment of the messages may influence the extent to which positive evaluations of alcohol are automatically activated.

Olson and Fazio (2001, 2002) provide evidence that automatic attitudes can be formed and activated via *evaluative conditioning*. Olson and Fazio (2001) found that automatic attitudes were formed by repeatedly pairing unconditioned stimuli (e.g., valenced words and images, which activate positive or negative evaluations) with conditioned stimuli (e.g., novel objects). More specifically, conditioned stimuli paired with positive items were evaluated more positively on an implicit measure than stimuli paired with negative items. These effects emerged even though participants demonstrated no explicit memory of the critical pairings (Olson & Fazio, 2001). In a follow-up investigation, Olson and Fazio (2002) used a subliminal priming procedure and found consistent results, providing further evidence that automatic attitudes can form via a conditioning mechanism below the conscious awareness of individuals.

In this case, we suggest that the advertisement is the unconditioned stimulus and the positive response to the advertisement is the unconditioned response. Such a response may be generated due to enjoyment and liking of the message. Alcohol is the conditioned stimulus and positive evaluation of alcohol is the conditioned response. Exposure to the four advertisements may strengthen, at least momentarily, the associative link between positivity (elicited in response to the alcohol advertisement) and the attitude object in the



advertisement (alcohol), resulting in more positive evaluation of alcohol as assessed by our implicit alcohol attitude measure:

*H6:* Among those in the alcohol advertisement exposure condition, those reporting more positive evaluations of the advertisements will report more positive automatically-activated attitudes toward alcohol; no such effect will be found in the control condition.

## Method

### Design & Stimuli

The study used a posttest-only experimental design with random assignment to condition<sup>1</sup>. Message type (alcohol advertisement, public service announcement [PSA], control) was a three-level between-subjects factor. One hundred and forty five undergraduate students participated in the study in exchange for extra course credit. Those in the alcohol advertisement condition ( $N = 48$ ) were exposed to four 30-second advertisements (for Bacardi, Budweiser, Heineken, and Miller) presented in random order. Those in the anti-alcohol PSA condition ( $N = 47$ ) were exposed to four 30-second PSAs (three produced by Mothers Against Drunk Driving, and one by the Ad Council). Those in the control condition ( $N = 47$ ) were exposed to four 30-second non-alcohol product ads (for Apple Computers, AT&T, Nike, and Southwest Airlines).

### Procedure

All data collection occurred in a computer lab using MediaLab (Jarvis, 2006a) and DirectRT (Jarvis, 2006b) software. After signing a consent form, participants were randomly assigned to one of the three conditions and then exposed to the series of four advertisements presented in random order. Immediately following exposure to the advertisements, participants completed the alcohol-version of the Affect Misattribution Procedure (AMP; Payne, Govorun, & Arbuckle, 2008), which is an implicit measure of attitudes toward alcohol. Following the AMP, participants were asked to complete a set of self-report measures assessing deliberative alcohol attitudes, alcohol use, behavioral willingness, and some general demographic items. The AMP and the self-report measures are described in further detail below.

### Measures

**Deliberative attitudes toward alcohol**—Participants were asked about their attitudes toward (a) beer, (b) liquor/mixed drinks, and (c) wine on a scale ranging from 0 (extremely unfavorable) to 10 (extremely favorable), using an explicit attitude measure derived from Payne et al. (2008). As expected, when factor analyzed, the attitude toward the advertisement measures loaded on a single factor (with loadings ranging from .72 to .85). Accordingly, the three items were averaged into a single reliable index (Cronbach's  $\alpha = .72$ ).

**Automatically-activated attitudes toward alcohol**—In response to problems with the IAT and other implicit attitude measures, Payne et al. (2008) adapted the affect misattribution procedure (AMP, Payne, Cheng, Govorun, & Stewart, 2005) to study automatically-activated attitudes toward alcohol. The alcohol AMP (Payne et al. 2008) is conducted as follows. First, participants are informed that various Chinese pictographs will be presented on the computer screen. Next, they are told that they will be asked to evaluate

<sup>1</sup>It may be considered by some a quasi-experimental, rather than fully experimental, design because the levels of the independent variable—advertisement type—were not manipulated, and insufficient appropriate messages were available to permit study of advertising type as a random effect.

each pictograph's pleasantness by pressing a key labeled "pleasant" if they perceive it is more pleasant than the average Chinese pictograph, and "unpleasant" if they perceive it is less pleasant than the average. Participants are also told that these pictographs will be preceded by either an image of water, an alcoholic beverage (beer, wine, liquor/mixed drink), or a gray square, and that these images could bias their judgments of the pictographs. Participants are asked to avoid making judgments of the pictographs based on their liking or disliking of the primes. Each participant receives 12 color photographs of water and 12 photographs of alcohol.

Participants complete 72 trials of the alcohol AMP (in which each of the 12 water and 12 alcohol primes are presented twice, and the gray square is presented 24 times). Seventy two unique Chinese pictographs are included and are randomly paired with the primes. For each trial, the prime (alcohol, water or gray square) is supraliminally presented for 75 ms (i.e., visible to participants, but difficult to process), followed by a blank screen for 125 ms, followed by the Chinese pictograph for 100 ms, followed by a pattern mask (made up of black and white pixels), which remains on the screen until participants rate the pictograph as "pleasant" or "unpleasant."

The alcohol AMP has performed well in research conducted by Payne et al. (2008). Specifically, the measure successfully predicted drink choice (alcohol or water), and had high reliability ( $\alpha=.92$ ). Additionally, when compared to an alcohol IAT and an alcohol evaluative priming task, the AMP more successfully predicted drinking status (drinker vs. non-drinker), drinking frequency, drinking quantity, hazardous drinkers, and those who had experienced life problems associated with drinking. In contrast, the IAT predicted only drinking frequency, and the evaluative priming task predicted only drinking quantity (Payne et al., 2008). Additionally, in order to provide evidence of the validity of the alcohol AMP, Payne et al. (2008) looked at motivation to conceal drinking as a moderator of the relationship between deliberative and automatically-activated alcohol attitudes. The authors found that compared to those low in motivation to conceal drinking, participants who were highly motivated to do so did not score more negatively on automatically-activated alcohol attitudes (as assessed by the AMP), but scored more negatively on the explicit measure. These results suggest that like other implicit measures, the AMP assesses attitude activation that cannot be controlled by participants.

After collecting the data we aggregated the responses to the 72 trials for each participant. This was conducted by taking a count of the total number of pleasant and unpleasant responses to each of the three primes (alcohol, water, gray square). Then, a net valence variable was calculated for each prime by subtracting the number of unpleasant responses per prime from the number of pleasant responses per prime.<sup>2</sup> Accordingly, individuals with negative scores reported more unpleasant than pleasant responses, those with positive scores reported more pleasant than unpleasant responses, and those with scores of zero reported an equal number of unpleasant and pleasant responses to the prime. The data collected from the AMP were analyzed using repeated measures designs (the within subject factor being prime—alcohol, water or gray square).

**Alcohol use**—Participants were asked how often they drink any kind of alcoholic beverage (never, once a month, several times a month, several times a week, and more than once a day), and how many drinks they usually have on the days that they drink (1, 2, 3, 4, 5

<sup>2</sup>Unlike other implicit measures (e.g., the IAT), the AMP does not calculate a comparison score (i.e., how much preference individuals have for alcohol over water). Rather, it allows a separate score for the object of interest (alcohol). The purpose of the primes is to provide a baseline for how individuals respond to more neutral objects. It also allows for a more powerful repeated measures analysis. Measures like the IAT provide a second prime so that a preference score can be calculated.

or more). “Drink” was defined as one shot of hard liquor, a glass of wine, or one beer (Slater, Lawrence, & Comello, under review). These were averaged into a single item index.

**Behavioral willingness**—Behavioral willingness was measured using the procedures outlined by Gibbons et al. (2003) and Gibbons, Gerrard, Blanton, and Russell (1998). First, participants are asked to think about a risk-conductive situation. In this study, participants were asked to consider two situations: (a) “Suppose you are with a group of friends playing beer pong. This game includes two teams, and members of each team try to throw ping pong balls across a table into full cups of beer. If your opponent throws a ball into one of your cups, you must quickly drink the entire contents of the cup”; and (b) “Suppose you have been drinking with some friends at a party several miles from campus. You and your friends are ready to go home and you are the one who drove that night. Your friends are clearly too drunk to drive. You are buzzed, but not drunk.”

As recommended by Gibbons et al. (2003) and Gibbons et al. (1998), after each scenario was introduced, participants were told that there is no presumption that they would be in such a situation in order to focus attention away from the self and onto the situation itself. After reading the scenario, participants were asked to indicate how likely it is that they would engage in a series of five behaviors, beginning with a low-risk behavior and progressively becoming more risky on a scale from 0 (not at all likely) to 10 (very likely). For the beer pong games, the items were as follows: (a) leave and go find something else to do, (b) stay, but not participate in the game, (c) participate in the game, but only chug 1 or 2 beers, (d) participate in the game, but stop once I feel as though I may be getting intoxicated, and (e) participate in the game until I am extremely intoxicated. The items for the driving under the influence scenario were as follows: (a) stay where I am overnight and leave in the morning, (b) get a ride home with someone who has not been drinking, (c) eat something to “kill” the buzz, then drive home, (d) drive home immediately, but more cautiously than usual, and (e) drive home immediately.

Prior to creating the indices, the items for each scenario were factor analyzed, using a varimax rotation. The beer pong items loaded on two factors. One factor consisted of the first two items (reverse coded) and the fifth item. These were averaged into a single “high risk behavior” index ( $\alpha=.65$ ). The second factor consisted of the third and fourth scenarios, which were more moderate in risk. We decided to drop these items, as it was only of interest to look at risky behaviors. The driving under the influence scenario was factor analyzed and all items loaded onto a single factor. Factor loadings for the first two items were positive (stay where you are overnight and leave in the morning; get a ride home with someone who has not been drinking), and factor loadings for the remaining items were all negative (eat something to “kill” the buzz, then drive home; drive home immediately, but more cautiously than usual; drive home immediately). Accordingly, the first two items were reverse-coded and combined into a single index with the last three items ( $\alpha=.79$ ). See Table 1 for descriptive statistics and alphas.

**Message evaluation**—Participants were asked to indicate how “enjoyable,” “appealing,” and “likable” they found each advertisement on a scale from 1 (not at all) to 10 (very). These items were adapted from Slater, Rouner, and Long (2006). Responses to all three items with respect to each of the four advertisements were averaged into a single reliable index (i.e., a 12-item index); reliabilities were assessed in each condition examined in these analyses ( $\alpha_{AlcAd} = .882$ ,  $\alpha_{Control} = .901$ )

**Demographics**—Participants were asked to provide their gender, age, ethnicity, and classification at the university (i.e., freshman, sophomore, etc.). They were also asked to indicate if they speak Chinese or Japanese; such individuals may know the meaning of the

pictographs used in the AMP task, and this knowledge could bias their evaluations of the pictographs. Four participants met this criterion and were eliminated from all analyses involving the AMP data.

## Results

### Effects of Condition on Automatically-Activated Attitudes

Hypothesis 1 predicted that participants in the alcohol advertisement condition would report more positive automatically-activated attitudes toward alcohol than those in the control condition. Research question 1 asked whether those in the alcohol PSA condition would report more negative automatically-activated attitudes toward alcohol than those in the control condition. A repeated measures analysis of variance was conducted with condition as the between subjects factor and prime type (alcohol, water and gray square) as the within subjects factor. Consistent with the work of Payne et al. (2008), there was a significant main effect for prime (Greenhouse-Geisser  $F(1.77, 234.87) = 33.83$ ,  $p < .001$ ,  $\eta^2 = .197$ ). Means for the primes are as follows: water ( $M = 9.62$ ,  $SD = 12.7$ ,  $SE = 1.08$ ), alcohol ( $M = 2.05$ ,  $SD = 14.6$ ,  $SE = 1.23$ ), gray square ( $M = -1.49$ ,  $SD = 15.3$ ,  $SE = 1.29$ ). Post hoc comparisons indicate that participants reported more pleasant responses to the water primes than the gray square ( $p < .001$ ) or alcohol primes ( $p < .001$ ). Additionally, participants reported more pleasant responses to the alcohol than control (gray square) primes ( $p < .05$ ).

Hypothesis 1 was supported by a significant prime by condition interaction [Greenhouse-Geisser  $F(3.45, 238.70) = 3.34$ ,  $p < .01$ ,  $\eta^2 = .05$ ]. The cell means of the interaction are reported in Table 1. Using the procedures outlined by Keppel and Wickens (2004), planned comparisons were calculated in order to investigate differences in responses to the primes among those in the alcohol advertisement and control conditions. Results indicate that there are differences in responses toward pictographs preceded by alcohol primes among the two conditions, with those in the alcohol advertisement condition ( $M = 5.5$ ,  $SD = 13.7$ ,  $SE = 2.13$ ) reporting more pleasant responses to the prime than those in the control condition ( $M = 0.55$ ,  $SD = 14.1$ ,  $SE = 2.11$ ),  $F(1, 155.27) = 3.90$ ,  $p < .05$ . There were no differences in responses to the water prime [ $F(1, 155.27) = .15$ ,  $p > .05$ ] and the gray square/neutral prime [ $F(1, 155.27) = .36$ ,  $p < .05$ ] among participants in the alcohol advertisement and control conditions. This pattern suggests that the positive priming in response to the alcohol advertisements was specific to the attitude object—alcohol—and did not represent a generalized pattern of more positive evaluations regardless of AMP prime.

Finally, addressing RQ1, comparisons were calculated to investigate differences in responses to the primes among those in the alcohol PSA and control conditions. There were no differences in responses to the pictographs preceded by the alcohol primes among those in the alcohol PSA ( $M = .09$ ,  $SD = 15.5$ ,  $SE = 2.13$ ) and control conditions ( $M = .55$ ,  $SD = 14.1$ ,  $SE = 2.11$ ),  $F(1, 155.27) = .03$ ,  $p > .05$ . There were also no differences in responses to the water [ $F(1, 155.27) = 1.6$ ,  $p > .05$ ] or gray square primes [ $F(1, 155.27) = .36$ ,  $p > .05$ ]. Thus, exposure to the PSAs did not result in more negative automatically-activated attitudes toward alcohol than exposure to the control advertisements.

### Effects of Condition on Deliberative Attitudes, and Indirect Effects on Deliberative Attitudes

Although not hypothesized, we investigated whether condition influenced deliberative attitudes (as assessed by an explicit attitude measure) in order to assess whether the implicit measure provided unique information. Results indicate a significant effect of condition,  $F(2, 141) = 4.21$ ,  $p < .05$ ,  $\eta^2 = .06$ . Means for deliberative attitudes in each of the conditions are as follows: alcohol advertisement ( $M = 7.7$ ,  $SD = 2.3$ ,  $SE = .39$ ), alcohol PSA ( $M = 6.3$ ,  $SD = 2.7$ ,

$SE = .38$ ), control ( $M = 6.6$ ,  $SD = 2.8$ ,  $SE = .38$ ). Follow-up analyses using Tukey's HSD were calculated. There are no differences ( $p > .05$ ) between deliberative attitudes among those in the alcohol advertisement and control condition. There are also no differences in deliberative attitudes among those in alcohol PSA and control conditions ( $p > .05$ ). The significant treatment effect was due to participants in the alcohol advertisement condition reporting more positive deliberative attitudes toward alcohol than those in the alcohol PSA condition ( $p < .05$ ), rather than showing differences from control as the implicit measure did. Thus, the implicit measure provides unique information that is undetected by the explicit measure.

Hypothesis 2 suggests a relationship between automatically-activated and deliberative attitudes. Results support this notion [ $r(139) = .41$ ,  $p < .001$ ]. Hypothesis 3 test this notion further, suggesting that automatically-activated attitudes toward alcohol would mediate or, in the absence of a direct effect, provide an indirect path to deliberative attitudes about alcohol. The relationship between the independent variable and mediator was demonstrated to be significant in the tests of Hypothesis 1, and the relationship between automatically-activated attitudes and deliberative attitudes was significant in the test of Hypothesis 2. We used bootstrapped Sobel tests of indirect effects (Hayes, 2007; Preacher & Hayes, 2004) using 5,000 bootstrap resamples. We first created a dichotomous independent variable, alcohol advertising versus PSA and control combined; we did so because available macros require either a continuous or a dichotomous independent variable, and differences between the PSA and the control advertisement on automatically-activated evaluations toward alcohol were non-significant and trivial in size (see Table 1). The dichotomous treatment of the independent variable was deemed more conservative than the underlying ordinal relation, in any case. The indirect effect was significant,  $M = .377$ ,  $SE = .214$ ,  $p < .05$ .

### Automatically Activated and Deliberative Attitudes as Predictors of Behavioral Willingness

Hypothesis 4 predicted that automatically-activated attitudes would predict behavioral willingness. Results supported this hypothesis. Regression analyses were conducted using net valence responses to the alcohol prime (automatically-activated attitude toward alcohol) as a predictor, and behavioral willingness as an outcome. First, analyses were conducted looking at the beer pong scenario. Results indicate that automatically-activated attitudes ( $M = 2.05$ ,  $SD = 14.6$ ) predict responses to the beer pong variable ( $M = 6.3$ ,  $SD = 2.3$ ),  $b = .185$ ,  $t(139) = .198$ ,  $p < .05$ ,  $R^2 = .034$ , meaning that as automatically-activated attitudes toward alcohol become more positive, people are more willing to engage in risky behaviors (e.g., participate in the game until intoxicated).

Automatically-activated attitudes toward alcohol also predicted participants' behavioral willingness for the driving under the influence scenario ( $M = 4.1$ ,  $SD = 2.1$ ),  $b = .269$ ,  $t(139) = 3.274$ ,  $p < .001$ ,  $R^2 = .073$ , meaning that as automatically-activated attitudes toward alcohol became more positive, people were less open to the low-risk scenarios (e.g., staying overnight and leaving in the morning) and more open to the high-risk scenarios (e.g., participating in the game until intoxicated).

We also looked at deliberative attitudes ( $M = 6.8$ ,  $SD = 2.6$ ) as predictors of behavioral willingness in each scenario for purposes of comparison. Like automatically-activated attitudes, deliberative attitudes also predicted responses to the beer pong behavioral willingness variable,  $b = -.532$ ,  $t(142) = -3.274$ ,  $p < .001$ ,  $R^2 = .283$ , and the driving under the influence variable ( $b = .185$ ,  $t(142) = 2.248$ ,  $p < .05$ ,  $R^2 = .03$ ). However, it is noteworthy that, consistent with prior research, what is presumably the less socially-acceptable activity among college students (driving under the influence) is better predicted by the implicit attitude measure. (The two drinking games are popular on the campus where research was conducted.)



Using the same procedures described for testing indirect effects above (for hypothesis 3), in order to test hypothesis 5, we tested indirect effects of alcohol advertisement exposure on our behavioral willingness outcome measures via automatically-activated attitudes. The indirect effects were significant as predicted for the driving under the influence variable (see Table 2).

### Investigation of Mechanism

In order to test hypothesis 6, which proposes that enjoyment of the alcohol advertisements moderates the relationship between message exposure and automatically-activated evaluations of alcohol, a general linear model was constructed with condition as a between subject factor, message evaluation as a continuous independent variable, and automatically-activated evaluations of alcohol as the dependent variable. Results of the test approach, but do not reach significance [ $F(2,133)=1.80, p=.09$ ]. However, follow up regression analyses suggest that among those in the alcohol condition, those who reported greater enjoyment of the messages also reported more positive automatically-activated evaluations of alcohol,  $b=3.52, t(139)=3.21, p<.01$ . No such relationship emerged among those in the control,  $b=1.7, t(139)=1.2, p>.05$ , or PSA condition,  $b=.59, t(139)=0.5, p>.05$ .

### Discussion

These findings support the proposition that effects of alcohol advertisements may operate by activating positive attitudes toward alcohol in ways that might best be described as pre-verbal and pre-conscious. Exposure to the alcohol advertisements resulted in more positive evaluations of supraliminally presented alcohol primes, but not non-alcohol primes (water, gray square), relative to control advertisements. Moreover, alcohol advertisement exposure did not produce a significant impact on deliberative attitudes. In other words, attempts to ascertain attitudinal effects of the advertisements relative to control using an explicit measure was unsuccessful; however, use of the implicit measure of automatically-activated attitudes was successful.

The alcohol PSAs showed no evidence of effect, either explicit or implicit. Reasons for this can only be speculative. Previous research has suggested that while alcohol advertisements have been shown to exert influence, PSAs have failed to effectively resonate with young adult audiences (see Andsager, Austin, & Pinkleton, 2001; Dejong & Atkin, 1992). Thus, there is evidence that alcohol advertisements may be better constructed than alcohol PSAs. We also propose that the PSAs under investigation simply do not successfully tap evaluative conditioning processes and mechanisms. Perhaps their effects are better ascertained using traditional measures of conscious deliberation, such as cognitive response measures. More deliberative processes can be consistent with greater durability of attitude effects (Petty & Cacioppo, 1986). However, such cognitively engaged deliberative processes are also potentially more subject to biased processing and counterarguing. Moreover, such paths to attitude change require cognitive involvement with the topic (Petty & Cacioppo, 1986), and such involvement may be difficult to elicit by an advertisement, which is inherently an interruption in the message that is of primary interest to the viewer or reader. We do note the findings of Czyzewska and Ginsburg (2007), which suggest some impact of PSAs on automatically-activated attitudes toward marijuana and tobacco. Perhaps as noted, alcohol is a particularly difficult topic on which to elicit negative attitudes of any kind among college students.

In addition, we provide evidence that these automatically-activated attitudes may influence spontaneous decisions that are themselves subject to modest deliberation, consistent with prior research on the effects of automatically-activated attitudes (see Olson & Fazio, in press). Our findings are most compelling with respect to drinking and driving, the riskiest of



the behaviors examined. Consistent with research suggesting that automatically-activated attitudes are better predictors of outcomes subject to social desirability and self-censorship, automatically-activated attitudes outperformed deliberative attitudes in predicting drunk driving willingness, but not willingness to participate in drinking games, which are presumably viewed as more acceptable in a college campus culture. We also found evidence for indirect influence of the alcohol advertisements on willingness to take motor-vehicle related risks via automatically-activated alcohol attitudes.

We acknowledge that use of the behavioral willingness measures simulates, and does not directly measure impact on such behaviors. We also note that these measures occur immediately after message exposure, while actual behaviors typically occur with longer lags between exposure and behavior. Therefore, in most cases (e.g., other than when advertisements are in a drinking environment, such as at sports bars), effects on behavior would also presume more extended conditioning effects of advertisement exposure on strengthening the positivity-alcohol linkage in memory. Such mechanisms are certainly theoretically plausible, but untested here. While these findings, therefore, are only suggestive with respect to behavioral impacts, they do provide a plausible account of advertising impact on risk behavior that is worthy of research attention.

We made an effort to probe how advertisements might influence automatically-activated attitudes. Specifically, we found that evaluations of alcohol (but not control) advertisements predict automatically-activated attitudes toward alcohol. This is consistent with an evaluative conditioning argument. In other words, positivity in response to the alcohol advertisements may condition positive responses to alcohol as a product, in ways that may not be fully available to conscious deliberation. We recognize that this evidence is quite preliminary and based on associational statistical test; however, it appears a promising direction for further theoretical development.

As in most research on advertising, a limitation is use of a convenient set of advertising stimuli in each condition. We used a selection of advertisements and PSAs currently available at time of writing on the Internet, which appear reasonably typical of alcohol advertisements and PSAs in the communication environment. A more definitive replication of these results ideally involve a systematic random-sampling effort of advertising messages and rotating sets of advertisements used as stimuli to minimize risk of execution-specific effects (see Slater, Goodall, and Hayes, 2009). In such a situation we could feel more confident that content differences between the alcohol advertisements and PSAs reflect ecologically valid differences in these two genres.

Another limitation is the population studied. The college students in the sample are unlike the general U.S. adult population, as 35% reported drinking several times a week, and over 40% reported drinking 5 or more drinks on the days they drink. Such individuals may perceive their behavior as normal and acceptable, potentially lowering motivation to conceal drinking habits. It seems possible that even stronger effects on the implicit measure would emerge among a general sample of adults, in which heavy drinking may be viewed as more unacceptable and irresponsible. It is also necessary to study automatic message processing among children, as researchers have demonstrated that alcohol advertising can influence development of alcohol-related beliefs and attitudes at young ages (see Martin, Snyder, Hamilton, Fleming-Milici, Slater, Stacy, et al., 2002). Questions remain regarding the age at which alcohol attitudes become well learned enough for automatic processes, such as those articulated in this investigation, to emerge.

Although a limitation, the use of a college student sample is entirely appropriate for this investigation. The reported findings are not intended to be generalizable to the U.S.

population; rather, they are intended to provide preliminary evidence of a process through which alcohol advertising messages may influence audiences. The emphasis on *process* inference, rather than *population* inference, makes the use of a college student sample an acceptable starting place for this research (see Basil, 1996; Hayes, 2005). Additionally, the high levels of alcohol consumption among members of this group, as demonstrated in the present study, make this an important group to study.

We regard these findings as a beginning in the task of understanding the non-deliberative mechanisms underlying message effects in general, and the undesirable social impact of messages such as alcohol advertisements, in particular. Important questions remain, including questions about the impact of automatic attitude activation via message exposure on decisions and behavior. Specifically, given that priming effects tend to be short-lived (Roskos-Ewoldsen, Klinger, and Roskos-Ewoldsen, 2007; Roskos-Ewoldsen, Roskos-Ewoldsen, & Carpentier, 2002), questions arise about whether effects of automatically-activated attitudes are likely to be of consequence. Roskos-Ewoldsen et al., (2007) suggest that priming effects may be more likely to emerge when the prime is recent and occurs frequently. Thus, we should expect the effects observed in the present studies to be of consequence if they occur in a situation in which drinking-relevant decisions are likely to be made, and when activation is frequent. Given the abundance of alcohol advertising in the media (see Center on Alcohol Marketing and Youth, 2004a, 2004b), and the frequency with which such messages may automatically-activate evaluations of alcohol (potentially contributing to “chronic accessibility” of such evaluations), we expect that the effects observed in this investigation are of consequence. However, future research should look at the impact of such activation on spontaneous decisions and behaviors.

Future research should also consider models such as the Message Interpretation Process (MIP) model (see Austin & Johnson, 1997; Austin, Pinkleton, & Funabiki, 2007), which takes into account both emotion-based and logic-based routes to decision-making and how these routes interrelate. This notion appears relevant to the distinction between automatically-activated and deliberative attitudes, and suggests that future research should more thoroughly investigate both types of processes and how they may be related.

In sum, we hope these results help spur further work, work that in the end may help in the development of more effective prosocial messages, more sophisticated media literacy efforts, and more insightful theories of message effects.

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## References

- Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 1991;50:179–211.
- Ames SL, Zogg JB, Stacy AW. Implicit cognition, sensation-seeking, marijuana use, and driving behavior among drug offenders. *Personality and Individual Differences* 2002;33:1055–1072.
- Andsager JW, Austin EW, Pinkleton BE. Questioning the value of realism: young adults’ processing of messages in alcohol-related public service announcements and advertising. *Journal of Communication* 2001;51:121–142.
- Arpan, L.; Rhodes, N.; Roskos-Ewoldsen, DR. Attitude accessibility: Theory, methods, and future directions. In: Roskos-Ewoldsen, DR.; Monahan, JL., editors. *Communication and social cognition: Theories and methods*. 2007. p. 351-376.

- Austin EW, Johnson KK. Immediate and delayed Effects of media literacy training on third graders' decision making for alcohol. *Health Communication* 1997a;9:323–350.
- Austin EW, Pinkleton BE, Funabiki R. The desirability paradox in the effects of media literacy training. *Communication Research* 2007;34:484–506.
- Basil MD. Standpoint: The use of student samples in communication research. *Journal of Broadcasting & Electronic Media* 1996;40:431–440.
- Center on Alcohol Marketing and Youth. Alcohol Advertising on Sports Television, 2001 to 2003. Washington, DC: Author; 2004a. (Center on Alcohol Marketing and Youth)
- Center on Alcohol Marketing and Youth. Alcohol Advertising on Television, 2001 to 2003: More of the Same. Washington, DC: Author; 2004b. (Center on Alcohol Marketing and Youth)
- Czyzewska M, Ginsburg HJ. Explicit and implicit effects of anti-marijuana and anti-tobacco TV advertisements. *Addictive Behaviors* 2007;32:114–127. [PubMed: 16675148]
- Dejong W, Atkin CK. A review of national television PSA campaigns for preventing alcohol-impaired driving, 1987–1992. *Journal of Public Health Policy* 1992;16:59–80. [PubMed: 7738159]
- Fazio RH. Multiple processes by which attitudes guide behavior: the mode model as an integrative framework. *Advances in Experimental Social Psychology* 1990;23:75–109.
- Fazio RH, Jackson JR, Dunton BC, Williams CJ. Variability in automatic activation as an unobtrusive measure of racial attitudes: a bona fide pipeline? *Journal of Personality and Social Psychology* 1995;69:1013–1027. [PubMed: 8531054]
- Fazio RH, Olson MA. Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology* 2003;54:297–327.
- Fazio, RH.; Olson, MA. Attitude structure and function. In: Hogg, MA.; Cooper, J., editors. *Sage Handbook of Social Psychology*. London: Sage; 2003a. p. 139-160.
- Fazio RH, Sanbonmatsu DM, Powell MC, Kardes FF. On the automatic activation of attitudes. *Journal of Personality and Social Psychology* 1986;50:229–238. [PubMed: 3701576]
- Finucane ML, Alhakami A, Slovic P, Johnson SM. The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making* 2000;13:1–17.
- Fishbein, M.; Ajzen, I. *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley; 1975.
- Gibbons FX, Gerrard M. Predicting young adults' health risk behavior. *Journal of Personality and Social Psychology* 1995;69:505–517. [PubMed: 7562392]
- Gibbons FX, Gerrard M, Blanton H, Russell DW. Reasoned action and social reaction: Willingness and intention as independent predictors of health risk. *Journal of Personality and Social Psychology* 1998;74:1164–1180. [PubMed: 9599437]
- Gibbons, FX.; Gerrard, M.; Lane, DJ. A social reaction model of adolescent health risk. In: Suls, JM.; Wallston, K., editors. *Social psychological foundations of health and illness*. Oxford, UK: Blackwell; 2003.
- Greenwald AG, McGhee DE, Schwartz JLK. Measuring individual differences in implicit cognition: the implicit association test. *Journal of Personality and Social Psychology* 1998;74 1464–1480.
- Grimes A, Kitchen PJ. Research mere exposure effects in advertising: Theoretical foundations and methodological implications. *International Journal of Market Research* 2007;49:191–219.
- Hayes, AF. *Statistical methods for communication science*. Mahwah, NJ: Lawrence Erlbaum Associates; 2005.
- Hayes, AF. SPSS and SAS macros. Retrieved September 29, 2007 from <http://www.comm.ohio-state.edu/ahayes/macros.htm>
- Jarvis, BG. MediaLab (Version 2006.2.25) [Computer Software]. New York, NY: Empirisoft Corporation; 2006a.
- Jarvis, BG. DirectRT (Version 2006.2.25) [Computer Software]. New York, NY: Empirisoft Corporation; 2006b.
- Jordan, CH.; Logel, C.; Spencer, SJ.; Zanna, MP.; Whitfield, ML. The heterogeneity of self-esteem: Exploring the interplay between implicit and explicit self-esteem. In: Petty, RE.; Fazio, RH.; Brinol, P., editors. *Attitudes: Insights from the new implicit measures*. Mahwah, NJ: Erlbaum; (in press)

- Madden PA, Grube JW. The frequency and nature of alcohol and tobacco advertising in televised sports, 1990–1992. *American Journal of Public Health* 1994;84:297–299. [PubMed: 8296959]
- Martin SE, Snyder LB, Hamilton M, Fleming-Milici F, Slater MD, Stacy A. Alcohol advertising and youth. *Alcoholism: Clinical and Experimental Research* 2002;26:900–906.
- Olson MA, Fazio RH. Implicit attitude formation through classical conditioning. *Psychological Science* 2001;12:413–417. [PubMed: 11554676]
- Olson MA, Fazio RH. Implicit acquisition and manifestation of classically conditioned attitudes. *Social Cognition* 2002;20:89–103.
- Olson, MA.; Fazio, RH. Implicit and explicit measures of attitudes: The perspective of the MODE model. In: Petty, RE.; Fazio, RH.; Briñol, P., editors. *Attitudes: Insights from the new implicit measures*. Mahwah, NJ: Erlbaum; (in press)
- O'Malley, Johnston. Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol* 2002 Suppl. 14:23–39.
- Payne KB, Cheng CM, Govorun O, Stewart BD. An inkblot for attitudes: Affect misattribution as implicit measurement. *Journal of Personality and Social Psychology* 2005;89:277–293. [PubMed: 16248714]
- Payne KB, Govorun O, Arbuckle NL. Automatic attitudes and alcohol: Does implicit liking predict drinking? *Cognition and Emotion* 2008;22:238–271.
- Petty, RE.; Cacioppo, JT. Motivational factors in consumer response to advertisements. In: Geen, R.; Beatty, W.; Arkin, R., editors. *Human motivation: Physiological, behavioral, and social approaches*. Boston: Allyn & Bacon; 1984. p. 418–454.
- Petty, RE.; Cacioppo, JT. Berkowitz, L. *Advances in experimental social psychology*. Vol. 19. New York: Academic Press; 1986. The Elaboration Likelihood Model of persuasion; p. 123–205.
- Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers* 2004;36:717–731.
- Roskos-Ewoldsen, DR.; Arpan-Ralstin, L.; St. Pierre, J. Attitude accessibility and persuasion: The quick and the strong. In: Dilliar, JP.; Pfau, M., editors. *The persuasion handbook: Developments in theory and practice*. 2002. p. 39–61.
- Roskos-Ewoldsen, DR.; Klinger, MR.; Roskos-Ewoldsen, B. Media priming: A meta-analysis. In: Preiss, RW.; Gayle, BM.; Burrell, N.; Allen, M.; Bryant, J., editors. *Mass media effects research: Advances through meta-analysis*. New York: Routledge; 2007. p. 53–80.
- Roskos-Ewoldsen, DR.; Roskos-Ewoldsen, B.; Dillman Carpentier, FR. Media priming: A synthesis. In: Bryant, J.; Zillman, D., editors. *Media effects: Advances in theory and research*. Mahwah, NJ: Lawrence Erlbaum Associates; 2002. p. 97–120.
- Rydell RJ, McConnell AR. Understanding implicit and explicit attitude change: A systems of reasoning analysis. *Journal of Personality and Social Psychology* 2006;91:995–1008. [PubMed: 17144760]
- Slater MD, Goodall CE, Hayes AF. Self-reported news attention does assess differential processing of media content: An experiment on risk perceptions utilizing a random sample of U.S. local crime and accident news. *Journal of Communication* 2009;59:117–134.
- Slater MD, Lawrence F, Comello EG. Media influence on alcohol control policy support in the U.S. adult population: The intervening role of issue concern and risk judgments. (under review).
- Slater MD, Rouner D, Long MA. Television dramas and support for controversial public policies: Effects and mechanisms. *Journal of Communication* 2006;56:235–252.
- Stacy AW. Memory activation and expectancy as prospective predictors of alcohol and marijuana use. *Journal of Abnormal Psychology* 1997;106:61–73. [PubMed: 9103718]
- Stacy AW, Newcomb MD, Ames SK. Implicit cognition and HIV risk behavior. *Journal of Behavioral Medicine* 2000;23:475–499. [PubMed: 11039159]
- Wiers RW, VanWorden N, Smulders FTY, DeJong PJ. Implicit and explicit alcohol-related cognitions in heavy and light drinkers. *Journal of Abnormal Psychology* 2002;111:648–658. [PubMed: 12428778]

**Table 1**

Automatically-Activated Evaluations: Mean Positive Responses by Condition for the Alcohol Advertisements, PSAs, and Control Advertisements, for the Alcohol, Water, and Gray Square Supraliminal Primes.

	Prime	Mean	Standard Error
Alcohol Ad	Alcohol	5.522	2.133
	Water	9.217	1.881
	Gray Square	-4.304	2.234
Alcohol PSA	Alcohol	.087	2.133
	Water	11.435	1.881
	Gray Square	2.609	2.234
Control	Alcohol	.553	2.110
	Water	8.213	1.860
	Gray Square	-2.766	2.210

Note: The interaction between experimental condition and prime was statistically significant, as was the contrast between positive responses to the alcohol prime in the alcohol advertising condition versus control, see text.

**Table 2**

Indirect Effects of Alcohol Advertising Exposure on Behavioral Willingness Outcomes via Automatically-activated Evaluations.

<b>Outcome: Willingness to...</b>		
	<b>Drive under influence</b>	<b>Play beer pong (high risk)</b>
Outcome regressed on alcohol ad exposure.	.077 (.375)	1.24* (.488)
Evaluation regressed on alcohol ad exposure.	5.199* (2.598)	5.199* (2.598)
Outcome regressed on evaluation (exp. controlled)	.039** (.012)	.029 (.016)
Outcome regressed on ad exp. (evaluation controlled).	-.126 (.368)	1.089* (.490)
Indirect effect mean.	.204* (.127)	.155 (.122)

*Descriptive Statistics for Study 2.*

	<b>Condition</b>	<b>M</b>	<b>SD</b>
Positive Expectancy Accessibility	Alcohol Ad	.007	.07
	Alcohol PSA	.006	.06
	Control	.008	.07
Negative Expectancy Accessibility	Alcohol Ad	-.04	.06
	Alcohol PSA	-.02	.07
	Control	-.02	.07
Accessibility (Positive Control Items)	Alcohol Ad	.14	.03
	Alcohol PSA	.14	.02
	Control	.14	.03
Accessibility (Negative Control Items)	Alcohol Ad	-.13	.03
	Alcohol PSA	-.13	.03
	Control	-.12	.05

Note: 5000 bootstrap re-samples to obtain unbiased probability distributions (see Preacher & Hayes, 2004). N = 139. The SPSS macro produces un-standardized regression coefficients; standardized betas for the relationship between automatically-activated evaluations and behavioral willingness measures are reported in text. Standard errors appear in parentheses.

\*  
p < .05,

\*\*  
p < .01.